TECHNOLOGIES OF INTELLIGENCE AND THEIR RELATION TO NATIONAL SECURITY POLICY: A CASE STUDY OF THE U.S. AND THE V-2 ROCKET

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ABSTRACT

While government intelligence—knowledge to support policy decision making—is often characterized as an art or science, this dissertation suggests it is more akin to what Science and Technology Studies call a "technological system" or a" sociotechnical ensemble". Such a policy support tool is a mechanism socially constructed for the production of policy-relevant knowledge through integration of social and material components. It involves organizational and procedural innovations as much as it does specialized hardware for obtaining, manipulating, and distributing information.

The development and function of American intelligence is illustrated here through a case study of how the United States and its European allies learned about Germany's World War II secret weapons, especially the long-range liquid fueled rocket known to their military as the A4, but better known to the public as the V-2. The colonial British heritage and the unique American experiences of participating in wars taking place in domestic and foreign territories set the cultural stage for both the strengths and weaknesses with which American intelligence approached the rapidly evolving German secret weapon capabilities of World War II.

The unfolding events that American and British intelligence dealt with in building their knowledge evolved through three stages: early speculation about the existence and nature of the secret weapon threat derived from frequently misleading or misunderstood espionage reports, followed by improvements in knowledge from direct access to information sources provided by enabling technologies, and, finally, systematic reflection on the aggregate of earlier knowledge and new data. This allowed government decision makers to build plans and resources with which to counter the new threats and to prepare for post-war management of similar political and technical issues. However, it also illustrated the difficulties that large and complex systems create for stabilization of institutional innovations.

Table of Contents

List of Figures

Government Classification Review

CHAPTER 1

INTRODUCTION AND DEFINITIONS

There is a discussion that occurs occasionally among intelligence practitioners about the nature of their enterprise. Is intelligence, in discharging its role as a producer of specialized knowledge to support policy making and operations, a science or an art? Is it an effort built on wholly rational methods and managed through an efficiently operating organization? Or is it an effort depending on the unique experience and intuition of a corps of exceptionally talented experts? One theme underlying this dissertation is that intelligence production is neither exclusively an art nor a science but combines elements of both. In this, it follows Science and Technology Studies models in breaking down existing perceptual barriers between society and its tools.

Intelligence is better understood as a technology, a tool constructed by people for the production of policy-relevant knowledge. This tool integrates social and material components and involves organizations and procedures as much as it does specialized hardware for obtaining, manipulating, and distributing information. Its history exhibits successes and failures as well as the evolution of processes and machines for collecting, analyzing, and distributing knowledge.

As a tool for supporting policy making and implementation, intelligence gives the most weight to factors of human organization and relationship. But it also makes

great use of enabling mechanical technologies to improve access to knowledge which competitors would like to hold secret. As such, this model of intelligence strongly reflects three themes developed within the field of Science and Technology Studies (STS):

- Both people and things are important as components of actor-networks,

- these actor-networks comprise complex technological systems, and independent systems may be acting in parallel, sometimes cooperatively and sometimes in competition, and

- these networks are systems constructed socially and the processes of interaction between people and machines may be usefully described through analysis of their historical context.

The Science and Technology Studies-based analysis in this dissertation allows a new perspective to be employed in understanding how human and material actors interacted during the World War II search for information on a German secret weapon development. The existing literature on intelligence frequently emphasizes specific historical activities of individual organizational components—largely the separate military services or the specialists responsible for particular types of information collection or analysis. More recent writing follows political science, business management, or journalistic models. This STS, approach, however, provides a broader view that looks at social groups involved in American and Allied intelligence, what their frames of reference were, how they differed, how their different views came together in the production of policy-relevant knowledge about a hostile weapon system, and how the

wartime stabilized definition of coordinated intelligence began to unravel as the military threat was seen to lessen with the impending victory in Europe.

Seen as a technology, intelligence most clearly demonstrates characteristics of what Wiebe Bijker calls sociotechnical ensembles and what Thomas P. Hughes describes as large technological systems.[1] Both of these approaches combine sociological and historical analysis, although Bijker seems to focus more on a sociological and Hughes a historical tradition of scholarship.

As this story unfolds, the social and material artifacts of intelligence demonstrate Bijker's concepts of technological frame and degree of inclusion within an example that closely follows his "third configuration" of dominant technological frames in which "…two or more entrenched groups with divergent technological frames will carry little weight with each other. Under such circumstances, criteria external to the frames in question may become important as appeals are made to third parties." [2] A number of Bijker's theoretical components will be seen in the interactions within American intelligence and between the Americans, the British, and the Russian decision making and intelligence organizations. In addition to relevant social groups, interpretative flexibility, closure, and stabilization take on major importance. The components Bijker identifies as elements of a technological frame play major roles, especially as key problems, problem-solving strategies, requirements, current theories, user's practice and

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[1] See Wiebe E. Bijker. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of sociotechnical Change*. Cambridge, Massachusetts and London England: The MIT Press, 1995 , pages 269-290, and Thomas P. Hughes, "The Evolution of Large Technological Systems" in Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, editors, *The Social Construction of Technoligical Systems: New Directions in the Sociology and History of Technology*, Cambridge, Massachusetts and London, England: The MIT Press, 1987, Pp. 51-82, for expanded discussion of these two related approaches.
[2] Bijker: 1995. Pp. 276-277.

exemplary artifacts, degrees of inclusion of the various actors, and the networks they create.

Hughes provides a similar picture, although his emphasis is less focused on the social than is Bijker. However, Hughes sees technological systems as "…messy, complex, complex, problem-solving…" creations that …"are both socially constructed and society shaping."[3] He sees major characteristics of technological systems as having patterns of evolution involving a number of often-overlapping stages such as invention, development, innovation, transfer, technological style, growth, competition, and consolidation, and technological momentum. Once again, this look at American intelligence will reveal many of these same elements.

Bijker goes further and melds social construction of technology, or SCOT, with an actor-network model for examining technological change that provides an analytic model to address each of these .[4] In presenting his SCOT model, Bijker assumes four requirements that he believes essential for analysis:

- SCOT analysis must dynamically account for both continuity and change.

- SCOT analysis must "symmetrically" account for judgments of both "working" success and "nonworking" failure as extrinsic results of the performance of technological artifacts in a specific social context rather than as an inherent capacities of the artifacts, themselves.

- SCOT analysis must describe actors' strategies and contributions in the context of the social structures within which they operate.

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[3] Hughes: 1987. P. 51.
[4] Bijker: 1995. See especially his section of the introduction "Requirements for a Theory of Sociotechnical Change,: Pp. 13-16.

- SCOT analysis must be based on description of actors' exhibited patterns of activity rather than with a priori assumptions about their activity.

However, he specifies that these requirements must be met within a descriptive case study that balances internal detail with an ability to step "outside the box" to include comparisons with other cases.

Following Bijker's model, the bulk of this study examines how government decision makers used the social and material technologies of intelligence in crafting national security policy during World War II. It approaches this question by reviewing how World War II decision makers faced a particular problem: how to discover, develop knowledge of, and respond to German secret weapons development.

A number of significant actors appear as members of "relevant social groups" that exhibit different political frames of reference and degrees of inclusion within the subordinate intelligence frames of reference. For example, as the heads of their respective national decision making structures, both British Prime Minister Winston Churchill and American President Franklin D. Roosevelt were concerned with information regarding threats to the diplomatic, military, and civil structures of their citizenry. However, their systems of government and personal leadership preferences led them to approach their common problems in different ways and with different organizational structures.

While President Roosevelt was both chief of state and leader of his nation, Churchill the Prime Minister was the chief executive but answered to his monarch's direction on central issues of the nation. On one hand, Churchill served simultaneously as Prime Minister and Minister of War and therefore chaired meetings of both the War

Cabinet and his military chief's Defence Committee. Roosevelt, on the other hand, placed intermediaries between himself and his military chiefs: the Secretaries of War and Navy, and Admiral William Leahy—who served in two roles as the President's Chief of Staff and, from 1943 on, as the head of the new Joint Chiefs of Staff organization.

This structural difference led the Americans and the British to adopt different approaches to issues such as the potential threat of German rocket weapons. While Churchill was directly involved in military concerns such as the capabilities of the flying bomb and the long-range rocket, he was equally concerned with the threat they might pose to his civilian population and the civil defense measures required to give them protection. In America, however, Roosevelt appeared to consider the specifics of these new weapons as a uniquely military problem to be addressed in detail by his military and naval staffs and the Chairman of his Office of Scientific Research and Development, constituted as the Joint Chiefs of Staff's Joint New Weapons Committee.

Thus, while Churchill was at the center of decision making about the German secret weapon threat, Roosevelt could have had access to information if he requested it, but held himself separate from the day-to-day issues surrounding gathering information on these weapons and developing countermeasures to them. Nevertheless, the development of policy-relevant knowledge for either leader began with the variety of information provided by the range of sources available in any intelligence investigation—isolated pieces of evidence assembled into a description of the threat or opportunity presented by a competitor's action.

In order to come to meaningful conclusions about the specific problem of defining the German secret weapon threat, other groups of specialists with their own technological frames were required to answer technical questions such as what propulsion systems and fuel were being used by the Germans in their secret weapon. What type of airframe did the weapon have and how heavy was it? What type of guidance and control was being used and how accurate was it? Only when such questions were satisfactorily answered, could technical specialists give their political and military decision makers a useful model of what size and type of payload could a vehicle deliver, over what Range, with what accuracy and destructive capacity? How many were being built? Where were they being fired from? When would the Germans start to use them? What means could be employed to counter them?

In the case of the German rocket weapon, the British were the first to hear a suggestion of activity through a document from an anonymous source, the Oslo Memorandum. While not making reference to the Long-range rocket, this unsolicited piece of information revealed that some form of weapon development program was underway at Peenemünde on the Baltic Coast. This was followed some time later by puzzling photographs of the Peenemünde area, and then by a host of unconfirmed and often contradictory reports from agents and volunteers that led to considerable speculation on the nature, indeed even the existence, of the secret weapon program.

It was not until close-up photos and pieces of debris began making their way to England from neutral and German-occupied countries that this speculation began to be bounded by hard evidence. Finally, with the war moving into European territory in mid-1944, the British and Americans were able to capture both operational equipment and

7

people who had been involved in the design, development, and employment of the rocket. Only then was clear resolution possible of long-speculated upon mysteries of construction, performance, and employment of the liquid-fueled rocket that enabled reflection on the significance of the individual bits of data earlier available.

This study is the story of how this information was collected and analyzed and how American and British leaders reacted to that knowledge.

Description of the Research Problem

How does an outside observer build knowledge about a technology that its developer wants to keep secret? In the context of national security, what knowledge acquisition, analysis, and diffusion technologies should a government employ in the creation of effective public policy? How does the complexity of the social context condition the interactions between members of relevant social groups with differing technological frames?   The answers to such questions are an important part of the technological frame of the various relevant social groups involved in managing and using sensitive information about foreign threats.

The diffusion of innovations as a form of technology transfer is commonly seen as a cooperative process between willing partners. But this is not the case in situations such as information acquisition during periods of international political tension or war. A historical case study of how United States Government organizations developed their knowledge technologies for learning about the German development of the V-2 liquid-fueled rocket during World War II and how American decision makers used that

knowledge to respond to the threat that it posed helps define what processes are involved and what sorts of information gathering and analytic problems arise in creating, distributing, and applying technical knowledge produced from incomplete and distorted information.

The specific case study assesses historical, social, and political policy activities that conditioned effectiveness of the U.S.'s and its Allies' acquisition of German missile knowledge through their intelligence organizations. There are two sets of technology involved in this study. The more obvious technology is the "target" of the American/Allied knowledge acquisition and diffusion effort: the V-2 rocket. The rocket serves primarily as an exemplar of factors conditioning the success or failure of American intelligence technology. The second technology is the intelligence apparatus itself. I argue that intelligence gathering, analysis, and distribution is a technological complex including organizations, knowledge, and practices—including social practices as a key component. Applying the STS framework of technological system to intelligence activities helps identify the strengths and weaknesses of the American approach and helps explain their success or failure at translating information into usable knowledge and ultimately policy action.

The dissertation describes how the U.S organized itself to create knowledge of Germany's technological systems and how it applied that technological knowledge during the last years of World War II. It also touches on how the U.S., in comparison with its wartime allies, adapted the captured target technology to its own purposes. The ultimate goal of this project is to explore patterned social factors enabling or hindering compilation of restricted technical information, the conversion of that information into

technological knowledge ("scientific and technical intelligence"), and the application of

that knowledge to effective national government-level policy development, decision

making, and operations.

Some Definitions

Technology: This dissertation emphasizes a definition of technology that includes both

its physical and social components. It accepts Thomas P. Hughes' "overarching themes"

of technology: creativity and a human-built world.[5] It also suggests that technologies are

defined by a variety of social processes ranging from conceptualization, through creation

and innovation, to adaptation for practical use. This parallels Everett Rogers' definition

of the hardware and software aspects of "…a design for instrumental action that reduces

the uncertainty in the cause-effect relationships involved in achieving a desired

outcome."[6] Such factors as counterculture critique of a particular technology's ethical or

aesthetic merits condition acceptance of a technology or complex. But, the ultimate

judgment of the effectiveness of a technology is dominantly a function of the perception

of its utility in meeting policy makers' perceived and anticipated needs.

In this paper I suggest that some technologies are dominated by intellectual

utility, while others, perhaps traditionally the majority, are more defined by their material

utility. The definition of a given technology's utility is reflected in both its knowledge

and its physical artifacts. Figure 1 helps to illustrate this balance:

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[5] Hughes, Thomas P. *Human-Built World: How to think about Technology and Culture*. Chicago and London: The University of Chicago Press, 2004. See especially pages 1-17 for a summary of Hughes' definition.

[6] Rogers, Everett M. *Diffusion of Innovations*, Fifth Edition. New York, London, Toronto, Sydney, and Singapore: Free Press, 1962, 1971, 1983, 1995, 2003.   P. 13.

FIGURE 1
COMPONENTS OF A TECHNOLOGY

KNOWLEDGE ARTIFACTS

PHYSICAL ARTIFACTS

**INTELLECTUAL
TECHNOLOGY** ⟵————————————⟶ **MATERIAL
TECHNOLOGY**
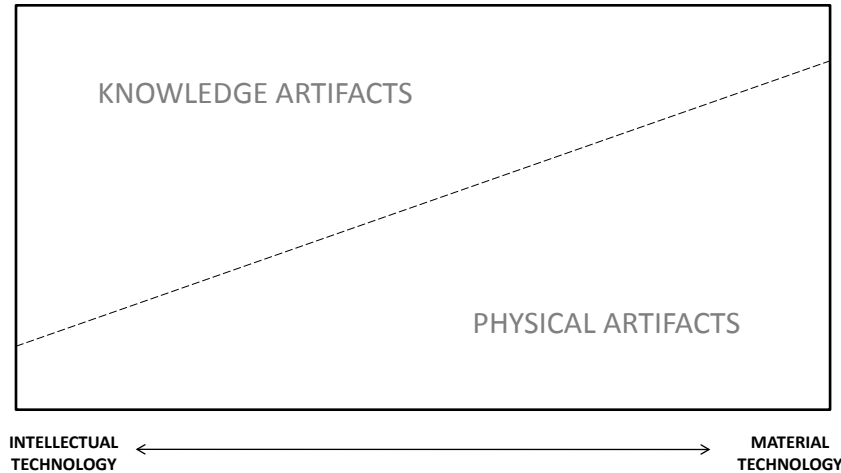
Any technology is a combination of both physical and knowledge artifacts. Many technologies are chiefly defined by their physical artifacts such as power generation and transmission facilities, public transportation devices, industrial machinery, or atomic weapons. Without the physical artifacts such as power generators and distribution cables, rail or road networks, trains and streetcars, or factories, these technologies lose the underpinning of their social meaning. Therefore, these are primarily material technologies.

However, other technologies, better defined by their knowledge artifacts, can be called intellectual technologies. A university for example, has buildings, laboratories, information systems, and libraries that serve as material enablers for an overarching intellectual purpose, the creation, innovation, and diffusion of knowledge. Material technologies support a university's intellectual processes by housing students, providing

places to work and means of communication, and gathering and protecting research materials. But the material technologies are secondary to the university's primary purpose of knowledge work. And in such an example, the networks of concepts, social relationships, organizational structures, and practices serve, in part, to give meaning and practical utility to the material artifacts.

Other examples of such intellectual technologies might include business information services, political parties, or the public media. Governmental intelligence organizations, developed for the specific purpose of creating useful knowledge for definition and execution of policy, are another subset of intellectual technologies.

The utility of these technologies for knowledge production is enabled by complexes of physical and knowledge artifacts that promote collection of information by various means, aggregation and evaluation of that information, and dissemination of the resulting knowledge to various sets of policy makers, planners, and operational users. However, the primary determinant of the effectiveness of intelligence organizations is creation of useful knowledge rather than the efficient acquisition and management of their material-based subsystems.

Strategic Intelligence: In this context, I use the term intelligence in the sense that Yale historian Sherman Kent describes in his 1949 book *Strategic Intelligence for American World Policy*: "…knowledge our state must possess regarding other states in order to assure itself that its cause will not suffer nor its undertakings fail because its statesmen and soldiers plan and act in ignorance…the knowledge upon which we base our high-

level national policy toward the other states of the world."[7]   Another way of stating this definition of intelligence is that it is a technology for developing policy- and operationally-relevant knowledge through systematic observation, assessment, and diffusion of political, economic, military, social, and scientific-technical artifacts.

The term strategic intelligence is also commonly used to describe a type of bureaucratic institution and a set of activities, some of which might be more accurately and broadly called secret or covert operations. However, the focus of this dissertation is on intelligence as a technology for producing knowledge through gathering, analysis, and diffusion of policy- or operations-relevant information. Other secret governmental activities—diplomatic, military, counterintelligence, or covert operations—that discover relevant information incidental to their broader security and operational purposes are discussed here only when it contributes to knowledge needed in policy development and implementation

Scientific And Technical Intelligence: What is today called scientific and technical (S&T) intelligence is, in turn, a subset of strategic intelligence. The *DOD Dictionary of Military and Associated Terms* currently (as of fall 2008) defines S&T intelligence as:

> The product resulting from the collection, evaluation, analysis, and interpretation of foreign scientific and technical information that covers: a. foreign developments in basic and applied research and in applied engineering techniques; and b. scientific and technical characteristics, capabilities, and limitations of all foreign military systems, weapons, weapon systems, and materiel; the research and development related thereto; and the production methods employed for their manufacture. [8]

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[7] Kent, Sherman. *Strategic Intelligence for American World Policy*. Hamden Connecticut: Archon Books, 1949 (by Princeton University Press) reprinted in 1965 with a new introduction, P. 3. Kent's original 1949 publisher, Princeton University Press, also published a paperback edition in 1966.
[8] Joint Publication 1-02, *DOD Dictionary of Military and Associated Terms*. As amended through 17 October 2008. This definition was taken from the online edition on May 9, 2009 from http://www.dtic.mil/doctrine/jel/doddict/data/s/04769.html

This definition of S&T intelligence has a relatively recent origin. It does not appear as a separate topic in Walter Sweeney's 1924 post-World War I discussion of military intelligence—he mentions science only as a factor that was beginning to blur the distinction between economic and military resources in the larger economic problem of war.[9] Neither does it appear as a separate intelligence topic in George S. Pettee's 1946 post-World War II discussion of strategic intelligence, although Pettee acknowledges that: "(t)echnology entered our strategic intelligence during the war in proportion as it entered into the waging of war by our enemies."[10] By 1949, however, S&T intelligence is included as a separate component in Kent's discussion of the current reportorial element of strategic intelligence: "developments that might be of significance for foreign policy considerations in mathematics, physics, chemistry, zoology, geography, oceanography, climatology and astronomy," and it also includes developments in the social sciences.[11] This dissertation's study of American intelligence success and failure in developing and diffusing knowledge of both the German development of the A4/V-2 missile and its later adoption as a weapon by the Soviet Union is an analysis of the intellectual and material technologies reflected in a historical example of scientific and technical intelligence.

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[9] Sweeney, Walter C. *Military Intelligence: A New Weapon in War.* New York: Frederick A. Stokes Company, 1924, Pp. 69-70.

[10] Pettee, George S. *The Future of American Secret Intelligence*. Washington: Infantry Journal Press, 1946, P. 30.

[11] Kent, 1949, 1965. P. 37.

The German V-2 Example as a Basis for the Case Study

The German development of the V-2 rocket and the response of the western allies before and during World War II provide the case history that I use here to explore various aspects, processes, and targets involved in a national-scale, non-cooperative technology transfer.

For a number of reasons, the German army decided that it would be useful to design and build a weapon system that would take the place of heavy artillery prohibited to it under the Treaty of Versailles. As a new technology not covered by the treaty, the liquid-fueled rocket provided a significant innovation in Germany's means of waging war. It had the potential to deliver larger quantities of explosive than an artillery shell over much greater distances. It also was anticipated by the Germans as having a great psychological impact on an unsuspecting enemy populace. However, in bringing the concept of a long-range rocket into the physical form of the V-2, the army had to contend with a number of competing elites within German society. Each vied with the others to establish construction priorities, provide resources, and direct the operational use of the weapon.

The American Government, advised initially by its British ally in creating an integrated intelligence technology, only learned of the existence of this weapon through a relatively slow aggregation of knowledge. Their knowledge was always incomplete, but was put together like the pieces of a puzzle. And initially there was not consensus about what the puzzle pieces looked like or how they fit together. Scientific advisors who did not believe a weapon-scale liquid propellant rocket to be feasible challenged reports from spies and aircraft photography. Sometimes they were right and sometimes they were

wrong. However, the aggregation of partial knowledge of the rocket's characteristics allowed the allies to identify the possible technology, estimate the potential threat it posed, and design new procedures with which to combat the weapon.

The V-2 did not live up to German expectations as either a physical or psychological weapon. However, the Allies' knowledge gained during the war allowed them to understand the system sufficiently well to enable them to exploit captured examples of the hardware and employ many of the German scientists, engineers, and technicians once the war was over. Therefore, the final result of the German technology development program did not benefit its originators so much as it provided an underpinning for the postwar missile and space programs of its wartime adversaries.

Significance of This Study

While many technology development situations appear cooperative, where the originator and recipient of the technology share a desire for the transfer to take place, other situations—such as war, economic embargos and boycotts, or commercial competition—exist in which there is no agreement on the desirability of the technological transfer between the innovator and the receiver of the information. This dissertation provides a Social Construction of Technology (SCOT)-based analysis and assessment of how development of a national intelligence structure may involve such an uncooperative technology transfer and what pitfalls exist that condition its relative effectiveness—in other words what factors define a working or a nonworking intelligence technology.

In academic or commercial situations the originator of a technology frequently wants to provide it to other parties, and the recipient of a technology cooperates in its transfer. On the other hand, transfer of knowledge of intelligence technology may be an act that the originator of the technology wants to restrict. This may be the result of a desire to control technology for political advantage, but perhaps the ultimate example of such technology transfer is during war, when the result may be fiscal expense, loss of a political or military power advantage the intelligence technology provides, or even a matter of national survival.

This dissertation approaches technology transfer in an occasionally uncooperative form that receives relatively little coverage in the existing literature: how does transfer of an intellectual technology occur in a hostile and competitive environment, as opposed to the more common situation in which there is both a willing provider and an amenable receiver? Existing writing on intelligence is largely directed toward a primarily civilian audience most interested in adventure stories, historians who focus on specific activities or events, or analytical commentary written from the perspective of political science or business management.

The STS approach contributes original insight into determining the interplay between the social groups and historical factors in development of the national intelligence system of knowledge creation technology by the Allies' learning of German innovations in secret weapon development. The actions of both America and its British and Russian allies were conditioned by the cultures and personalities within which they evolved, providing examples of how the spread of knowledge that is sometimes neither voluntary nor cooperative will, in the aggregate, still be affected by the cultural

environments in which it takes place. The emphasis on the social relationships that condition creation and use of an intelligence technology separate this dissertation from the large and expanding literature on intelligence that is most frequently written from political science or organizational history perspectives.

The diversity of interactions both within the individual Allied intelligence management, collection, and production organizations and between these organizations and their policy and operational seniors conditioned the content of knowledge developed about the German secret weapons program. Differing goals, strategies, knowledge bases, and practices led different groups to show interpretive flexibility, both in the processes they employed in information management and their interpretations of the exemplary artifacts they discovered in the form of captured hardware, reconnaissance photography, intercepted signals, and reporting from agents and observers. The complexity grew even more difficult with the late entry of Soviet intelligence in ways that limited closure and stabilization of knowledge of Allied definitions of what constitutes workable intelligence technologies and about the German weapon development effort itself.

One of the most immediate uses of this dissertation may be its examination of the effect of this complexity on the stabilization of American definition of intelligence, as well its ability to arrive at coordinated assessments of foreign actions that could support national-level policy making, resource allocation decisions, and military and civilian operations. Intelligence as a technology of social and material actors works within a hierarchy of political leaders and military and civilian seniors. During World War II, these included the senior political executives of America, Britain, Russia, and other allied nations, directors of their armed forces and intelligence organizations and military

18

commanders engaged in combat operations. The relationship between these actors were most often cooperative, but occasionally resulted in conflicts and disagreements.

More recently, these types of relationships have been repeated within the relatively narrow context of an intelligence problem defined in terms of the wars with Iraq. The 2005 *Report of the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction* attributes misjudgments of the status of Iraq's nuclear, biological, and chemical programs to a range of factors that seem very similar to those faced by the Allies during World War II. These include difficulties inherent in obtaining information in denied areas and inaccuracies resulting from systemic weaknesses in the way components of the Intelligence Community are organized to collect, analyze, and disseminate knowledge.[12] Indeed, the opening paragraph of the first volume of Hinsley's *British Intelligence in the Second World War* rings a very familiar note when it says:

> In the Years before the Second World War several bodies within the British structure of government shared the responsibility for intelligence. They were far from forming a single organization. They had evolved on different lines, within different departments, and no one authority directly supervised them all, Nor could any one authority have done so, given the nature of their responsibilities and the variety of their activities.[13]

This dissertation is intended to contribute to both a better understanding of the social construction of intelligence capabilities within the historical example of World War II, and to shed light upon problems of today's intelligence organizations and

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[12] *The Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction*. Washington, D.C.: March 31, 2005. Pp. 162-203.
[13] Hinsley, et. al., 1979. P. 3.

activities. It endeavors to do so by assessment of the structure, function, and output of earlier intelligence efforts to cope with quite similar problems.

Source Material

There is considerable material from war-time and early post-war U.S. intelligence organizations at the National Archives and Records Administration facility at College Park, Maryland. For example, Record Group (RG) 226 contains the paper and microfilm files of the war-time national intelligence organization, the Office of Strategic Services (OSS). These contain documents that range from basic planning and administrative material, through operational communications, to the individual analyses and reports compiled from field reporting. The microfilm records of OSS Research and Analysis Branch analytic reports have been particularly helpful in my research.

In addition to the "national" intelligence activities of the OSS, each military service had its own "departmental" intelligence organization. I have found useful material on the wartime U.S. and U.K. "CROSSBOW" intelligence effort against the V-weapons in the files of the U.S. Army Adjutant General's office (RG 18). RG 165 provides much useful information on the Joint New Weapons Committee that was the American focal point for developing countermeasures to threats such as the V-1 and V-2. RG 338, Records of the United States Army Commands contains files on European Theater operations, and especially the records of the Field Information Agency, Technical (FIAT), exploitation of German Scientists, and the post-war Joint Chiefs of Staff Joint Intelligence Objectives Agency (JIOA.), the American-only follow-on to the

Allied Combined Intelligence Objectives Subcommittee. JIOA material is also covered

in RG 330, records of the Office of the Secretary of Defense. Within OSD, the JIOA was

established in 1945 as a subcommittee of the JCS' Joint Intelligence Committee with

responsibility for operating a foreign scientist program as the follow-on to CROSSBOW,

subsequently given the code name OVERCAST and, finally, PAPERCLIP.

There is also a wealth of published primary source material contained in the

British official histories of the Second World War and the memoirs of participants in the

German V-2 development project and Allied intelligence. The five-volume official

history of British intelligence is mentioned above. In addition, the British official history

series on *Grand Strategy*,[14] *The Strategic Air Offensive Against Germany—1939-1945*,[15]

The Defense of the United Kingdom,[16] *SOE in France*,[17] and the officially written but

unofficially published secret history of British Security Coordination in the United

States[18] provide rich detail on the U.K.s organizations and operations, although without

much information on specific individuals. Memoirs by participants such as Babington-

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[14] The six-volume series *Grand Strategy* was edited by J.R.M. Butler and published with different authors and volumes appearing over a 20-year period by Her Majesty's Stationary Office, London. Volume I, *Rearmament Policy* was written by N.H. Gibbs and published in 1976. Volume II, *September 1939-June 1940*, was written by J.R.M Butler and published in 1957. Volume III, *June 1941-August 1942*, was published in 1964 in two parts, the first by J.M.A. Gwyer and the second by J.R.M. Butler. Volume IV, *August 1942-September 1943*, was written by Michael Howard and published in 1972. Volume V, *August 1943-September 1944*, was written by John Ehrman and published in 1956. Volume VI, *October 1944-August 1945*, was also written by John Ehrman and published in 1956.
[15] The four-volume series *The Strategic Air Offensive Against Germany, 1939-1945* was co-authored by Sir Charles Webster and Noble Frankland, London: Her Majesty's Stationary Office, 1961.
[16] Collier, Basil. *The Defense of the United Kingdom*, London: The Imperial War Museum, 1957. Reprinted in 1995 with permission of the Controller of HMSO and published jointly by The Imperial War Museum and Battery Press, Inc., Nashville Tennessee.
[17] Foot, M.R.D., *SOE in France: An Account of the British Special Operations Executive in France, 1940-1944*. London: Her Majesty's Stationary Office, 1966.
[18] British Security Coordination. *The Secret History of British Intelligence in the Americas, 1940-1945*, introduction by Nigel West. New York: Fromm International, 1998 by St. Ermin's Press. Fromm edition, 1999.

Smith,[19] Bennet,[20] Calvocoressi,[21] Watkins[22], and Welchman[23] are very helpful in adding personal experience to the official presentations of photographic reconnaissance and the ULTRA code breaking activity at Bletchley Park.

With the exception of the commercially published *War Report of the O.S.S.*,[24] early post-war U.S. Army and Army Air Forces official histories of the war paralleling the British Official History series do not provide the intelligence-focused detail on wartime intelligence organizations, activities and targets of the U.K. histories. However, the post-war officially sponsored histories do provide much useful information.[25]

Memoirs such as those listed in the bibliography by Dornberger, Huzel, and Wegener mentioned above—while potentially based on "selective memory"—provide useful direct observations of V-2 development activities. Secondary sources provide material on specialized topics such as the use of concentration camp labor in the V-2 development program. For example, a literature of survivors' personal experiences at the

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[19] Babington-Smith, Constance. *Air Spy: The Exciting Behind-the-Scenes Story of the role of Photo Intelligence in the Winning of World War II*. New York: Harper & Brothers Publishers, 1957.

[20] Bennett, Ralph. *ULTRA in the West:The Normandy Campaign of 1944-1945*. New York: Charles Scribner's Sons, 1979.

[21] Calvocoressi, Peter. *Top Secret ULTRA: An Insider's Account of How British Intelligence Monitored and Broke the Nazi Top-Secret Codes*. New York: Pantheon Books, 1980.

[22] Watkins, Gwen. *Cracking the Luftwaffe Codes: The Secrets of Bletchley Park*. London: Greenhill Books and St Paul: MBI Publishing, 2006.

[23] Welchman, Gordon. *The Hut Six Story: Breaking the Enigma Codes*. New York, St. Louis, San Francisco, Toronto, Hamburg, and Mexico: McGraw-Hill Book Company, 1982.

[24] War Department, History Project, Strategic Services Unit, Office of the Assistant Secretary of War. *War Report of the O.S.S.* Published in two volumes, with a new introduction by Kermit Roosevelt, Chief Historian. New York: Walker and Company, 1976. Volume 2 published by New York: Walker and Company, and Washington, D.C.: Carrolton Press, Inc., 1976.

[25] See especially, Finnegan, John Patrick, *Military Intelligence*, Army Lineage Series, Washington, D.C.: Center of Military History, United States Army, 1998, and Kreis, John F., *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, Washington, D.C.: Air Force History and Museums Program, Bolling Air Force Base, 1996. See also Gilbert, James L. and John P. Finnegan, *U.S. Army Signals Intelligence in World War II: A Documentary History*, Honolulu, Hawaii: University Press of the Pacific, 2004, reprinted from a 1993 edition published by the U.S. Army Center of Military History.

underground V-2 production at Nordhausen provides a unique perspective on weapon

production and Allied response[26].

Organization of The Paper

After the Chapter 1 general introduction to the subject and some intelligence-

related definitions that may be unfamiliar to the reader, Chapters 2 through 4 provide

specific background information to help frame the project. Chapter 2 discusses the

evolution of relevant social groups in American intelligence and identifies problem

solving strategies, the growth of current theories of intelligence, and how these groups

practiced intelligence between the American Revolution and the beginning of World War

II. It reviews American intelligence activity by looking at its historic origins in 18th

century English practice and how American culture and history changed the forms of its

intelligence organization to that which existed as W.W. II started. Chapter 3 then

presents an examination of the consistency of intelligence organization's design methods

and definition criteria through a discussion of the functions of American intelligence as

seen through the writings of three senior intelligence experts dating from the period

between the World Wars, the immediate aftermath of World War II, and the Cold War

era beginning in the late 1940s. Chapter 4 then looks at the background information

forming the goals and key problems that American and Allied intelligence organizations

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[26] For specific discussions, see Béon, Yves, *Planet Dora: A Memoir of the Holocaust and the Birth of the Space Age*, Boulder, Colorado: Westview Press, and Washington D.C.: The Smithsonian Institution, 1997; Michel, Jean, *DORA: The Nazi Concentration Camp Where Modern Space Technology was Born and 30,000 Prisoners Died*, New York: Holt, Rinehart and Winston, 1975 and 1979; and Sellier, André, *A History of the DORA Camp*, Chicago: Ivan R. Dee, 2003. The latter book was published in association with the United States Holocaust Memorial Museum.

would have to face. It is derived primarily from German participants' memoirs and published secondary sources, and it surveys the history of German secret weapon development. Taken together, these three chapters are intended to orient the reader to the technological frame within which American intelligence operated and the secret weapon "target" against which it was applied during the war.

Chapters 5 through 7 look at the unfolding events that American and British intelligence dealt with in building their knowledge. These are described as three stages of knowledge building. Chapter 5 looks at early speculation about the existence and nature of the secret weapon threat as described by fragmented reporting from sources of unknown expertise—this stage continued in some measure throughout the war. Chapter 6 describes how better and more direct access to information sources such as airborne imagery, intercepted signals, and knowledgeable senior German prisoners of war provided detail, context, and perspective that filled in holes in Allied Knowledge. And Chapter 7 demonstrates how reflection on the aggregate of earlier knowledge allowed intelligence analysts and government decision makers to refine their knowledge of the characteristics and probable use of the revolutionary new weapons and to builds plans and resources with which to counter them.

Chapters 8 and 9 broaden the focus of the study to include the integration of knowledge from intelligence into application of countermeasures as part of more general war operations. Chapter 8 deals with topics such as administration of intelligence requirements, tactical countermeasures and sharing of sensitive information between the Western Allies. Chapter 9 explores the late-war effect of Soviet involvement in the

secret weapon intelligence issue and how the Western Allies modified their key

intelligence problems and problem-solving strategies as the end of the war neared.

Chapter 10 concludes the study by summarizing the post-war exploitation of V-2

hardware and the captured personnel who created it. As the material moved from the

realm of intelligence to the realm of scientific research and development, both sides used

captured systems for upper-atmospheric research. But only the Soviet Union built an

operational version of the German system. In the West the effort raised public concern

over the ethics of use of German technology and personnel, a problem not shared by the

Soviets. But the V-2 had first demonstrated the viability of rockets, soon to be equipped

with nuclear warheads, which were a major factor in the start of the Cold War.

Intelligence involvement with the V-2 declined in the West, but became focused on the

question of discovering what the Soviet Union was doing with its part of the captured

technology.

CHAPTER 2

HISTORICAL FRAME OF REFERENCE: THE EVOLUTION OF AMERICAN
STRATEGIC INTELLIGENCE

This chapter defines American intelligence traditions as they evolved from the

American Revolution to the beginning of American involvement in World War II. In

doing so, it discusses the makeup of what Bijker calls "relevant social groups," as well as

some of the components that he identifies as a "technological frame". The relevant social

groups which will be encountered include those individuals and groups directly

concerned with the construction, management and operation of intelligence activities,

such the Second Continental Congress and George Washington as the Commander in

Chief of the Continental Army during the Revolution, President Lincoln, General Grant,

and their senior intelligence officers during the Civil War, and the members of

increasingly professional War and Navy departments created at the end of the 19th

century. The "technological frames" are the varying political, military, and professional

frames of reference that guide such factors as goal and key problem definition, problem

solving strategies, requirements for problem solutions, current theories of intelligence,

design methods, and practices.[27] The evolutionary history of these groups and their

changing technological frames shed light on how the political, military, and intelligence

practitioners developed technological systems of intelligence that resulted in an unstable,

but partially effective, level of integration of intelligence processes for producing

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[27] Bijker: 1995. P. 125.

information on which American civilian and military decision makers based national security policies at the beginning of World War II.

The history presented here is not intended as a detailed portrayal of institutional evolution. It is more an exploration of the cultural background of American ideas of intelligence and how American culture created intelligence capabilities in time of war and frequently dismantled these capabilities after a war was over. It is also a review of the slow road to professional institutionalization that created an intelligence frame of reference by the beginning of World War II.

American forms of intelligence activity were not unique to the new nation. This chapter summarizes the British heritage of American intelligence and provides an outline of the evolution of six organizational "actors" of a nascent American "intelligence community." These American intelligence actors include and the President and his personal staff, the State Department, the United States Army, the Navy, the Federal Bureau of Investigation, and the Air Force. Perhaps the greatest similarity between the intelligence organizations and activities of the Americans and their British cousins is a pattern of bureaucratic insularity and ambivalent cooperation exhibited by each of these intelligence elements. As part of the British colonial empire, pre-revolutionary American intelligence targets and techniques shared the technological frame of the "mother country."

With the onset of the revolution, America was forced to adapt the intelligence components of its earlier frame of reference to the circumstances of its new self-government in wartime. Their frame began to slowly diverge from the British model,

while preserving the form of some of its components and processes. It was not until the common cause of World War II cemented political alliances that there was a partial coming together again of the parallel intelligence frames—although limits remained to the degree of inclusiveness each shared with the other. A review of the British heritage and American adaptations of social and material intelligence technology will help to understand how these two separate nations came together to resolve the problem of a German secret weapons threat.

The British Intelligence Heritage

A recent publication of a history of British intelligence based on documents released to the British National Archives describes the important stepping stones in evolution of British intelligence organizations. Written by a Senior Historian at the Foreign and Commonwealth Office and two Records Specialists from the British National Archives at Kew, *British Intelligence: Secrets, Spies and Sources* assesses their nation's intelligence activities as revealed in publicly released documents from the members of their present intelligence community.[28]

According to Twigge, et al., Sir Francis Walsingham created one of England's earliest intelligence organizations for Queen Elizabeth I in the 1580s to gain domestic and foreign knowledge of Catholic plotters, especially King Philip II of Spain. However, the authors of *British Intelligence* cite the Post Office as the first permanent British

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[28] Stephen Twigge, Edward Hampshire, and Graham Macklin. *British Intelligence: Secrets, Spies and Sources*. Kew: The National Archives, 2008. See especially Pp10-16 of the "Introduction" and Chapter Two, "International Intelligence," Pp59-105 .

intelligence organization that established a Secret Office in the 17th century to intercept mail. A deciphering department was set up in the 18th century to act as the government's code breakers.

By the 19th century, the size and complexity of the expanding British Empire created the need for information on insurrection in the colonies, internal border threats on the island, and on the designs of other expansionist nations. The Admiralty was especially interested foreign fleets and set up its own system for monitoring—normally through publically available publications or direct observation. However, it wasn't until 1887 that the Admiralty established a Naval Intelligence Department. The War Office initially set up a staff structure for intelligence earlier, in 1873, that gathered operational information from foreign maps and direct observation. This organization evolved in 1888 into the Directorate of Military Intelligence.

Information from openly available sources appears to have been adequate for much of the 19th century. But by the early 20th century, Britain perceived a need for greater secrecy in its intelligence gathering and analysis. A Secret Service Bureau was set up as an attempt to create a single management for foreign and domestic intelligence. But this organization soon split into a homeland security organization (MI5) controlled by the War Office and a foreign intelligence organization (MI6) controlled by the Admiralty.

During the First World War, the foreign intelligence organization was re-subordinated from the Admiralty to the War Office. However, it was not until a Secret Service Committee review after the War that it became the Secret Intelligence Service.

Also during the period between the World Wars, all British SIGINT was centralized within a new organization, the Government Code and Cypher School (GC&CS), later renamed the Government Communications Headquarters (GCHQ), and a new organization was established in 1936 as the senior U.K. intelligence analysis agency.

Additional—and temporary—intelligence organizations were created during the Second World War to perform Special functions. The Special Operations Executive was responsible for the sabotage operations that today would be called special operations. The Ministry of Economic Warfare analyzed potential enemy industrial targets. The Political Warfare Executive was responsible for covert propaganda. MI9 was set up to assist captured soldiers' escape from enemy military prisons. And British Security Coordination had a broad charter for intelligence-related operations in the United States.

American Adaptation of British Intelligence Processes

American intelligence as an organized activity evolved from this British colonial heritage. As the American Revolution began, many of its leaders were experienced veterans of a predominantly British culture that considered intelligence primarily an activity of its military. For example, General George Washington, senior commander of the Continental Army, had served with the British Army during the 1750s French and Indian War—the American part of the 7-Years War between Britain and France. In the British and American governments, other activities that would later be defined as part of strategic political and economic intelligence were considered more an integral part of diplomacy than a separate information gathering and evaluation activity.

Prior to World War I, America's organized intelligence activities were focused largely on English-style perceptions of military need for tactical knowledge about the capabilities of opposing armies and navies. In the colonial-period British model, many military and civilian institutions such as the British Foreign Office included information gathering as a component of their activities. However, there was no central facility for analyzing all of the varied sorts of information and integrating them into a comprehensive picture of equal value to all components of a national government. Thus, the British army focused on enemy military tactical information gathered in the field by its own officers and such spies as they could recruit.

Some idea of how British spies operated during the Revolutionary War can be gained from a description in Winthrop Sargent's 1861 study of British Major John André's career—which included involvement in the defection of General Benedict Arnold to the British. André was the Adjutant General of the British Army and in that role, its chief spymaster. In speculating on what Major André's activities could have been like, Sargent cites the example of two spies working directly for British General Gage in the vicinity of Boston in 1775:

> Without the means of connecting André directly with any incident in the occupation of Boston, a sketch of the military features of the place and time has now been given, with intent to present those points which would most probably have had a chief interest to him. Were there any reason to think that he remained with Gage so late as February, 1775, he might be suspected as a part in some expedition as that of Brown and De Bernier,—two officers sent out in disguise by the general to make a *reconnaissance* of the country, through Suffolk and Worcester counties, where the Whigs had their chief magazines; perhaps with an eye to a descent. The spies were selected apparently as having recently arrived from Canada, and therefore as less apt to be known as royal officers. They returned from a perilous and toilsome journey, well supplied with plans and sketches; and a very entertaining report of their experiences is preserved. We may imagine how André's pencil and pen would have been busied, not only with the more legitimate duty of the occasion, but with such episodes as the militia review at Buckminster's tavern, which was followed by an address from the commander, "recommending patience, coolness, and bravery, (which indeed they much needed,) particularly told them they would always conquer if they did not break, and recommended them to charge us coolly,

and wait for our fire, and everything would succeed with them—quotes Caesar and Pompey, Brigadiers Putnam and Ward, and all such great men; put them in mind of Cape Breton, and all the battles they had gained for his majesty in the last war, and observed that the regulars must have been ruined but for them. After so learned and spirited an harangue, he dismissed the parade, and the whole company came into the house and drank until nine o'clock, and then returned to their respective homes full of pot-valor."[29]

General George Washington's organization for intelligence production reflects the British reliance on spies and scouts. His 1777 instruction to Robert Townsend, one of the leaders in the New York area spy network seems very much in this tradition. Washington, acting as his own chief intelligence analyst, instructed Townsend (operating under the name of Culper, Jr.) "…to pay particular attention to the movements by land and water in and about the city…." Washington's request was both detailed and wide ranging, and included, in addition to movement, military strength, construction, supply, health, and morale.[30] This approach to defining information needs helped set a far-reaching precedent for American military intelligence activities to be focused on the immediate and impending combat requirements of senior commanders in the field.

The new American Navy also built on experience gained as colonial participants in the Royal Navy during the French and Indian War. While they were generally familiar with the capabilities and deployment patterns of Royal Navy from past contact with it, American naval officers employed spies and other means of information collection

[29] Winthrop Sargent. The Life and Career of Major John André, Adjutant-General of the British Army in America. Boston: Ticknor and Fields, 1861, Pp 69-70. The 19th century historian was the namesake and grandson of Winthrop Sargent, the distinguished Revolutionary War veteran, adjutant-general of the United States Army and first governor of Mississippi.

[30] Washington's letter of instruction is reproduced in Bruce W. Bidwell. *History of the Military Intelligence Division, Department of the Army General Staff: 1775-1941*. Fredrick, Maryland: University Publications of America, 1954/1986, Pp.7-8.

during both the Revolution and the War of 1812 to determine the size, location and movement of hostile fleets of whose combat capabilities they were already aware. [31]

During the Revolutionary period, what is today called civilian strategic intelligence was indistinguishable from traditional diplomacy and international commercial activity—with an added emphasis on secrecy to keep sensitive details from the prying eyes of British adversaries. The primary revolutionary period American government organization engaged in acquisition of strategic political and economic information was the Committee of Secret Correspondence of the Second Continental Congress. However, other Congressional standing and special committees also performed intelligence and secret operation functions. A Secret (Commercial) Committee concerned with confidential commercial activities—especially foreign financing and acquisition of military equipment, and a Committee on Spies that was a predecessor of later counterintelligence activities are the primary examples.

Formal means of communication, most commonly written or oral messages carried by public mail or special government couriers, or using devices such as signal flags and lights, provided other sources of knowledge. Important communications sometimes included use of codes to hide the most sensitive information. This led to employment of individuals who had developed the capability to decode such messages. Thus, Revolutionary era intelligence collection methods focused largely on what would in today's frame be called open source exploitation of public media, Human Source Intelligence (HUMINT), and early forms of Communications Intelligence (COMINT).

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[31] Jeffery Dorwart provides a useful summary of the roots of the American naval intelligence in the first chapter of his two-volume history of the Office on Naval Intelligence. See Jeffery M. Dorwart. *The Office of Naval Intelligence: The Birth of America's First Intelligence Agency, 1865-1918*. Annapolis, Maryland: Naval Institute Press, 1979, Pp. 3-11.

The expanding borders of the new union and the beginning of the industrial revolution—a source of new enabling technologies for intelligence as well as industry—in the early 19th century had significant effects on the American functions and practices of both the Army and Navy. Both services undertook explorations and scientific surveys to improve knowledge of the terrain and coastlines of the new nation's territory and create accurate maps of it. The 1804 Lewis and Clark and the nearly simultaneous Zebulon Pike expeditions provide representative examples.[32]

Innovations in manufacturing interchangeable parts for military weapons and improved ignition systems for small arms placed America in a pathfinder role for army technology during the first half of the 19th century, while the harnessing of steam power and the scientific purpose of naval explorations set a pattern for an approach to intelligence focused on developing knowledge of the marine environment and its exploitation.[33] Both factors ultimately created a need for both immediate geographic intelligence and, with less bureaucratic enthusiasm, detail on foreign development of new military technologies.

Marquette University history professor Francis Paul Prucha describes the evolution of the U.S. Army after the Revolution as an unexpected, and perhaps unintended, development in a culture which was giving little positive thought to a standing military. The change toward a permanent military establishment was brought

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[32] Bidwell, Pp. 12-13, describes the intelligence importance of these expeditions.

[33] For discussions of the interaction between the military and arms making technology at Harper's Ferry West Virginia, see Merritt Roe Smith, *Harper's Ferry Armory and the New Technology: The Challenge of Change*, Ithaca and London: Cornell University Press, 1977 and R. T. Huntington, *Hall's Breechloaders: John H. Hall's Invention and Development of a Breechloading Rifle with Precision-made Interchangeable Parts, and Its Introduction into the United States Service*, York Pennsylvania: George Shumway Publisher, 1972. Dorwart 1979, discusses the Navy-intelligence connection of early expeditions on Pp. 4-5.

about by continuing tension between the new nation and its earlier colonial sovereigns

and foes:

> The regular army of the United States owed its existence to the American frontier. The American Revolution, it is true, had been fought and won in large part by the Continental troops, a kind of regular army, to whom were added a generous portion of militia. But the republican principles dominant at the end of the war ruled against a standing army. It was only the exigencies of the Indian frontier that convinced the members of congress to authorize a handful of regular troops, and in the decades that followed the Revolution it was the tiny regular army, augmented occasionally by additions of regular soldiers and enlarged now and then in times of crisis by state militia, that secured and maintained American sovereignty in the West in the face of Indian intransigence and the schemes of the British and Spanish to limit the expansion of the new nation.[34]

Prucha's summary of the effectiveness of the American Army concludes that its

performance was adequate to the task as defined at the time, albeit in the face of a general

cultural resistance to providing or applying adequate resources:

> The Army in the six decades between the Revolutionary War and the Mexican War marched with the expanding nation to the West. The child of the frontier, whose exigencies called it into being, the army grew as the nation grew (although never quite enough), and it devoted its energies to national development. In the north and south and west, as the agent of a government that sought to exert its authority in the lands over which it claimed jurisdiction , the army upheld American sovereignty. For a nation whose leaders struggled to find a humane solution to the difficult problem of providing for the orderly advance of a rapidly growing population over lands tenaciously held by thinly spread tribes, the army served as the weapon to hold back lawless frontiersmen as well as to chastise Indians for savage incursions against white settlements. In searching out the secrets of unknown areas within the vast domain of the young nation, army officers and their detachments skillfully explored the land, until American presence was everywhere experienced and respected. To be sure, not all the visions of national grandeur were fulfilled, not all the laws whose enforcement rested so largely upon the army were properly enforced.
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> The inadequacies of the army in size and in quality of personnel were regrettable, most profoundly so in the matter of contacts and conflicts between whites and Indians on the frontier. But Americans of the period were unwilling to give unstinted support to a regular military force. Here was a serious flaw in the American experience, which marred the period of early national development. The need for order on the frontier was clear. The only available means to maintain that order was a regular army of reasonable size, to act for national not local interests. The character of the American republic, unfortunately, would not allow this means to be developed. American democratic ideals

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[34] Francis Paul Prucha. *The Sword of the Republic: The United States Army on the Frontier 1783-1846*. Lincoln and London: University of Nebraska Press, 1969, first Bison Book printing 1986. P. 1.

themselves thus paradoxically permitted conflicts that every honest American can only lament.

Yet if the mission of the regular army on the frontier is seen primarily As the upholding of American dominion within the territorial limits of the United States—against foreign encroachment and against the Indian nations—the army successfully fulfilled its role. Here the "sword of the Republic," despite its weakness, served the nation honorably and well.[35]

The Navy during this same period was modestly expanding because of a series of threats perceived by the American public and their political leaders. Raids on American shipping by Barbary pirates in the Mediterranean in the 1790s gave Congress cause to authorize a reluctant effort at building six frigates, including the *Constellation* and the *Constitution*. By 1798, increasing tensions with France led to removal of the Secretary of War's authority over the Navy and establishment of a separate Department of the Navy, whose Secretary was given responsibility for resource acquisition and "all other matters connected with the Naval Establishment of the United States."[36]

Despite the general lack of interest in military and naval technologies in the early part of the century, there was some increase in Ad Hoc intelligence-like information gathering by military and naval observers implicit in the operational activities that foreshadowed the American-British tensions that led to the War of 1812 and thirty years later to the Mexican-American War. For example, James Monroe, as Secretary of State in the Madison Administration (and simultaneously from September 1814 to March 1815, Secretary of War) personally performed a necessity-driven reconnaissance and reported on British Movements in the Baltimore-Washington area as the British were building up

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[35] Prucha, 1969, 1986. Pp. 394-395.
[36] Furer: 1959. P. 5. This and the following paragraph are distilled from Furer's account, especially pages 4to 6.

to their attack British attack on Washington. Later, in 1815, he supported assignment of

regular army officers (Corp of Engineers officers Major William McRee and Captain

Sylvanus Thayer) as observers on an extended tour of military activities in Europe "for

professional improvement"—but with obvious benefit to senior decision maker

knowledge of European military capabilities and operations.[37]

Similarly, in 1846—just prior to the Mexican-American War—Navy Pacific

Squadron surgeon William Maxwell Wood collected popular rumors of impending war

and observed Mexican military capabilities and preparations as he traveled through

Mexico to a new assignment to the Washington area. He provided this information to the

commander of the Navy's Pacific Squadron, Commodore John Sloat, and the Secretary of

the Navy. In doing so, Wood enabled Sloat to move his squadron from Mexico to

Monterrey Bay and to lay claim to California for the United States--in advance of a

similar move being attempted by the senior British naval officer in the area.[38]

Notwithstanding the importance and utility of the information provided by

observers such as Secretary Monroe, Major McRee, Captain Thayer, and Doctor Wood,

none of these individuals were specialists in intelligence collection or evaluation. They

were government officials, Army engineers, and a Navy surgeon undertaking intelligence

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[37]Bidwell:1986, Pp. 18-19. Bidwell's book was originally written in the 1950s as a classified official Army history. It was published commercially after declassification and light editing by University Publications of America as part of its Foreign Intelligence Book Series

[38] Dorwart: 1979. Pp. 3-4. George Cumming McWhorter described Wood's action in an undated paper for the New York Historical Society, "Incident in the War of the United States with Mexico: Illustrating the Services of WM. Maxwell Wood, Surgeon U.S.N." (public domain, available as a Kessinger Legacy Reprint, Kessinger Publishing, LLC.) Wood relates his own version of his journey and reporting in Chapter XXIV of the memoir of his early Naval service, *Wandering Sketches of People & Things in South America, Polynesia, California & Other Places Visited, During a Cruise On Board the U.S. Ships Levant, Portsmouth, and Savannah*. (Philadelphia: Carey and Hart, 1849, Pp. 338-386. Photo reproduction copyright, undated, by Bibliolife, LLC, Charleston, SC.) See also the Wikipedia entry on William Maxwell Wood at http://en.wikipedia.org/wiki/William_Maxwell_Wood. This version was retrieved on March 31, 2011.

reporting because of the press of circumstance. Their methods, as important as they were, were versions of traditional scouting and observation as means of military and naval information gathering. On the other hand, such contributions established a precedent within the American military and naval services for relying on substantive specialists who were intelligence amateurs for provision of essential information. This precedent would continue into the 20th century.

The earlier tradition of subordinating military intelligence to tactical management was frequently adopted by the Union army during the American Civil War, where control of intelligence activities was vested in the major army field commanders. For example, the intelligence service of the Union Army was managed first by private detective Allan Pinkerton and then by a serving military officer, Lafayette Baker. Pinkerton, using the pseudonym Major E. J. Allen, performed both spy-master and counterintelligence functions and answered directly to General George McClellan Commanding the Union Army of the Potomac. When McClellan was replaced following the battle of Antietam in 1962 by General Ambrose Burnside, Pinkerton resigned and was replaced in Washington by Baker, who had first served under Commanding General of the Army Winfield Scott, and who was appointed to head the Bureau of National Detective Police by Secretary of War Edwin Stanton. Baker performed spy and counterspy duties throughout the rest of the Civil War and into the administration of President Andrew Johnson—although he was dismissed from the Johnson administration for spying on the President.[39]

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[39] Both Pinkerton and Baker published autobiographies. Pinkerton's (*The Spy in the Rebellion; Being a True History of the Spy System of the United States Army During the Late Rebellion*. New York: G. W. Carleton & Co., Publishers, 1884) is a series of anecdotes of his own experiences and those of his agents. Baker's self-published memoirs (*History of the Secret Service*. Philadelphia: L. C. Baker, 1867) is also anecdotal--covering the war through the capture of President Lincoln's assassins. However, the final six

While Pinkerton's and Baker's organizations concentrated on managing Union spies and capturing Confederate spies, the Civil War also provided a venue for developing equipment and procedures for intercepting and decoding enemy communications. However, these activities were a function of the small War Department communications staff and Army Signal Corps rather than a secret intelligence service.

In addition to scouts, spies, and expanding capabilities for military communications, the use of the observation balloon in the Civil War was a major, although short-lived, addition to the ability of military commanders to see the positions and movements of an opposing force. The advent of the balloon was seen at the time as having only limited value and was used operationally only during the early part of the War. But it represented an excursion into extending the range of visual reconnaissance and, when combined with short range adaptation of electronic communication techniques, it led to improved tactical intelligence support for ongoing military operations.

Specialized material technology enabling existing Governmental civilian and military organization's decision makers to gain new forms of information was managed in several ways. Aerial reconnaissance, for example, was essentially a contractor-run operation, with military personnel playing only a supporting role. On the other hand, tactical telegraphic interception and decoding was largely run by Army signals specialists, while strategic telegraph message decoding was almost exclusively a contractor operation run out of the War Department in Washington—with a direct line to President Lincoln. As already mentioned, spy and counterspy support for General

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chapters are devoted to telling his side of the disputes and law suits that ended his government career. Pinkerton, the private detective, is more revealing of early wartime espionage, while Baker, Chief of the National Detective Police, focuses on spy catching and protection of the President.

McClellan was managed by a civilian private detective. With the exception of Army tactical telegraph interception, each of these efforts were small units, depended on the presence of temporary contact employees, and the information they supplied was frequently distrusted by senior professional military officers.

The balloon is an example of physical technology that improves a person's visual access to information by increasing the amount of ground that one can see with the naked eye. However, it does not increase technical access beyond normal human capabilities without the aid of additional artifacts such as a telescope to magnify an image within an area of coverage. The advantages provided by a balloon's altitude are easily appreciated. In an ideal situation—rarely seen over land— with vision unhindered by natural or man-made obstructions or atmospheric conditions, a six-foot tall person standing on the surface of the earth can see a distance of about three miles in any direction. By climbing a ladder or a tree to a height of around ten feet, that same person's range of vision increases to just under four miles, and by climbing further, say to the roof of a house about 20 feet up, their view increases to about 5-and-a-half miles. However, placing an observer in a balloon at a height of 500 or 1,000 feet increases their range of vision dramatically. From an altitude 500 feet, people can see about 27 miles and from 1000 feet they can see nearly 40 miles. This increase in visible access can be very useful to map makers and to military commanders who want to be able to locate and identify natural features or opposing forces.[40]

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[40] The distance to the horizon of the earth from any altitude can be approximated by multiplying the height of the observer in feet by the diameter of the earth and taking the square root of the product. The earth's diameter is approximately 41, 849,280 feet at the equator. Wikipedia has a more detailed discussion of this calculation at http://en.wikipedia.org/wiki/Horizon. It also has a chart allowing direct reading rather than

While the Civil War did not result in the creation of permanent organizations for the specific purpose of intelligence gathering and analysis, it did begin movement in that direction, and many of these steps are discussed in the various service official histories and publications.[41] Prior to the late 19th century, both the Army and Navy carried out tactical information gathering operations, usually under the control of local commanders during wartime. Beginning in the mid-19th century, the purposes of American intelligence evolved to reflect the increasing complexity of the nation's international relations.

calculation at http://en.wikipedia.org/wiki/File:How_far_away_is_the_Horizon.png. These two entries were downloaded for this paper on March 12, 2011.

[41] Official histories prepared by Army and Navy historical offices provide a useful summary of how their service's intelligence efforts evolved. See for example, Colonel Bruce W. Bidwell's *History of the Military Intelligence Division, Department of the Army General Staff: 1775-1941*, a declassified Army study that was originally written in 1954 and published commercially in1986 by University Publications of America in Frederick, Maryland. John Patrick Finnegan and Romana Danysh's *Military Intelligence* (Washington, D.C.: Center of Military History, United States Army, 1998) builds on Bidwell's treatment and other sources to bring the Army's intelligence history into the post-war era. Similarly, The Department of the Navy published a comprehensive history, *A Century of U.S. Naval Intelligence*, by Captain Wyman H. Packard, USN (Retired) in 1996. Knowledge of these efforts are enhanced with unofficial histories such as Jeffery Dorwart's two volumes on Naval Intelligence, *The Office of Naval Intelligence: The Birth of America's First Intelligence Agency, 1865-1918* (Annapolis, MD: Naval Institute Press, 1979) and *Conflict of Duty: The U.S. Navy's Intelligence Dilemma, 1919-1945* (Annapolis, MD: Naval Institute Press.) These histories can be usefully supplemented by memoirs of participants in post-World War I and World War intelligence such as Colonel Sidney Forrester Mashbir, Ret, A.U.S. (*I Was an American Spy*. New York: Vantage Press, Inc., 1953), Captain Ellis M. Zacharias, USN (*Secret Missions: The Story of an Intelligence Officer*. New York: G. Putnam's Sons, 1946), and Rear Admiral Edwin T. Layton, U.S.N. (Ret.) (*"And I was There": Pearl Harbor and Midway—Breaking the Secrets*. With Captain Roger Pineau, U.S.N.R. (Ret.) and John Costello. New York: William Morrow and Company, Inc., 1985.) The youngest of the U.S. military services, the Air Force also has published useful material on air intelligence activities. The most comprehensive treatment is *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II* (John F. Kreis, General Editor. Bolling Air Force Base, Washington, D.C.: Air Force History and Museums Program, 1996.) Other useful sources on the history of air intelligence in the U.S. include *ULTRA and the Army Air Forces in World War II: An Interview with Associate Justice of the U.S. Supreme Court Lewis F. Powell, Jr.* (Edited by Diane T. Putney. Honolulu: University Press of the Pacific, 2005. Reprinted from the 1987 edition published by the Office of Air Force History), *ULTRA and the History of the United States Strategic Air Force in Europe vs. the German Air Force* (Frederick, MD: University Publications of America, 1980. This was an official report, originally published in a highly classified version in September, 1945.), and a recent commercial publication of doctoral dissertation by Charles R. Christensen A History of the Development of Technical Intelligence in the Air Force, 1917-1947: Operation LUSTY (Lewiston, New York: The Edwin Mellen Press, 2002.)

With its entry into the Mexican War, the functions assigned by the operational organizations for which intelligence activities provided knowledge expanded, although still limited by the reluctant willingness of American citizenry to spend tax dollars on security-related activities. In the post-Civil War era, American policy makers and military officers closely watched the performance of military technologies demonstrated by European nations in conflicts such as the Crimean, Austro-Prussian, and Franco-Prussian Wars. Intelligence activity was still defined as an essentially military activity but was beginning to be appreciated by national foreign policy makers as well.

Later Evolution of American Intelligence Activities

Army and Navy intelligence organizations and processes evolved in the late-nineteenth and early-twentieth centuries from being purely tactical reporters of information from scouts and spies to more sophisticated information services with which to inform service officers of foreign developments and capabilities and intentions. By the end of this period they were becoming services that were intended to support military and political policy definition and planning of a more strategic nature.

For the first time, Army and Naval Intelligence Divisions were established within both the War and Navy Departments during the 1880s—although these struggled through the late nineteenth century and World War I to establish separate identities from their services' war colleges and planning components. As the youngest service, the 20th century Air Force had the benefit of Army and War Department experience, although it

had to fight its own battles in the wake of World War II to form the Air Force to become a separate service independent of the Army in 1947.

By the beginning of the Cold War, knowledge from intelligence sources was increasingly accepted as valuable to the extent that it allowed more efficient and effective planning, resource acquisition, and conduct of military operations against hostile forces. But tensions between the services remained over institutional boundaries and coordination of what was seen as sensitive and privileged information.

Civilian organization of intelligence structures and functions at the beginning of America's preparations for World War II were no more integrated than those of the military departments and services. As Commander in Chief, President Roosevelt was in a position to review any intelligence—military or civilian—that he perceived as necessary to carrying out his civilian and military responsibilities. The President was not a newcomer to the intelligence business. During World War I he became familiar with intelligence in his position as Assistant Secretary of the Navy, and he maintained naval intelligence contacts in his new role as president—although occasionally operating outside the established bureaucracy.

During the interwar period Roosevelt had established relationships with several different organizations and individuals whom he recruited as personal advisers. Over time, some of these became semi-official and were given status through the president's contacts within the Office of Naval Intelligence. A primary example of this source of presidential advice went by the name of The Room and later The Club. This was a small informal group of New York high profile luminaries led by Vincent Astor, and included

Theodore Roosevelt's grandson—FDR's nephew—Kermit and other well-known

bankers, diplomats, publishers, journalists and philanthropists who volunteered to provide

the president privileged information and analysis that came their way through their

various international activities and interests. The knowledge from this kind of source was

valuable to the president, to the extent that it provided confidential information or

confirmation not available from other sources on either foreign issues or, sometimes,

even the performance of Federal bureaucracy.

These organizations also acted as information collectors. For example, Roosevelt

gave Astor instructions in 1938 for a covert reconnaissance of expanding Japanese

military presence in the Marshall, Gilbert, and Ellice Islands in the Pacific using Astor's

yacht, the *Nourmahal*. While this mission was only partially successful, it provides an

example of the president's willingness to find untraditional sources of information to

supplement the more traditional military intelligence structure with which he had become

familiar during his World War I service as Assistant Secretary of the Navy. Persico

suggests that Astor had ambitions of becoming the head of a new American intelligence

service.[42]

In 1939, Roosevelt established a more formal organization for gathering internal

"intelligence" on the functioning of the government bureaucracy. At the time of his

September 8th Proclamation of Limited National Emergency, he also issued an Executive

Order that moved the Bureau of the Budget from the Treasury Department to the

Executive Office of the President. According to Robert Sherwood, this sizable

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[42] The preceding section is based on Joseph E. Persico. *Roosevelt's Secret War: FRD and World War II Espionage*. New York: Random House, 2001. See especially, Pp. 9-18. At the end of this section of Persico's first chapter "Gentlemen Amateurs", he also comments on Roosevelt's distinctive management style.

organization gave Roosevelt operational authority to go directly to every department and American foreign mission to acquire information desired by the President on how money was being spent, who was spending it and what the results were. Sherwood calls this "the President's personal intelligence service" that some thought to be "his own private Gestapo."[43]

During World War II, Roosevelt set up his own focal point for receipt of foreign intelligence within the White House, which was called the Map Room. Admiral William Leahy, the president's chief of staff, provided a brief summary of the layout and function of this sensitive facility in his memoir, *I Was There*:

> Many mornings [the President] would prefer to go directly to the Map Room, which was one of the best-guarded portions of the White House.
>
> The President kept himself informed minutely on the progress of the war. The maps in the Map Room were so hung that he would not have to get out of his wheel chair to look at them. There were flags and pins of various colors showing the disposition of our land, naval, and air forces over the entire globe. While looking at them he and I would talk about some overnight development that seemed at the time to have significance.
>
> There were a number of young officers assigned to the White House Map Room who received military dispatches twenty-four hours a day. The President could have instant information any time he needed it. From this Map Room also messages could be sent by him all over the world, as there was a relay from this point in the White House to the Communications Center in the Pentagon Building.[44]

As with military intelligence, most civilian intelligence functions not directly under the control of the President were subordinate to senior departments or agencies.

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[43] Robert E. Sherwood. Roosevelt and Hopkins: An Intimate History. New York: Harper & Brothers, 1948. P. 210. Sherwood, an author and playwright, served as a speech writer for President Roosevelt, and also aa wartime Director of the Office of War Information.
[44] Leahy: 1950, P. 99. With the establishment of the Joint Chiefs of Staff organization as the American component of the Combined Chiefs of Staff, Admiral Leahy simultaneously served as the President's Chief of Staff in the White House, and as what is known today as Chairman of the Joint Chiefs of Staff. In these two roles, Leahy was in position to be a conduit of both civilian and military intelligence to meet Presidential needs.

The place of the United States Department of State and the Federal Bureau of Investigation in inter-war and wartime intelligence is less comprehensively covered in public literature than are those of the military intelligence services. As Sherman Kent notes, the State Department had no separately designated political intelligence organization prior to the end of World War II in the Pacific.[45] But despite Secretary of State Henry Stimson's often mentioned qualms about reading other people's mail during the inter-war period, his department clearly had been a willing customer of secret information gathering in its co-sponsorship with the Army of Herbert Yardley's "Black Chamber" code breaking operation.[46] FDR also assigned Assistant Secretary of State for Administration George Messersmith to be his coordinator of the intelligence activities of the FBI, Army's MID and Navy's ONI intelligence activities in June 1939—a role transferred to Adolf Berle when he replaced Messersmith in the Spring of 1940.

The Department of State clearly used sensitive intelligence but had no intelligence-unique organization for broad coverage of complex international issues. One explanation of the apparent inconsistency in State's attitudes toward intelligence may be that within the institutional culture of the Foreign Service, diplomacy was seen as a single effort that integrated information gathering through embassy activities with foreign policy formulation and execution. This interpretation receives some support in an officially published 1942 summary of State Department organization and functions which states that:

> Activities of Foreign Service posts in direct relation to the home government include the assembling, analysis, interpretation, and transmission to the Department of State

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[45] Kent, 1949,1965, P. 113.

[46] See Yardley, Herbert O. *The American Black Chamber*. Indianapolis: The Bobbs-Merrill Company, 1931.

information regarding official acts, diplomatic policies, public opinion, conditions, and trends in the in the country in which the officers are stationed; and the carrying out of specific instructions of the Department. Of special importance in the reporting service is the duty of providing the Department with information on political, social, and economic conditions which have a direct bearing upon American diplomatic and commercial relations with the particular foreign countries.[47]

Knowledge would thus be seen as valuable within the State Department and Foreign Service to the extent that it either informed the development of foreign policy or supported the implementation of that policy. In this light, separating intelligence and policy functions could be interpreted as disrupting State's ongoing and productive information gathering and knowledge development processes.

It is clear from former Secretary of State Dean Acheson's memoirs that the State Department's wartime internally-integrated approach to such questions continued to spark tensions into the post-war period.[48] More recently, the State Department has published two volumes dealing with post-war intelligence history in its "Foreign Relations of the United States" series. These both contain large collections of intelligence-related documents and introductory summary material. However, both were compiled well after the war and focus on the broader post-war interagency intelligence establishment—giving relatively little space to a specialized historical analysis of the effectiveness of State's unique approach to intelligence structure, functions and output.[49]

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[47] Gerber, William, Division of Research and Publication. *The Department of State of the United States*. (Department of State Publication 1744.) Washington: United States Government Printing Office, 1942, P. 30.

[48] Acheson, Dean. Present *at the Creation: My Years in the State Department*. New York and London: W.W. Norton & Company, 1969. See especially, Chapter 18 "The Department Muffs its Intelligence Role," Pp. 157-163.

[49] The two volumes are Thorne, C. Thomas, Jr. and David S. Patterson, Editors. *Foreign Relations of the United States, 1945-1950: Emergence of the Intelligence Establishment*. Washington, D.C.: Department of State Publication 10316, 1996, and Keane, Douglas and Michael Warner, Editors.   *Foreign Relations of the United States, 1950-1955: The Intelligence Community 1950-1955*. Washington, D.C.: Department of

The final major pre-war departmental component of the Federal Government with political intelligence responsibilities was the Federal Bureau of Investigation. The Army, Navy, and Army Air Force were primarily concerned with accurate and timely knowledge of military issues—size, characteristics and doctrine of foreign militaries, their weapon capabilities, and their current operations. The Department of State was primarily concerned with the knowledge of the political and economic components of foreign relationships and the conduct of diplomacy. The FBI, on the other hand, was a law enforcement agency under the Department of Justice. Its intelligence-related focus, therefore, was on internal security questions, including the detection and countering of foreign espionage and sabotage—a function also performed by the military services within their own organizations. Knowledge for the Bureau would be seen as valuable where it supported investigations of hostile foreign activities within the United States, helped to disrupt such activities, and provided evidence that would meet legal standards for successful prosecution of lawbreakers.[50]

Slow Movement Toward Wartime Coordination and Integration of American Intelligence Activities

Following World War I, the process included in the various American intelligence organizations' technological frames moved slowly toward closer cooperation. Coordination and integration of knowledge from such disparate military and civilian

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State Publication 11441, 2007. The earlier of the two publications is also available online at http://www.state.gov/www/about_state/history/intel/index.html.

[50] See Batvinis, Raymond J. *The Origins of FBI Counterintelligence*. Lawrence, Kansas: University Press of Kansas, 2007. This book is a commercial publication of Batvinis' (a retired special agent of the FBI) PhD dissertation. His presentation is a scholarly inquiry that avoids both the positive hype of many FBI-authorized publications and the negative hype of its detractors.

organizations and individuals was in its adolescence during the interwar period. By the

interwar period of the 1920s and 30s American intelligence collectors and producers were

created to serve the needs of six independent organizational elements. The War, Navy,

and State Departments each performed intelligence functions that can be traced back to

the American Revolution—although the State Department, whose Revolutionary-era

predecessor was the Committee of Secret Correspondence, did not identify a separate

component for such functions until the beginning of the Cold War period in the mid-

twentieth century[51]. The Federal Bureau of Investigation was an early twentieth century

creation within the Department of Justice that added internal security concerns to its law

enforcement functions in the run-up to World War I[52]. The Army Air Corps/Air Force

held a semiautonomous status within the War Department from the mid-1930s, and

created its own intelligence organizations under Army regulations during the interwar

period. Finally, there were several processes for coordinating selected military and naval

intelligence activities and those of the FBI, as well as *ad hoc* arrangements for providing

integrated strategic knowledge directly to the President of the United States.

The complexity of these arrangements increased significantly during the War

where a shortage of information made it necessary to share knowledge of Axis activities

between close allies such as the U.K., but also with the Soviet Union, which was as

frequently perceived as somewhere between a reluctant compatriot and a future enemy.

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[51] See Hunt, Gaillard. *The Department of State of the United States: Its History and Functions*. New Haven: Yale University Press, 1914. Facsimile edition published by Elibron Classics/Adamant Media Corporation, 2005. Hunt describes the 1775 establishment of the Committee of Secret Correspondence and its 1777 evolution into the Committee for Foreign Affairs on pages 3-6.
[52] See Federal Bureau of Investigation. *The FBI: A Centennial History, 1908-2008*. Washington: Government Printing Office, 2008, P. 10, for a summary of the Bureau's investigation of 1916 German sabotage at the Black Tom railroad yard in New York City. For a more comprehensive treatment, see Whitcover, Jules, *Sabotage at Black Tom: Imperial Germany's Secret War in America, 1914-1917*, Chapel Hill, NC: Algonquin Books, 1989.

The result of such tentative cooperation was a multiplication of nationally-based intelligence collection, analysis and knowledge diffusion efforts tied together by a complicated management structure intended to coordinate information needs and distribute knowledge consistent with each of the Allies' operational goals, but without damaging national perceptions of their own interests.

The Army and Navy had occasionally exchanged information of mutual benefit through a Joint Army-Navy (JAN) board dating back to early in the century, but this was not a formally institutionalized and overseen process until shortly after Pearl Harbor.[53] However, the FBI had established internal committees to coordinate Bureau investigations, espionage, and counterespionage, and integrated these in June 1939 under a presidentially directed Interdepartmental Intelligence Conference (IIC).[54] The IIC, under the chairmanship of J. Edgar Hoover, included members from Army and Navy headquarters intelligence organizations and it invited State Department participation. Assistant Secretary Adolf Berle was assigned as State's representative, but he noted in his diary after the first meeting on June 4, 1940, "…I don't see what the State Department has got to do with it…."[55]

Despite American disinterest in entangling foreign alliances, however, overseas conflicts forced a shift in the nation's political frame of reference and the national security structures needed to face increasing threat of involvement in European and Asian affairs. While America attempted to remain focused on resolution of internal neutrality problems, foreign advances in weapons technologies such as more powerful smokeless

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[53] Bidwell, 1986, Pp. 416 and 417, and Packard, 1996, Pp. 225-227.
[54] See Batvinis, 2007, Chapter Four, "Interdepartmental Intelligence Conference", Pp. 69-97.
[55] Berle, Adolf A. Navigating the Rapids 1918-1971. Edited by Beatrice Bishop Berle and Travis Beal Jacobs. New York: Harcourt Brace Jovanovich, Inc., 1973, P. 320.

powder, repeating small arms, improvements in artillery design, and the construction of large iron ships with greater speed and operating range and increased firepower drew attention to the threats to America's overseas obligations. Advances in material technologies enabled the increased physical and technical access necessary to intercept information carried over newer communications systems, as well as the ability to record information using photography—especially from airborne platforms such as balloons. Combined with innovations in knowledge management represented by the establishment of Navy and War Departmental intelligence staffs and the development of heavier-than-air flight, the United States entered the twentieth century with some capacity—even if under-used—for building a more complete knowledge of the threats and opportunities posed by foreign political maneuvering and America's ability to enforce their perceived interests through exercise of economic, political, social, and military power.

While American intelligence organizations were adopting new material technologies to improve their access to sensitive information, such as aerial photography, the political frame of reference continued to hamper provision of large-scale military resources. These limitations reflected the economic crash after 1929 and the general lack of interest in foreign events of a largely pacifistic population. In addition, intelligence organizations that existed were all components of larger military and civilian organizations with dominant power structures that were skeptical of any move toward centralization of intelligence functions. Each senior agency zealously maintained its bureaucratic boundaries and control of their independent resources.

Independent of this resource question, the frame of reference for a number of civilian and political goals leading up to the pre-World War II intelligence frame can be

traced through the first 165 years of America's existence. These frames often hindered creation of any sort of professional civilian or military intelligence service. First, the American public was skeptical of standing military forces, and intelligence up until World War II was widely seen as a military function. Second, intelligence was also seen largely as properly under the control of military commanders, especially in wartime, although this began to change with the establishment of War and Navy Department intelligence divisions in the 1880s. Third, enabling material technologies were often created by individuals who, although frequently possessing military experience and rank, were acting as independent inventors or contractors to the government and did not enjoy respect from many military commanders. Fourth, individual military organizations guarded the independence of their intelligence organizations from what were considered unreasonable attempts at outside interference—sometimes including interference from other services and civilian decision makers. Finally, in periods of relative peace, American politicians, reacting to public pressure, would prefer to withdraw resources for military and intelligence activities, allowing the resources to be used for peaceful domestic purposes.

CHAPTER 3

OPERATIONAL FRAME OF REFERENCE: A FUNCTIONAL MODEL OF
AMERICAN INTELLIGENCE

The American intelligence technical frame began to stabilize in the second

quarter of the 20th century. While beginning from a military base in the 1920s, a

common approach was created that was reflected in the establishment during the war of a

"national intelligence service," the Office of Strategic Services, and continued into the

post-1945 Cold War era as the Central Intelligence Agency.

The historical experience of American intelligence organizations led to a

formalization of several components of an intelligence technological frame. A three-

factor model based on broad intelligence concepts addressed generalized goals, problem-

solving strategies, organizational design methods, and users' practices. The three factors

formed the basis for a technological network—the "intelligence cycle"—that became

increasingly more complex with the new experiences of World War II organizational

innovation. The resulting functions and structure then produced an intelligence output

through a set of enabling social and mechanical technologies and each of the advanced

technologies gave birth to staffs of specialists that operated within related but

independent frames of reference requiring additional coordination by senior military and

civilian authorities.

<u>The Three Factors</u>

Three authors, each a senior intelligence practitioner and manager, define American intelligence in different parts of the 20th century and early 21st century as sharing a common approach by identifying similar sets of intelligence components. Writing in the early 1920s, U.S., Army Lt. Colonel Walter C. Sweeney described American intelligence as organizing a "machinery" or "system" within the context of a military "Command Agency" to produce a "commodity" or "product."[56] In the aftermath of World War II, Sherman Kent, Yale history professor and Director of the Central Intelligence Agency's Office of National Estimates defined intelligence as "knowledge," "organization," and "activity."[57] Finally, writing at the end of the century, former Assistant Director of Central Intelligence for Analysis and Production Mark M. Lowenthal defined intelligence as "process," "product" and "organization."[58]

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[56] Sweeney, 1924. See especially Chapter II, "Military Intelligence Defined," Pp 13-29.
[57] Kent, 1949, 1965. Kent's describes his use of the three categories as the organizing principal for his book in the "Preface," Pp. xxiii-xxiv.
[58] Lowenthal, Mark M. *Intelligence: From Secrets to Policy*, Fourth Edition. Washington, D.C.: CQ Press, 2009. See especially P. 8.

All three authors define intelligence as including the three components identified in the column headings of Figure 2. The functional category creates a basis for organizational analysis of structure. And the inclusion of knowledge as an "output" extends this project beyond traditional functionalist investigation by opening up the possibility of investigating the processes and results of actors and their networks in

FIGURE 2
A THREE-PART DEFINITION OF INTELLIGENCE TECHNOLOGY

	FUNCTION	STRUCTURE	OUTPUT
SWEENEY (1924)	"MACHINERY" OR "SYSTEM"	"COMMAND AGENCY"	"COMMODITY" OR "PRODUCT"
KENT (1949, 1966)	"ACTIVITY"	"ORGANIZATION"	"KNOWLEDGE"
LOWENTHAL (2009)	"PROCESS"	"ORGANIZATION"	"PRODUCT"

creating knowledge.

Each of the three authors had a varied background that included practical experience in intelligence activities. Sweeney was a military officer who had served as Chief of the Censorship Section of the American Expeditionary Force Military Intelligence Division during World War I. His duties included not only monitoring various forms of correspondence but supervising establishment of the "Stars and Stripes"

military newspaper.[59] Kent's background was as a Yale University history professor, interspaced with periods of government service. He joined the Research and Analysis branch of the Office of Strategic Services during World War II and was director of the Central Intelligence Agency's Board of National Estimates in the 1950s and 1960s.[60] Lowenthal served in a range of executive and legislative intelligence staff and management roles. He has taught intelligence policy and history-related courses at Columbia University's School of International and Public Affairs and George Washington University's Elliott School for International Affairs. In 2005, Lowenthal retired from government service as Assistant Director of Central Intelligence for Analysis and Production, and as Vice Chairman for Evaluation of the National Intelligence Council (a follow-on organization to Kent's Board of National Estimates).

Sherman Kent's 1949 formulation is perhaps the best known presentation of the three. He focuses on the connection between strategic intelligence and the development and implementation of foreign policy, and he identifies the three components of Strategic intelligence as activity, organization, and knowledge.   In Kent's formulation, strategic intelligence is defined primarily as the search for useful knowledge that allows a strategist to create plans and successfully conduct operations vital for national survival. Thus, the term encompasses knowledge that goes beyond that required to support tactical military operations, to include complex divisions of expert labor designed to address problems "of personnel, organization, administration, and human relations which are

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[59] Sweeney, 1924. Pp. vii-aiii.
[60] O'Toole, G. J.A. *The Encyclopedia of American Intelligence and Espionage: From the Revolutionary War to the Present*. New York and Oxford: Facts On File, 1988. P. 237.

peculiar to the nature of the enterprise, and are by no means characteristic of all familiar and homely searches for truth."[61]

Kent labels his functional component "activity," to describe the efforts of a government to warn of impending substantive threats and to form a basis for foreign policy and grand strategy.[62] His structural component is early Cold War "organization," with an emphasis on factors arising in the context of attempts to centralize intelligence activities across the U.S. Government, and corresponding problems of creating and managing, and coordinating intelligence components of the individual government departments.[63] Finally, Kent's output category is "knowledge," which has an encyclopedic descriptive subcomponent, a subcomponent that reports current changes to the descriptive baseline, and a "speculative-evaluative" subcomponent, frequently called an "intelligence estimate."[64]

Sweeney, predating Kent by a quarter of a century, used similar categories but applied them within the narrower context of post-World War I military-related knowledge. He says that that no difference had by the time of his writing been made in the post-World War I American army between the subjects of intelligence and the organizations or people involved in such activity: "No distinction has been made in terminology to indicate whether in saying Military Intelligence reference is made to information of the enemy—the commodity; to the command agency which supervises and directs its handling; or to the system or machinery by which the activity is operated." It is Sweeney's stated purpose "…without attempting to coin new terms, to differentiate

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[61] Kent, 1949, 1965. See especially pages xxi to xxiii.
[62] Kent, 1949, 1965. Pp. 151-206.
[63] Kent, 1949, 1965. Pp. 69-147.
[64] Kent, 1949, 1965. Pp. 3-65

between those already commonly used and to indicate how they may be used so as to avoid confusion in the future."[65]

 Sweeney identifies his structural component as "Command Agency," a subset of the War Department General Staff (the "G-2") focused on developing information for a commanding general or chief of staff about a potential enemy. The G-2 works at a staff level equivalent to the G-1 (administration), the G-3 (operations and training), and the G-4 (supply).[66] He calls his functional component "the machinery or system," composed of a General Staff-qualified G-2 and more specialized experts that are detailed from other components to make up an "Intelligence Service."[67]

Sweeney describes as outputs two types of military intelligence commodity or product: "positive intelligence," constitutes "all activity and all measures taken to gain specific information of the enemy or of the theaters of operations."   "Negative intelligence," or defensive knowledge, is focused primarily on protection from enemy intelligence services.[68] He identifies three subsets of positive intelligence based on his interpretation of what the army hierarchy which would find the most useful: War Department Intelligence, combat intelligence, and G.H.Q. (general headquarters) intelligence that informs the activities of what today would be called "combat commanders."

Lowenthal post-dates Kent by nearly 50 years. His formulation expands the scope of intelligence to include support to homeland security and discussion of legislative

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[65] Sweeney, 1924. Pp. 13-14.
[66] Sweeney, 1924. Pp. 17-18.
[67] Sweeney, 1924. Pp. 19-29.
[68] Sweeney, 1924. Pp 15-16.

and executive oversight mechanisms emphasized since the mid-1970s. Lowenthal intends his book to be an introductory text for undergraduate and graduate students. Thus, the scope of his material is broader than that in either Sweeney's or Kent's earlier works.

Lowenthal's functional element is "process" and he devotes several chapters to describing how collection, analysis, and dissemination of knowledge create the output "product".[69] He labels his structural component "organization," as does Kent, by which he means the organizational entities involved in performing intelligence activities to enable knowledge production.

Lowenthal goes beyond either Sweeney or Kent in his analysis of the relationship between the creation of knowledge and the users of that knowledge, who are the ultimate judges of whether or not intelligence has given them an adequate basis with which to inform policy development or implementing operations. Among other factors, Lowenthal, a former senior staff officer of the House Permanent Select Committee on Intelligence, stresses the rising prominence in the last half of the 20th century of executive and legislative oversight of intelligence and the importance of the programming and budgeting process as both an enabler and a controller of intelligence activities.

Given the agreement in the view of three practitioner-authors over a period of 80 years that the function, structure, and output components of a definition of intelligence provide a historically stable basis for understanding the term, this dissertation adopts those three categories as a framework for analysis that illustrates the application of

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[69] Lowenthal, Mark M., 2009. See especially his summary definition of intelligence on P. 8 and chapters 4 through 6 for discussion of the intelligence process (Pp. 55-67), collection disciplines (Pp. 69-110), and analysis (Pp. 111-150.)

intelligence in national policy making the 1940s and early 1950s. The knowledge

derived from this intelligence technology network is exemplified in the successes and

problems of knowledge creation and diffusion of war-time understanding of German

development of the V-2 rocket. The three-part focus on the function, structure, and

output draws attention to the creation and diffusion of knowledge, where effectiveness

for supporting policy development and implementation depends on acceptable

perceptions based on timely provision of detail, perspective, context, and proportion,

distorted by a minimum of information pathologies.

By looking at the changes in the description of intelligence by these experienced

practitioners (Figure 3) it is clear that intelligence was becoming an increasingly complex

activity. Its functions expanded from providing combat-related information separately to

each of the armed services to a complex series of interrelated processes operating across

organizations. The structure grew from military "Command Agencies" to organizations

supplying information to a broad range of departmental and central political, diplomatic,

military, and fiscal decision makers. And many knowledge products developed into

tailored formats and mechanisms for distributing knowledge to this range of customers.

Taken together, intelligence was becoming a complex network of processes,

organizational and mechanical actors, and products .

FIGURE 3

INCREASING COMPLEXITY OF INTELLIGENCE TECHNOLOGY

	FUNCTION	STRUCTURE	OUTPUT
SWEENEY (1924)	• Processes and procedures through which the Command Agency creates knowledge for use by Army.	• Command Agency, the "G-2," a subset of the War Department General Staff.	• "Positive" knowledge for military units. • Negative information on foreign intel activities.
KENT (1949, 1966)	• Domestic protective surveillance and foreign observation. • Research on policy-relevant issues.	• Central intelligence organization. • Departmental intelligence organizations.	• Basic descriptive knowledge. • Current reportorial knowledge. • Speculative-evaluative knowledge.
LOWENTHAL (2006)	• Processes by which intelligence organizations collect, analyze, and deliver information. • Outside oversight of intelligence activities	• Organizations through which political, diplomatic, military, and budget policy makers receive policy-relevant information	• Information selected and presented verbally or in writing to intelligence "consumers."

The Intelligence Network

Viewed as a network, the functions, structure, and output of social and mechanical "actors" form the basis for the actions and technological innovations of intelligence organizations that help enable the development of government policy. One very simplified diagram of the generic intelligence network is called "the intelligence cycle." It is composed of three functions that make up a part of Kent's category of "activity." In this formulation, a common organizational structure is assumed between departments and agencies. In actual practice, it differs from organization to organization. The model portrayed in Figure 4 assumes a closed cycle with no provision for variation in management styles or unique applications.

Figure 4

A SIMPLE FORMULATION
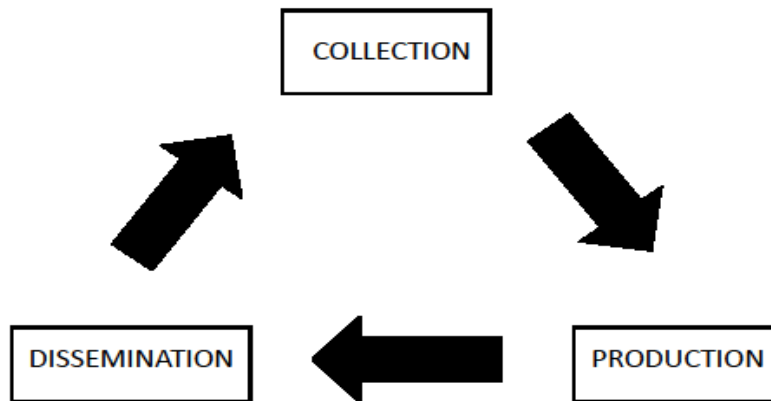
A more developed version of this model is shown as Figure 5, based on a U.S. Navy description published in 1994 in Naval Intelligence Publication 2, *Naval Intelligence*.[70] It continues to portray a closed system within a single organization, but makes allowance for the additional activities of planning and direction and information processing, as well as showing that all of the activities are internal to the organization with the mission prescribed by the commander of that organization.

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[70] Naval Doctrine Publication 2, *Naval Intelligence*. Washington, D.C.: Department of the Navy, 30 September 1994. See especially P. 24-26 for the doctrinal definition of the functions displayed in the diagram..

Figure 5

INTELLIGENCE CYCLE (NAVY): 1994
(Adapted from Naval Doctrine Publication 2, *Naval Intelligence*, 30 Sep 94, P. 24)
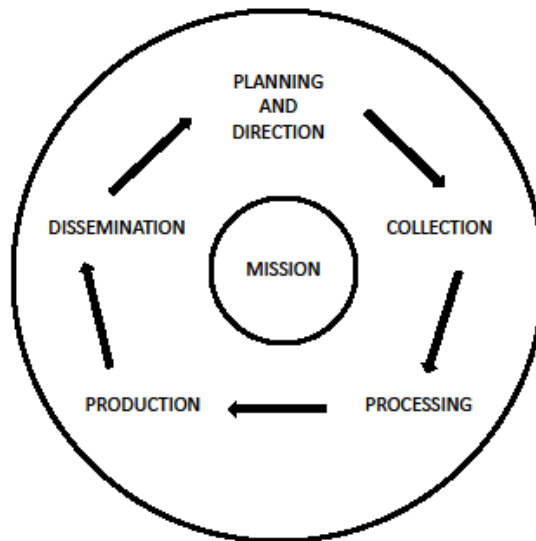
These two versions of the intelligence cycle contain the three primary activities discussed by Kent. But the complexity of interactions between activities and actors in the context of scientific and technical intelligence during World War II suggests a more inclusive model that will be presented in the final chapter.

Kent's model adds considerable detail to the functions and their relationships with structure and output of intelligence. He sees the essential functions of intelligence as a systematic process of surveillance—more recently described as "collection"—and research, or "production." These processes can be initiated at the request of policy makers and operational managers. Or they can begin with facts revealed by earlier

surveillance of foreign nations. Much of the "surveillance" is performed through systematic review of publically available information from the media and generally available documentation. But in the case of nations that are potential economic or political competitors, it may also require secret access from espionage and technical means such as agents with close access to the information required, intercepted radio signals, or aerial photography.[71]

Kent suggests research stages closely akin to that of the social sciences. This process would contain seven stages:

1. The appearance of a problem requiring the attention of a strategic intelligence staff.

2. Analysis of this problem to discover which facets of it are of actual importance to the U.S. and which of several lines of approach are most likely to be useful to its governmental consumers.

3. Collection of data bearing upon the problem as formulated in stage 2. This involves a survey of data already at hand and available in the libraries of documentary materials, and an endeavor to procure new data to fill in gaps.

4. Critical evaluation of the data thus assembled.

5. Study of the evaluated data with the intent of finding some sort of inherent meaning. The moment of the discovery of such meaning can be called the moment of hypothesis. In reality there is rarely such a thing as one moment of hypothesis though some students of method, largely as a convenience, speak as if there were. Nor can it be said categorically at what stage in the process hypotheses appear. One would be pleased to think that they appeared at this, the respectable stage 5, but in actual practice they begin appearing when the first datum is collected. They have been known to appear even before that, and they may continue to appear until the project is closed out—or even after that.

6. More collecting of data along the lines indicated by the more promising hypotheses or deny them.

7. Establishment of one or more hypotheses as truer than others and statement of these hypotheses as the best approximations of truth. This is the last stage and is often referred to as the *presentation* state.[72]

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[71] Kent: 1949, 1965. Pp. 151-154.
[72] Kent: 1949, 1965. Pp. 157-158.

While the intelligence research process has similarities to social science, Kent also points out significant differences. For example, a policy and planning staff may be wrestling with a policy problem for some time before its members realize that they need additional information from intelligence, often at the last minute. In other cases, the people involved in information collection and surveillance activities must recognize the limited availability of revealing resources and must be prepared to make trade-off decisions about the likely most useful sources and the level of detail required. The intelligence researcher must also be able to quickly determine information already available and requirements for new data collection, as well as have the ability to communicate with the surveillance specialists in the field—a problem often made more intense by administrative security mechanisms. Further, intelligence cannot be run like an assembly line without endangering the ability of the researcher to critically evaluate new data. An intelligence researcher must have access to all relevant data and a professional staff competent and devoted to the research task of building a useful hypothesis. And, finally, the researcher must be able to communicate the preferred hypothesis to the consumer, both briefly and clearly.[73]

Intelligence organizations are built to enable and guide these research functions. As Kent describes the institutions of intelligence, they are focused on the special knowledge and skills required to "put foreign countries under surveillance and must be prepared to expound their pasts, presents, and probable futures." To do this they must be

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[73] Kent: 1949, 1965. Pp. 159-179.

able to direct research toward issues that are useful to policy and operational decision makers by providing knowledge that is relevant, complete, accurate and timely.[74]

Intelligence management and organization may be subordinate to various levels of government. In the post-World War II era great emphasis would be given the concept of *central* intelligence to support strategic policy making, both civil and military. This arrangement was largely in response to what were seen as wartime difficulties in coordination of intelligence within and between organizations. However, the proposals for coordination implied unacceptably taking control away from the traditional intelligence managers in the Departments, Agencies, and armed services—a tension which persists.

Kent's formulation of intelligence as organization deals less with specific structural arrangements than with lessons he has drawn from his wartime Office of Strategic Services and early-post-war Central Intelligence Agency experience.[75] He discusses the evolution of CIA as America's first "formal and official central organization for strategic intelligence"[76] and departmental intelligence as the components of the military services, the Department of State, and other civilian departments that perform intelligence functions.[77] His discussion in Chapter 8, "Departmental Intelligence Organization: Ten Lessons from Experience," provides the basis for the following

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[74] Kent: 1949, 1965. P.69.

[75] Kent: 1949, 1965. Kent deals with organization in his second section, Pp. 69-147. The discussion that follows draws primarily from his Chapter 8, "Departmental Intelligence Organization: Ten problems from experience," Pp. 116-147.

[76] Kent: 1946, 1965. Pp. 78-79. Chapter 6, "Central Intelligence," presents a more fulsome discussion on pages 78-103.

[77] Kent: 1946, 1965. Chapter 7, "Departmental Intelligence," Pp. 104-115.

summary as his comments are drawn directly from his role in the organizations involved in this study of American and British intelligence activity in Chapters 5 through 8, below.

The first four questions Kent discusses are closely related and deal with the general structure of an intelligence organization:

- Should the basic pattern of intelligence organization be regional or functional?

- How one handles matters which defy regionalization?

- How one handles those problems of a multi-national nature for which the organization provides no full-time supervisor or coordinator?

- How to exercise effective control without jeopardizing the accomplishment of the mission?

In Kent's view, the majority of strategic intelligence problems draw data from sources viewing their problem through a lens focused on national or regional issues. Therefore, his preference is for a regional organization of the intelligence organizations aligned with the political and economic entities that are the subjects of the policy interests of their primary customers. However, some subjects of intelligence interest such as international organizations and more limited multinational activities may become dominated by specialists in cross-regional functional areas such as economics or political sciences. While there is an underlying regional basis for most issues of this type, such situations can cause tensions between expert groups, and Kent proposes a control organization as necessary for managing competition and arbitrating disputes between experts. His ideal solution is to "push the control function back down the hierarchy as far

as possible. If this were done, each professional unit would have its own control

officer"[78] to deal with issues such as professional standards, paper work management,

project authorization, and product distribution.

Kent's remaining six issues are less closely related, although several deal with

some variation of the need for a reference library function within intelligence

organizations. His fifth question concerns the most effective form of administration for

managing a deployed field intelligence unit. Deployed intelligence officers must

maintain as close a relationship as possible with their home office control organization.

Since the home office will be sending out officers to other areas as well, they must have

some sort of central mechanism to coordinate these officers and to ensure that

information from them is shared with other units that would benefit from the knowledge

supplied by all. Moreover, deployed officers will also have responsibilities to the senior

diplomatic representation in the country to which they are assigned. Kent proposes no

magic solution, but encourages close contact between the field representation and their

home office staff.[79]

A sixth question concerns the need for a library storage, retrieval, and access

control function in a strategic intelligence organization. In Kent's view, the answer is

strongly positive. Such a function must see to acquisition of openly available information

and the ability to exchange material with other similar offices in parallel organizations.

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[78] Ketn: 1949, 1965. Pp127-130.
[79] Kent: 1949, 1965. Pp. 130-132.

He includes in these materials all open sources but maps. The library should also be responsible for the central handling and controlled distribution of classified material.[80]

However, in his seventh question, Kent draws a distinction between collection and dissemination of material which can be identified by title and source and raw material received from professional reporting officers. The former is a library function. The latter is more a professional staff function. For this reason, Kent does not agree with establishment of a single collection and dissemination office in his seventh problem. Rather, he proposes "a skillful and active library and a small distribution unit attached to the active office of the chief of the organization where it will have close contact with Control and the professional staff." [81]

Management of a biographical intelligence function is defined by Kent's eighth problem. Gathering names and pertinent data on the thousands of foreign individuals in which one's national decision makers may be interested is an enormous—and largely clerical—under taking. This factual data must be kept in a central file to ensure availability. But the more sensitive evaluative assessment of the raw biographical data is likely beyond the capabilities of clerical staff and would have to be the responsibility of trained professional staff. Therefore, in Kent's view, a "Personalities Unit" must supply help to the clerical-level, and the regional units must recruit professional-level biographic analysts. But the temptation must be avoided in the regional units to seeing the

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[80] Kent: 1949, 1965. Pp. 133-136.
[81] Kent: 1949, 1965. Pp. 136-140.

biographic professionals as fungible and thus assigning them to more general analytic responsibilities, especially when manpower is in short supply.[82]

A ninth question Kent raises is the most effective arrangement for managing cartography and its products. The acquisition of maps appears at first glance to be a library problem. However, while large quantities of maps are collected and centrally filed, their purpose is to provide useful data for the intelligence organization's own cartographic effort. In Kent's view, it is more important to keep the map collecting and cartographic functions together at the organizational level of—but separate from—the largest geographic unit than it is to merge the map collecting function into the acquisition functions of a central over-all library.[83]

Kent's tenth and final problem is how to maintain a professionally competent staff within legal constraints of the Civil Service Act and limited budgets. His wartime experience showed how permissive budgets and hiring practices attracted talented people but made it hard to remove those who proved unsatisfactory. On the other hand, the end of the war brought declining budgets into the political context and few political leaders thought that a nation needed as large and competent an intelligence staff in peacetime as it did in war. peacetime also brought more opportunities in the private sector for the most competent government employees. Kent acknowledges that his solution was a "heroic" heresy in its proposal that proven specialized experts such as intelligence professionals should be made immune from ordinary civil service regulations. In his view, the over-

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[82] Kent: 1949, 1965. Pp. 140-143.
[83] Kent: 1949, 1965. Pp. 142-145.

standardization of personnel regulations could cause unacceptable declines in strategic

intelligence effectiveness.[84]

The underlying purpose behind the surveillance and research functions of

intelligence and the organizations created to implement these functions is the production

of useful knowledge to support political and military leaders, planners, and operators.

However, Kent is clear that intelligence is only one of several sources of information to

support policy making and execution. Scholars, writers, businessmen, and a variety of

expert advisers—including the decision makers themselves—all provide policy-relevant

data.

Kent describes the intelligence subset of policy support knowledge as falling into

three overlapping categories: a basic descriptive element, a current reportorial element,

and a speculative-evaluative element.[85] The basic descriptive element sets a baseline for

the other two. In a sense, this component provides a constantly-updated encyclopedic

data base of accumulated facts and figures about possible opportunities and threats

presented by potential international social, political, economic and military competitors.

In Kent's wartime experience, such knowledge was applied in contexts such as strategic

bombardment, political and economic warfare, and military government. Such

information provides the grist for what Kent calls "narrow-deep studies" as well as

answers to policy makers' immediate requests for detail on specific issues and

situations.[86]

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[84] Kent: 1949, 1965. Pp. 145-147.
[85] Kent: 1949, 1965. Pp. 3 – 10.
[86] Kent: 1949, 1965. Pp. 11-29.

Kent's current reportorial element often goes by titles such as current intelligence—a constant monitoring of unfolding events in regions of interest. He suggests eight substantive areas where the producers of this type of information combine the data from the basic descriptive data bases with new information from current surveillance activities:

- personalities,

- geography,

- military developments,

- economic developments,

- political events,

- social phenomena,

- moral changes, and

- scientific-technological advances.

It is easy to see that the topic of this dissertation, the development of American and British intelligence on German secret weapons, fits neatly within the categories of military developments and scientific-technical advances. As will be seen, it also relates to personalities and economic developments. In addition, Allied decisions to bomb German industry and Germany's decision to apply the new weapon technologies to attacks on the British populace in retribution mattered as moral changes.[87]

Finally, Kent discusses the speculative-evaluative component of intelligence knowledge. This area is more concerned with enabling foresight in strategy development

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[87] Kent: 1949, 1965. Pp. 30-38.

and planning than in supporting immediate operations. From this perspective, the

important intelligence questions are about the future potential of foreign governments in

areas such as strategic stature, specific vulnerabilities, and probable courses of action.

These form the basis for estimates of future threats and opportunities. Speculative

estimates do not by themselves determine the direction or substance of national policy.

They may have great weight during wartime although access to pertinent information

may be restricted. But they are a major component for informing peacetime decision

making when foreign information is more easily acquired. However, Kent cautions that

speculative knowledge is not just a recording of easily available facts, but depends on the

critical facilities of its analysts.[88]

The variety of functions Kent describes and the experience described in this

study suggest that a more complex diagram is more realistic. Figure 6 provides an

attempt to build such a model:

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[88] Kent: 1949, 1965. Pp. 39-65.

Figure 6

A MORE COMPLEX MODEL

KEY
POLICY ACTIVITIES
INTELLIGENCE ACTIVITIES
OVERSIGHT ACTIVITIES
COMMERCIAL ACTIVITIES

NATIONAL STRATEGY

POLICY IMPLEMENTATION — POLICY FORMULATION — ACADEMIC ADVICE

REQUIREMENTS DEVELOPMENT

DISSEMINATION

EXECUTIVE OVERSIGHT   LEGISLATIVE OVERSIGHT

COLLECTION

EXECUTIVE MANAGEMENT AND COORDINATION

ANALYSIS (KNOWLEDGE PRODUCTION)

MEDIA CRITICISM   PUBLIC OPINION

DATA PROCESSING

INFORMATION EXPLOITATION AND REPORTING

COMMERCIAL INTEREST AND SUPPORT

74

The Enabling Social and Mechanical Technologies

While social factors defined the functions, organization, and forms of knowledge collected and produced by intelligence in the period leading up to World War II, innovations in mechanical and electrical technologies first discovered in the 19th century allowed extended range of physical and technical access and data processing that enabled the components of the social structure to achieve its desired goals. These innovations included means of agent transportation and communication; the intercept, recording, and analysis of foreign radio communications; and adaptations of aircraft, cameras, and film that allowed taking good resolution photographic images from distances of several miles.

The post-World War I development of transport aircraft parallels the importance of railroad development during the American Civil War. Combined with improvements in ground vehicles and road building techniques, these earlier innovations allowed the rapid movement of heavy or sensitive loads over long distances and into sensitive areas. This had the added benefits for intelligence of being able to deliver secret agents into enemy territory, recover them, provide covert delivery of supplies, and ferry captured material to facilities equipped to analyze it. The development of aircraft increased the speed and size of cargo loads and the range over which they could be delivered.

In terms of data collection, the capability for airborne surveillance began with balloons used to carry observers who constructed maps and to reported visual sightings of enemy military strength and movement. This technology was based on French experiments during the eighteenth century and recognized by Benjamin Franklin during

the American Revolution as a potential source of military information and airborne attack.

However, such tools were not employed in military conflict until the American Civil War. Both the Union and the Confederate armies had small units for this purpose, but they were used for only a very limited period during the first year of the War and didn't gain acceptance by mainstream military leadership despite support by President Lincoln and several field commanders. Balloons continued to be referenced in American military publications during the last half of the nineteenth century but did not see routine employment with cameras to record enemy positions and provide mapping data until the First World War.[89]

By 1914 balloons shared the reconnaissance field with early aircraft. The British and American innovation of aircraft as a means of observation in this conflict were largely drawn from French experience in information collection during the early part of the War. Here, aircraft performed multiple roles including observation—with either the naked eye or early cameras, pursuit of enemy aircraft and balloons, or to a more limited extent, bombardment of ground targets. The availability of photography of enemy positions enabled planners on both sides to more accurately identify potential air

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[89] Lieut-Col. Arthur L Wagner,. *The Service of Security and Information*. Seventh Edition. Kansas City, U.S.A.: Hudson-Kimberly Publishing Co., and London: W. H. Allen & Co., 1899. See especially Pp. 161-164. Wagner's book was published in many editions. On Page 5of this edition, Wagner includes a reprint from an 1893 Army Adjutant-General's Circular that includes the statement that "The Service of Security and Information' by Captain Arthur L. Wagner, 6th Infantry, is announced as an authorized text-book…in connection with the system of examination to determine the fitness of officers for promotion…." Thus, his comment on P. 164 that "While the value of balloon reconnaissance is still somewhat problematical, this method of gaining information of the enemy presents so many possibilities that it cannot be safely ignored" likely represents the views of aerial surveillance adopted by many officers at the turn of the century before the advent of heavier-than-air vehicles.

bombardment and artillery targets and to record the damage being done by artillery fire and aerial bombardment.[90]

While both the British Royal Air Force and the American Army Air Corps maintained budget-limited aerial reconnaissance capabilities after World War I, their operations were relatively open and could be seen by any potential enemy. However, during the late inter-war period, an Australian, Sidney Cotton, developed a covert photographic capability for the British Secret Intelligence Service, in cooperation with the French. The aircraft he used for many of his reconnaissance missions were a slightly smaller version of the Lockheed Electra in which Amelia Earhart attempted her around-the-world flight in 1937. Cotton had unique access because of a "cover" business in commercial film research and production that allowed him to secretly photograph German airfields, ports, and industrial facilities. Both Cotton and his SIS superior have written about his exploits. While differing about personalities and management details, both make it clear that Cotton's covert photographic capability provided a valuable innovation in collection of information on German port and aeronautical facilities.[91]

As Britain entered World War II in 1939, Cotton's covert reconnaissance organization was merged with the existing Royal Air Force photographic capability to form what became known as the PRU or Photographic Reconnaissance Unit. A sister

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[90] See, for example, Floyd D. Carlock, United States Army. *Military Topography and Photography*. Menasha, Wisconsin: The Collegiate Press, George Banta Publishing Company, 1918. Carlock was an Army expert in WW I topography and balloon operations.

[91] See Cotton: 1969 and Winterbotham:1969 (Pp. 127-1370 and Winterbotham: 1978 (Pp. 192-201) for their differing points of view. Hinsley, et al, Volume One:1979 provide a more measured description of Cotton's performance in Appendix 2, "The SIS Air Photographic Unit – the Activities of F S Cotton," Pp. 496-499, drawn in part from Cotton/Baker (1969), Winterbotham (1969), and Babington-Smith (1958).

central analysis organization, the Photographic Interpretation Unit (PIU) was located for most of the War at RAF Station Medmenham, which became not only an operational interpretation facility for the British, but served as a training facility for American interpreters after the U.S. declared war in 1941. It was then re-designated the Central Interpretation Unit (CIU) for the Western Allies in Europe.

As the Britain and America increased their involvement in the European war, they also improved the aircraft platforms for their photo reconnaissance capabilities by adapting successful versions of fighter and bomber aircraft for new reconnaissance roles. The American Air Force modified a limited number of P-38 and P-51 fighters and B-17, B-24, B-25, and, in the Pacific theater, B-29 bombers, giving the aircraft of their reconnaissance fleets a maximum service altitude of up to 42,000 feet, a speed of up to 375 mph, and a range of up to 36,000 miles. The British flew a similar mix of fighter, bomber, and liaison aircraft with fleet maximum speed of 460 mph, a maximum service ceiling of 44,000 feet and a range of up to 3,500 miles.[92]

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[92] Col. Roy M. Stanley *World War II Photo Intelligence*. New York: Charles Scribner's Sons, 1981. Pp.79-115. For comparison, a Civil War era balloon in the early 1860s tethered over a single spot and operating at an altitude of around 1000 feet would give an observer visual—but not photographic, access to a horizon just short of 40 miles away. At the opposite extreme, a B-29 in the Pacific Theatre in the mid-1940s operating at 38,000 feet could travel about 3600 miles at 375 miles an hour and would have potential visual and photographic access out to a horizon 240 miles either side of its flight path. A smaller P-51 (its American air force reconnaissance designation was F-6) could travel 1000 miles with auxiliary fuel tanks, fly at up to 440 miles per hour at 42,000feet and could see out to 250 miles—although many P-51, Spitfire, and Mosquito pilots would fly the photographic part of their mission at much lower altitudes, comparable to those of the Civil War-era balloon   Over all, aircraft for photo reconnaissance gained area of coverage access, higher photograph resolution with new types of film and modern cameras with telephoto lenses, and systems to compensate for aircraft motion, without the limitation of being tethered in a balloon over a single location as were the earlier Civil War and World War I operational military balloon reconnaissance systems.

While there were a limited number of British and American aircraft modified for airborne intercept of radio and radar signals, the bulk of radio intercept during the war was performed from ground stations. Governments have long relied on communications systems to coordinate political policy and manage the conduct of diplomatic and military operations. Historically, the need for communications led to both physical technologies such as road systems and organizational technologies such as courier services and the establishment of systematic postal services. Particularly sensitive communications were protected with the development of codes and ciphers .

Innovations in radio signal interception, data processing, and code breaking also improved between World War I and World War II. Development of wire, transoceanic cable, and wireless radio means of communications over long distances reduced planners' and operators' reliance on couriers who could be captured and dramatically reduced the time it took to send orders and receive news from afar. However, these new means of electronic communication were also were vulnerable to new interception techniques. Wire telegraph transmissions had been tapped since the American Civil War, undersea cables were vulnerable to destruction or monitoring by governments of nations through which they passed, and most governments developed organizations for increased censoring of mails, intercepting radio signals and breaking other nations codes and ciphers. Innovations in wire and tape recording technology also began to allow recording of signals for more detailed exploitation at better-equipped processing facilities.

Both America and Britain had developed networks of radio monitoring stations by World War II. The British interception activities were focused primarily on the threat in Europe, North Africa, and the Mediterranean theaters. American forces shared the

surveillance effort in North Africa and the Mediterranean, but were the responsible authority in the Pacific theater.

Pertinent to the V-2 problem, the British communications intercept network was made up of a series of tactically-oriented Home Defence Unit intercept stations along the southeastern English Channel coast across from France and Belgium. Larger facilities Located at Cheadle (near Birmingham) and Chicksands Priory (near Cambridge) were capable of intercepting enemy wireless-telegraphy and radio-telephone communications, including encrypted "ENIGMA" messages, over great distances. This was particularly useful in surveillance of message traffic from as far away as Peenemünde on the Baltic Coast.

At the start of World War II, the American Army had a similar set of intercept sites at Fort Hancock, New Jersey; Fort Scott, Presideo of San Francisco; Fort Sam Houston, Texas; Port of Corozal, Panama Canal Department; Fort Shafter, Territory of Hawaii; Fort McKinley, Philippine Islands; and Fort Hunt, Virginia. The U.S. Navy had facilities at Bainbridge Island, Washington and Bar Harbor Maine. By the end of the war, the American Military had expanded its intercept sites to include Vint Hill Farms, Warrenton Virginia; Two Rock Ranch, Petaluma California; Indian Creek Station, Miami Beach Florida; Amchitka and Fairbanks in Alaska; Guam; Bellmore, Long Island; and Tarzana California. Vint Hill Farms, Two Rock Ranch, and Fort Shafter were the best equipped.

There were variations over time and in different theaters of the war in the distribution of sensitive material, but the British and Americans used similar models to

provide sensitive information to policy makers and operational customers, while

restricting its availability to those not possessing "need-to-know." In general, intercepted

messages from British sites were forwarded for decoding and translation to the British

Secret Intelligence Service's Government Code and Cypher School facility at Bletchley

Park. The Americans had a corresponding Army Signal Intelligence Service facility at

Arlington Hall Station in Virginia. The decoded messages were be reviewed for

controlled distribution to British customers by watch officers at Bletchley Park and

passed to customers through the Secret Intelligence Service's Special Liaison Unit

system. American decrypted Signal Corps Signal Intelligence Service intercepts

processed at its Arlington Hall Station were similarly reviewed for distribution to

American customers by the Special Branch of the War Department's Military

Intelligence Service and later in the war through a system of Special Security Officers

that paralleled the British SLU system. And from the middle of the war, the American

Army's Special Branch had a liaison unit commanded by Colonel Telford Taylor—later a

prosecutor at the Nuremberg Trials—permanently assigned to the GC&CS Bletchley

Park facility.[93]

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[93] The foregoing description was compiled from several published sources. The British arrangements for intercepting radio transmissions are the central topic of Aileen Clayton's *The Enemy is Listening: The Story of the Y Service* (London, Melbourne, Sydney, Auckland, and Johannesburg, Hutchinson & Co. (publishers) Ltd., 1980   Nigel West also covers this topic in his history of the post-war Government Communications Headquarters GCHQ: The Secret Wireless War 1900-86, London: Weidenfeld and Nicolson, 1986. An expanding literature on British code breaking activities is discussed elsewhere in this paper. However, the less well known American activities are summarized from original documents *in U.S. Army Signals Intelligence in World War II*, edited by James L. Gilbert and John P. Finnegan and originally published in 1993 by the United States Army Center of Military History in Washington. A reprint version was published by University Press of the Pacific in Honolulu in 2004. While F. W. Winterbotham's 1974 *The Ultra Secret,* purports to be the story of breaking the German ENIGMA machine code by Polish, French and British cryptographers, it is most useful as a description of the SLU dissemination control system that Winterbotham instigated. Gilbert and Finnegan, eds., contains much useful information on the American version of the dissemination system.

Despite similarities in approach of the British and American code breaking activities, the two nations' efforts remained largely separate until mid-1943, when the British decided—despite some internal dissent—to accept American presence at Bletchley Park. Up to that time each nation was suspicious of the other's ability to keep their sensitive communications intercept and decoding capabilities a secret from the enemies' own intelligence services. There had been a brief interlude during World War I when the British had used provision to the Americans of a copy of German diplomatic messages—the Zimmermann Telegram—as a lever with which to convince President Wilson that he must change his deeply felt neutralist position in favor of joining the European Allies in the war against the Germans and their allies.[94] However, this was a specific instance, not a routine change of policy. The extremely close relationship that

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The contributions of computers to British and American code breaking is introduced in some detail in Józef Garlinski in *The Enigma War: The Inside Story of the German Enigma Codes and how the Allies Broke Them*, New York: Charles Scribner's Sons, 1979. A more advanced COLOSSUS system to break the sophisticated German naval electronically-generated code system is discussed in two books: *From Fish to Colossus: How the German Lorenz Cipher was broken at Bletchley Park* by Harvey G. Cragon (Dallas, Texas: Cragon Books, 2003) and *COLOSSUS: The Secrets of Bletchley Park's Codebreaking Computer*s edited by B. Jack Copeland (Oxford: Oxford University Press, 2006.) An interesting presentation of an American Navy contract effort with National Cash Register to build a machine to break a more complex 4-rotor version of the ENIGMA was written by Jim DeBrosse and Colin Burke: *The Secret in Building 26: The Untold Story of America's Ultra War Against the U-Boat Enigma Codes*, New York: Random House, 2004.

[94] Much has been written about the attempt of the German effort to make an agreement with Mexico and Japan to engage the Americans so that they would be unwilling to further aid Britain. The Germans were about to begin unrestricted submarine warfare and wanted American diplomatic and military attention to be directed to the south and east rather that the Atlantic and Europe. The British, and especially their Director of Naval Intelligence,Admiral William "Blinker" Hall, agreed to provide limited American access to a copy of the German code reconstructed by the Admiralty's code breaking organization, "Room 40," to verify the authenticity of the German message that virtually constituted an act of war against a neutral America. Three published sources provide a useful summary of this incident. Barbara Tuchman's The Zimmermann Telegram" (New Edition,:New York: Macmillan Publishing Co., Inc., 1958. 1966) described the political context of the German message, the British decision to share an intercepted version of the telegram, and the American response. Alfred W. Ewing's biography of his father, the director of Room 40, provides a brief summary of the incident from the British perspective in *The Man of Room 40: The Life of Sir Alfred Ewing* (London: Hutchinson & Co. (Publishers) Ltd., Preface dated May 1939. Pp. 201-207. David Kahn discusses some of the technical detail in *The Codebreakers. The Story of Secret Writing*. (London: Weidenfeld and Nicolson, 1967. Pp. 282-297.)

continues to the present did not exist until 1943 and its subsequent codification in a

formal agreement known variously as the" BRUSA" or "UKUSA Agreement".[95]

In summary, it is the American adaptation of British intelligence frames reflected

in models and techniques, and the slow internal and external integration of American and

British intelligence activities that led to a three-part technological complex of enabling

social and mechanical technologies that established America's ability to focus

intelligence on the specific problem of defining and responding to a German rocket-based

secret weapon program. That German effort is the subject of the next chapter.

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[95] This agreement remains a very sensitive issue to the two nations. However, some general idea of the organizations, processes, and issues involved can been drawn from Jeffrey T. Richelson and Desmond Ball's *The Ties That Bind: Intelligence Cooperation between the UKUSA Countries—the United Kingdom, the United States of America, Canada, Australia and New Zealand*. (Boston, London, and Sydney: Allen & Unwin, 1985.)

CHAPTER 4

INTELLIGENCE GOALS AND KEY PROBLEMS: THE GERMAN ROCKET
DEVELOPMENT EFFORT

As Bijker describes the content of technological frames, goals and key problems
are fundamental elements of a technological enterprise. In this dissertation those goals
and problems were provided by growing awareness, first by the British, then the
Americans, and finally the Russians, of a new and unexpected type of enemy weapon
system, the long-range liquid-fueled rocket with a warhead of undetermined type or
strength.

It is important to note, however, that concern over this new type of threat existed
in a context of complex military operations, western allies' operation in two widely
separated geographic regions, and a third conflict within the area of Russian control.
Nonetheless, studying the case of Allied intelligence focus on the new rocket weapon
provides an exemplar demonstrating how the social and mechanical components of an
intelligence technology interacted in developing information to support policy and
military decision makers. In this narrower context, a survey of the German rocket
program helps to define goals and key problems that Allied intelligence technology had
to address.

The development of the German rocket was the result of a long and complex
process, involving multiple military programs and a quickly changing set of development
priorities common to combat situations. In the aggregate, Germany's effort formed a key

problem to be resolved by the American and Allied intelligence effort: defining the military and political threats posed by Nazi secret weapon development.

Interwar German Army Rocket Research

The first part of this process was rooted in Germany's World War I experience. The motivations for developing the V-2 were both military and political, a reaction to restrictions of The Treaty of Versailles which limited the capabilities of weapon systems Germany was allowed to have after its defeat, including artillery. Article 166 of the Treaty restricted German field artillery to 204 7.7cm guns and 84 10.5cm howitzers.[96] However, advances in artillery design continued to be very important to the thinking of the most senior German army officers. Michael Neufeld shows this was reflected in the senior staff of the later Third Reich military during the first part of World War II:

> Until Hitler himself took over command in December 1941, all the Army Commanders-in-Chief during the Third Reich came out of the artillery, as did Wilhelm Keitel, Hitler's chief of staff in the Armed Forces High Command (OKW) after 1938. Every Chief of Army Ordnance in this period, including [General Karl] Becker himself from 1938 to 1940, was an artillery man as well....[97]

The importance of artillery in German military culture and the Treaty restrictions imposed by the victorious World War I Allies moved the German army's weapons development authorities to search for new technologies that could be used like artillery but would not be legally restricted by international treaty sanctions. General Walter

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[96] Barton Whaley. *Covert German Rearmament, 1919-1939: Deception and Misperception.* Fredrick, MD: University Publications of America, Inc., 1984. Pp. 127, 137.
[97] Michael J. Neufeld. *The Rocket and the Reich: Peenemünde and the Coming of the Ballistic Missile Era.* New York: The Free Press, 1995. Pp. 51-3.

Dornberger, the V-2's military project director, described the German thinking and approach in his memoirs:

> The consequence, logically enough, was that the Army Weapons Department began to look for new developments in armament which would increase the fighting power of the few existing troops without violating the Treaty.
>
> Rocket literature revived again in the thirties and experiments drew attention to alleged improvements. The Army Weapons Department, especially the Ballistic and Munitions Branch under Professor Becker (later General Becker), began to take an interest in these ideas….[98]

The potential of the rocket appeared to solve both technical and political problems. As a new technology, it was not restricted by treaty. Beyond this, it was capable of carrying a heavier load of explosive over longer ranges than any gun-based system. And, as Dornberger explains, rockets were considerably easier to maneuver and potentially more effective in the field than the World War I-vintage rail-mounted Paris Gun:

> …Von Braun and Riedel were already thinking of a really big rocket, and I too had been giving the subject a lot of thought. I had been with the heavy artillery. Artillery's highest achievement to date had been the huge Paris Gun, developed during the First World War. This could fire a 210-millimeter shell with about 23 pounds of high explosive about 80 miles. My idea of a first big rocket was something that would send a ton of explosive over 160 miles--that is, double the range of the Paris Gun.[99]

Early Development at Peenemünde

Before Germany invaded Poland at the beginning of September 1939, its army and air force (Luftwaffe) had established a joint aircraft and rocket weapons research and

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[98]Major-General Walter Dornberger. *V2*. London: Hurst and Blackett 1952, 1954. P. 31.
[99]Dornberger, 1952,1954. P. 55.

development center at Peenemünde on the northeast German Baltic coast. The two

services' combined effort was directed toward researching liquid-propulsion technology

rocket engines and developing that research into practical weapon systems. By the time

America entered the war, the Germans at Peenemünde were making considerable

progress in the development of both manned and unmanned rocket- and jet-powered

systems.

Von Braun had identified the Peenemünde area as a possible site for an expanded

rocket research facility in December. 1935 and the study plans for the Peenemünde

project were just beginning to be laid out in March 1936.[100]   These plans were approved

in April, and personnel from Kummersdorf were just moving to Peenemünde in May of

1937, before any of the test stands were operational.[101]

1939 was an active period for German long-range rocket development. Planning

had begun on Peenemünde's work schedule at the beginning of the year, and

development had begun of new integrating accelerometers as part of rocket guidance

control systems. By March, various tests of the aerodynamic stability of the A-5 were

underway at Peenemünde and the small launch facility then available on the off-shore

Baltic island Greifswalder Oie.[102]

Also in March, Hitler made his first visit to Kummersdorf to see the results of the

research effort. He asked questions about production availability of the larger A-4 that

was capable of carrying an explosive warhead. According to Dornberger, Hitler's

reaction was "reserved." (Hitler never did visit the larger Peenemünde complex.) But

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[100] Dornberger: 1952, 1954. Pp 48-49, 55.
[101] Dornberger: 1952, 1954. P. 60.
[102] Dornberger: 1952, 1954. Pp. 65-66.

Hermann Goering was briefed on the same material a few weeks later, and he had exactly the opposite reaction to Hitler's, in Dornberger's opinion "unrealistically enthusiastic."[103]

By August 1939, Albert Speer was becoming involved in the rocket program. He discussed a number of topics with Hitler that month at a meeting at the Obersalzberg (Germany's "Camp David" during the Hitler era) and as a result, began planning a technical assistance group for efficient management of the Peenemünde operation. This concept was rudely rejected by Hitler's chief of staff Martin Bormann, who passed on Hitler's direction that Speer was to focus all his effort on architectural building plans for Berlin.[104] But Speer's interest had been piqued and he would soon have a larger role to play in V-2 development.

The beginning of World War II with Germany's contrived attack on Poland on September 1st, was a watershed moment for Germany's long-range rocket program. The facility at Peenemünde was developing rapidly. A collocated supersonic wind was tunnel becoming operational, and the senior army staff was giving the A-4 a highest military priority. Speer was able to manage an arrangement with the army to get around Hitler's cut in priority for facility construction labor and material resources.[105]

Despite successful late-October 1939 test launches of the smaller A-5 with an improved control system developed by the Siemens Corporation, the rocket developers were told to focus on completing the A-4 weapon rather than pursuing less operationally-oriented research or support to the Luftwaffe's rocket aircraft development.[106]

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[103] Dornberger: 1952, 1954. Pp. 70-73.
[104] Albert Speer. *Inside the Third Reich*. New York: The Macmillan Company, 1970. Pp. 167-168.
[105] Speer: 1970. P. 366
[106] Dornberger: 1952, 1954. Pp. 124-125.

Ultimately, this decision kept designs for an intercontinental-range version of the A-4, known as the two-stage A-9/A-10, on paper, limiting the potential range of the rocket to targets within a range of about 200 miles from a launch site.

The German rocket program continued apace, while its military entered Yugoslavia, Greece, and Scandinavia in Spring 1940, and pushed the British and their early European allies west across France to Dunkirk on June 3, 1940. At Peenemünde, the first successful test of a large 25-ton engine for the A-4 was carried out on March 21, 1940 and the new supersonic wind tunnel had helped in determining wing shapes that could extend A-4 range performance for both the operational rocket, and potentially even the planned intercontinental-range A-9/A-10 combination. By mid-year, during the Battle of Britain and the Blitz, the Peenemünde planning staff was completing its design work on the first version of the A-9/A-10 two-stage intercontinental rocket. And by the end of the year, the developers had a set of workable rocket nozzles for the A-4.

Shifting Priorities and a Successful A-4 Launch

As Field Marshal Rommel began his first offensive in North Africa in spring 1941 and Hitler broke Germany's non-aggression pact by invading Russia in June, Hitler increased the A-4 rocket project's priority and approved its operational development. However, at Peenemünde, the plans being made in 1940 for an improved mach-10 supersonic wind tunnel as part of intercontinental A-9/A-10 rocket development were put on hold as part of the emphasis on creating immediately available combat capability.

The German army developers were, by June 1942, facing resource priority competition from their Air Force's unmanned pulse-jet missile, the Fi-103, later nicknamed the V-1 system. At the same time, Hitler was asking Speer, as Minister of Munitions, to support Himmler's SS in a plan to build a separate economic empire. Speer agreed, with the proviso that he maintain the same degree of control over SS armaments industry that he had over civilian industries.[107]

The first test launches of the A-4, although unsuccessful, began in late June 1942, shortly before the start of the September 1942 to February 1943 German-Soviet battle at Stalingrad and the Western Allies' November TORCH landings in North Africa. The first two A-4 launches failed early in flight. Hitler began to express personal concerns, as the third launch on August 16 also failed.

The Peenemünde effort was being directed by this time to expend scarce research resources in developing combat weapons such as submarine-launched powder rockets. Successful tests of these rockets did not win Naval Weapons Department acceptance. However, von Braun was also discussing a contract for rocket-based upper atmospheric research with the researcher Erich Regener in Friedrichshafen.[108] Hitler changed his earlier policy edict restricting secret weapons work to loyal citizens, and he signed a general policy order on September 21 that approved the use of prisoner labor in factories under the direction of Speer's industrial armaments organization.[109]

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[107] Speer: 1970. P. 372.
[108] David H. DeVorkin. Science With A Vengeance: How the Military Created the US Space Sciences After World War II. New York: Springer-Verlag, 1992. P.xix.
[109] Speer: 1970. P. 370 and note 13 on P. 556.

The German military, responding to varying directions from Hitler, was fighting internal bureaucratic battles to obtain sufficient priority to begin a program of year-long construction of permanent, concrete-hardened secret weapon launch facilities on the English Channel coast. As construction of the reinforced concrete structures progressed, they became known to British intelligence by the shorthand name "large sites," with different reinforced-concrete hardened facilities intended for launching the army A-4 liquid-fueled rocket and for the air force developed-Fi-103 pulse-jet flying bomb.

The first successful launch of an A-4 at Peenemünde occurred on October 3, 1942.[110] After a second successful launch on October 14, Speer persuaded Hitler to increase the priority of the Peenemünde project, although at the cost of greatly exaggerated expectations reflected in Hitler's demand for five thousand missiles for "wholesale commitment."[111] By December, Dornberger was pushing clarification of program priorities through establishment of a production coordination committee under the authority of Speer's Ministry of Munitions.[112]

Planning for Production

At the beginning of 1943, Hitler once again expressed doubts about the success of the secret weapon development program. In response, Dornberger and von Braun established a relationship with Speer's ministry which resulted in involvement of one of Speer's railroad experts, Degenkolb, as head of A-4 production, and another expert, Stahlknecht, who proposed a production plan calling for production of 300 A-4s a month

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[110] Dornberger: 1952, 1954. Pp. 17-29.
[111] Speer: 1970. P. 367.
[112] Dornberger: 1952, 1954. P. 78.

by January 1944 and 600 a month by June 1944. Degenkolb proposed a much accelerated schedule calling for 300 A-4s a month by October 1943 and 900 a month by December.[113] Stahlknecht's plan was closer to practical reality, but Degenkolb's was closer to Hitler's ambitious pacing. Ultimately, a Long Range Bombardment Commission was established within the Ministry of Munitions that adopted a schedule modified to include 300 A-4s produced monthly at three factories: the production works at Peenemünde, the Zeppelin Works at Friedrichshafen, and the Rax Works at Wiener Neustadt.[114]

Work was continuing in March 1943 on construction of the rocket bunker "large sites" on the Channel Coast, and Dornberger says in his memoir that he was increasingly concerned about the possibility of air raids on Peenemünde because of the visibility from Sweden of contrails of test rockets, and his building anxiety about eventual discovery by RAF photo reconnaissance aircraft. Complicating these concerns, Hitler had yet another change of heart about the priority of rocket development based on a dream that no A-4 would ever reach London.[115]

In April 1943, Himmler had begun to make his presence more strongly felt in the rocket development program. While the Army Weapons Department had first sponsored rocket research operated under the direction of Army Weapons Office, Army program personnel had been cut by 20% to avoid duplication of effort with the Ministry of Munitions planners in an effort to make scarce technical experts available for other

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[113] Dornberger: 1952, 1954. Pp. 78-79 and 82-88.
[114] Dornberger: 1952, 1954. P. 90.
[115] Dornberger: 1952, 1954. Pp. 91-92, 165.

duties.[116] Himmler made his first visit to Peenemünde. His party was briefed on rocket developments but did not see a launch because of poor weather. Himmler confirmed Hitler's support for the rocket program and asserted a new status for it as an effort of the German People rather than just the Army. On this basis, he announced his intention to protect the program "against sabotage and treason." This was met with half-hearted acquiescence to proposed SS external security arrangements. As he was leaving, Himmler expressed to Dornberger his interest in the rocket work and his desire to "help."[117]

At the end of May, the Long-Range Bombardment Commission met at Peenemünde to review the relative performance of the flying bomb and the rocket. The Commission had assessed that both systems were at the same level of development and performance, that each had characteristics recommending it, and that both the Luftwaffe flying bomb and the Army rocket should continue to production.[118] Test stands were being made operational on the Army side of the facility for use in surface-to-air missile development (Test Stand IX, for the Wasserfall system using A-4-like rocket technology) and field-condition tests of the A-4. But Minister of Armaments Speer was also getting critical internal memoranda about the perceived ineffectiveness of "terror weapons" and a preference for antiaircraft missile development.[119]

By June, Speer says that he was receiving criticism from his staff about the efficacy of "terror weapons" that were already diluting scarce research and development

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[116] Dornberger: 1952, 1954. Pp. 187-188.
[117] Dornberger: 1952, 1954: Pp. 172-173.
[118] Dornberger: 1952/1954. Pp. 95-99.
[119] Speer: 1970. P. 365.

resources.[120] However, during his late-June second visit to Peenemünde, Himmler made a decision to insert SS concentration camp labor into secret weapon production at the still-under-construction Nordhausen Mittlewerk facility. After viewing two test launches, one of which failed and crashed on the nearby Peenemünde West airfield, Himmler promised Dornberger that he would report favorably to Hitler, but he would only agree to provide labor if Hitler's decision was favorable.[121] This was also the point at which the perceived urgency of A-4 production led to stopping construction work on the A-4-based, intercontinental-range, two-stage A-9/A-10 development, although the design group was permitted to continue conceptual planning.[122]

In addition to use of prisoner labor, another solution to the shortage of skilled manpower available to comply with Hitler's edict for stepped-up rocket research and development was to relieve engineering- and scientifically-qualified German front line soldiers from combat duties in ongoing battles and to reassign them to A-4 development and production tasks. In cases documented in published literature such as those of Dieter Hüzel, an enlisted truck driver and Peter Wegener, a second lieutenant in an antiaircraft unit, soldiers were reassigned from Russia in mid-1943 to Peenemünde. Individuals of nominally low rank were sometimes given very responsible positions in the military rocket development effort. Both Hüzel and Wegener leave memoirs of their experiences in operations testing and management (Hüzel) and wind tunnel aerodynamic research

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[120] Speer: 1970, P. 365.
[121] Dornberger: 1952, 1954. Pp. 183-184, 185-186.
[122] Dornberger: 1952, 1954. Pp. 138-140.

(Wegener). After the war both were also part of the cadre of German experts employed in the American post-war rocket and space program as part of Project PAPERCLIP.[123]

In July 1943, the Germans and Russians were fighting the great tank battle at Kursk on the Eastern Front and the Western Allies were moving from their successful North African campaign to the invasion of Sicily. Meanwhile, the Germans were implementing their A-4 production plan. Speer notes that availability of final technical data would lead to the start of industrial-scale production,[124] while Dornberger remarks in his memoirs that in July, the Central Office of the Ministry of Munitions set a production goal of 2000 rockets each month, to be met by December 1943—300 each from Peenemünde, the Rax Works in Austria, and the Zeppelin Works at Friedrichshafen, plus an additional 900 rockets to be produced at the new SS-run underground factory at Nordhausen. The planned aggregate of 1800 rockets a month was then rounded up to 2000. According to Dornberger, this production goal was "impractical" because provisions for launching equipment and fuel production were not complete and the Nordhausen facility was still under construction.[125] In this context, neither Speer nor Dornberger mention the damage to the Friedrichshafen facility in June which, at a minimum, should have caused removal of about 15%--several hundred—from the production estimate.

None of these impediments seemed to have had any impact on Hitler's decision to proceed with A-4 rocket production. Speer invited Dornberger and von Braun to give a

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[123] Dieter K. Hüzel. *Peenemünde to Canaveral*, with an introduction by Wernher von Braun. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962; and Peter P. Wegener. *The Peenemünde Wind Tunnels: a Memoir*. New Haven and London: Yale University Press, 1996.
[124] Speer: 1970. Pp. 367-368.
[125] Dornberger: 1952, 1954. Pp. 110-113.

presentation to Hitler at his headquarters on July 7[126]. They were effective in their effort

and convinced Hitler to make a decision on the spot to swap production priorities

between the A-4 rocket and the formerly first-priority tank production programs. It is a

measure of the effectiveness of Dornberger's secrecy arrangements that he comments that

of the number of people at Hitler's conference, Speer was the only person outside of

Hitler that knew there was already an ongoing long-range rocket program.[127]

While Dornberger and von Braun had gained the production priority they sought,

July was also a period of ambiguity in purpose of the program. Hitler decided at this time

that the rocket was to be used as a retaliatory weapon against England. In compliance

with Hitler's earlier order that only Germans were to work on rocket development, the

technically qualified army conscripts such as Dieter Huzel and Peter Wegener were

beginning to arrive at Peenemünde. According to Speer, a "tremendous industrial

capacity" was being brought to bear on missile production. On the other hand, Speer was

having second thoughts, at least from the hindsight of the late 1960s, when he was

writing *Inside the Third Reich*:

> We would have done much better to focus our efforts on manufacturing a ground-to-air
> defensive rocket. It had already been developed in 1942, under the codename waterfall,
> to such a point that mass production would soon have been possible, had we utilized the
> talents of those technicians and scientists busy with rocket development at Peenemünde
> under Wernher von Braun." [128]

At about the same time in mid-summer that Hüzel and Wegener arrived at

Peenemünde, Dornberger reports that he received a warning from the Air Ministry that he

should expect bombing by the Allies. He had, therefore, arranged for copies of

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[126] Speer: 1970. P. 368.
[127] Dornberger: 1952, 1954. Pp. 100-106, 110.
[128] Speer: 1970. Pp. 364-365.

production-related papers to be made and had begun the physical dispersal of parts of his organization. Thus, he was somewhat prepared when the British Royal Air Force made its first large-scale bombing raid on Peenemünde on the night of August 17/18, 1943.[129] The major losses suffered by the Germans at Peenemünde were more in trained and experienced research and development personnel than in physical facilities. Dornberger's memoirs seem to down-play the material damage and suggest that by judicious deception, they were able to create the impression of more physical damage than was actually sustained:

> Material damage to the works, contrary to first impressions, was surprisingly small. The test fields and special plant such as the wind tunnel and Measurement House were not hit at all. As a result of the immediate help given to us on a most generous scale, we were assured of being able to work on with a delay of four to six weeks. Moreover, by repairing only essential buildings, and by camouflage, we maintained the effect of complete destruction for nine months, during which we had no more raids. The project could not be prevented now from coming to fruition.
>
> It was weeks before the exact number of casualties could be established. The raid had cost us 735 lives, including 178 of the 4,000 inhabitants of the settlement. Losses were particularly heavy among foreign workers in the destruction of Trassenheide Camp.[130]

Troop Training and Operational Testing in Poland

Shortly after the British bombing at Peenemünde, a number of new operational measures were implemented by the Germans. A new training facility for future operational rocket troops was established at Koslin on the Baltic, with the unit designation Experimental or Test Batallion 444. Hitler agreed to a plan by Himmler for concentration camp forced labor to be used at the Mittlewerk underground production facility at Nordhausen. And Hitler continued to push his plan for large concrete

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[129] Dornberger: 1952, 1954. P. 159.
[130] Dornberger: 1952-1954. P. 164.

launching facilities on the Channel coast—the "large sites"—rather than to back

deployment of simpler, cheaper, and more mobile launchers preferred by the Army. The

large site at Watten, which had been disabled by Allied bombing shortly after the

Peenemünde raid, was converted by the Germans to a liquid oxygen production facility,

and a new hardened A-4 launch facility was to be constructed at Wizernes, also near the

French coast.[131]

As the Allies were moving from the island of Sicily to the Italian mainland at

Salerno in early September 1943, the German Army continued to work out relationships

with the various organizations related to rocket production and gave consideration to an

innovation that would have allowed U-Boats to tow seaborne A-4 launching containers—

which, had it been approved, could have placed American coastal cities within missile

range.[132] Colonel-General Fromm, Gen. Becker's replacement as head of the Army

Weapons Department and recently appointed as Commander-in-Chief of the Home front,

gave Dornberger a measure of military authority by appointing him Commissioner for the

A-4 program, responsible for the creation of training for the nascent operational unit that

would launch the rocket weapon once the system reached its operational capability.

In addition, SS Brigadier General, Hans Kammler, who had been appointed by

Himmler as a commissioner to manage construction needed for A-4 production, was

beginning to follow a directive from Hitler that SS concentration camp labor would

become an important part of the work force at the newly-operational underground

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[131] Dornberger: 1952, 1954. P. 169-171. See also Speer: 1970, P. 369.
[132] Dornberger: 1952, 1954. P. 231.

Mittlewerk factory at Nordhausen.[133] But, factors of slow delivery of planning

documents and flight test problems delayed the start of operational rocket production.[134]

Series Production at Nordhausen Mittlewerk

At the beginning of September 1943—while the Allies were landing at Salerno—

production assembly of A-4s was begun at Mittlewerk, and Himmler was given special

authority for construction of A-4-related production facilities under the Ministry of

Munitions and directed by SS Brigadier General Hans Kammler.[135] Dornberger was also

ordered to begin overland training launches from a new facility near Bliza in extreme

southeastern Poland. "Heidelager" was to be the launch site, with target areas to be

approved by Himmler.[136]

The last quarter of 1943 was a continuation of the struggle over priorities.

Munitions Minister Speer, according to his memoirs, was still ambivalent about the

difficulties of producing the rocket, which he reflected in a speech on October 6. In this

speech he said: "...that it would be premature 'to count with certainty on this weapon.' I

added that the technical difference between individual manufacture and mass production,

considerable in itself, would involve special difficulties in the case of these highly

complicated mechanisms."[137]   However, the Army let production contracts for the A-4,

and by the end of October Experimental Battery 444 and the experimental staff had been

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[133] Dornberger: 1952, 1954. Pp. 187, and Speer: 1970. P. 373.
[134] Speer: 1970. Pp. 368-369.
[135] Dornberger:1952, 1954. P. 187, and Speer: 1970, P 373.
[136] Dornberger: 1952, 1954. Pp. 203-205.
[137] Speer: 1970., Pp. 368-369.

transferred to Blizna, Poland, where significant support facility construction was underway.[138]

The first field test launches from Blizna began on November 5, 1943 and troop training continued until April 1944, often observed by SS General Kammler. By the end of November, more test launches were being made from Blizna than from Peenemünude. Problems with missile launch platform stability at Blizna, however, delayed the operational readiness of the weapon.[139]

SS General Kammler began to further insinuate himself as Himmler's representative into the A-4 operation in November by frequent observation of tests and the practice launches at Heidelager. These launches began on November 5, as ordered by Hitler, and from that point forward nearly all A-4 test firings were conducted over Poland.[140] Kammler continued as a force to be reckoned with in secret weapon decision making through the end of the war, despite the Army's unsuccessful attempts to reestablish its total control of the program.

By December 1943, the Nordhausen Mittlewerk facility was also nearing full-production status. Speer had visited that facility on December 10th and observed concentration camp labor setting up machinery "under barbarous conditions," after which he says he pressed the SS to improve the prisoners' food and sanitation.[141] By the end of the month, Dieter Hüzel—the engineer-qualified Army enlisted man reassigned from the Eastern Front, was still at Peenemünde. He wrote that the first production missile from

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[138] Dornberger: 1952, 1954. P. 204.
[139] Dornberger: 1952, 1954. Pp. 198-201, 204-205.
[140] Dornberger: 1952, 1954. Pp. 198-203.
[141] Speer: 1970. P. 370.

the Mittlewerk arrived there in late December, at which time he was placed in charge of the central evaluation of production missiles.[142] The first Mittlewerk production missile (serial number 17,001) was received for component testing at Peenemünde in late December.[143]

Significant Failures in Series Production A-4s

According to General Dornberger, in January 1944—about the time the Allies were invading the Italian mainland at Anzio on January 22—the German A-4 experimental development program was faced with a series of in-flight explosions that caused further operational delays.[144] At this same time the Mittlewerk production facility at Nordhausen was being inspected by the medical supervisor from the Armaments Ministry, based on Speer's report of poor conditions.[145] But perhaps most damaging, the third production missile—which had been the first to pass its ground evaluation—failed at launch and crashed into the test launch facility at Peenemünde's Test Stand VII.[146]

Dornberger reported that the Germans were beginning to understand the causes of launch failures by early March, but remained puzzled by a continuing series of late-flight explosions near the test impact area[147]. Himmler chose this time to insert himself more aggressively into the issue of control of the rocket program. On March 15, the SS arrested scientific director von Braun, Peenemünde army facility commander Col.

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[142] Hüzel: 1962. Pp. 86-87.
[143] Hüzel: 1962. Pp. 86-87
[144] Dornberger: 1952, 1954. P. 191.
[145] Speer: 1970. P.371.
[146] Huzel: 1962. Pp. 88-90.
[147] Dornberger: 1952, 1954. P. 191.

Zanssen, and engineers Helmut Gröttrup and Klaus Riedel on charges of sabotage for advocating use of the A-4 for space flight research rather than as a near-term military weapon (Gröttrup would become a central figure in providing German assistance to the nascent Russian rocket program after the war.) Speer says that he interceded with Hitler for their release a week later. Dornberger, on the other hand, writes that he reported this to Hitler's senior army aide, Field Marshal Keitel, and negotiated directly with Gestapo Chief Müller to secure their provisional release, although not their exoneration on the charges.[148]

The A-4 launch-area missile failure problems had not been completely resolved. On March 17, the same day Dornberger was negotiating with Müller for von Braun's release, the seventh production missile failed at launch, hitting the ground on the area built up on the Baltic coast which had been constructed as Test Stand X for military operational training launches.[149] In late April, von Braun reassigned the former Eastern Front truck driver Dieter Huzel, then serving as a production scheduler, to put together a coordinating group charged with organizing component-level testing on developmental and production missiles. Hüzel says that this effort freed-up 10 missiles, and saved millions of Marks and thousands of man-hours.[150]

As the D-day landings approached, much of the German decision making for the long-range rocket program was still concerned with administrative issues. At the end of May, a civilian doctor was assigned to the Mittlewerk production facility with Minister

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[148] Speer: 1970. P. 371. And Dornberger: 1952, 1954. Pp. 192-201.
[149] Huzel: 1962. Pp. 96-97.
[150] Huzel: 1962. Pp. 98-99.

Speer's blessing over the objection of the head of the Labor Corps. [151] At the same time, Dornberger was requesting Army authority to take over the entire rocket project, from research to field operations.[152] Despite Dornberger's effort, by the beginning of June, 1944—less than a week before D-Day, the Army Weapons Office divided the rocket program into a solid-fuel section at Kummersdorf and a liquid fuel section Peenemünde. The Development Works at Peenemünde was converted into a private commercial concern under a managing Director from Siemens. Administrative control of the long-range rocket program was raised to the level of the Army Weapons Department. In Dornberger's words, "A disastrous muddle ensued."[153]

As the Allies increased their knowledge of the German secret weapon deployment and the American forces organized themselves for a major role in the Normandy invasion, the Luftwaffe was positioning itself to make its flying bomb operational. The Army's rocket program, however, continued to suffer technical and bureaucratic problems that delayed its deployment of a practical weapon. General Dornberger continued his effort to assert control over the A-4 system from its research through field operations. His military superior, General Fromm, appears to have approved Dornberger's request. But it also appears that Fromm may not have cleared this decision with Hitler, thereby undercutting Dornberger's plan.[154]

By the end of June, Hitler once again shifted his weapon production priorities, giving preference to the Luftwaffe's flying bomb and newly-developed jet planes. The first four of thousands of flying bombs were launched against London from French-based

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[151] Speer: 1970. P. 371.
[152] Dornberger: 1952/1954. P. 200.
[153] Dornberger: 1952/1954. Pp. 198-200.
[154] Dornberger: 1952, 1954. Pp. 198-201.

Luftwaffe launch ramps on June 12, 1944, a campaign that continued through March 1945.[155] The next day, a special test rocket went off course from Peenemünde and landed in Sweden, providing the Allies their first physical access to Germany's long-range rocket. This A-4 was not a normal weapon, but was being used as a flying platform to test the ground-controlled guidance system of a developmental anti-aircraft weapon— what would later be called a surface-to-air missile, or SAM. Its guidance system would initially confuse Allied rocket experts. But the wreckage would provide them a clearer picture of the rocket structure and propulsion system.[156]

By July 1944, Hitler's senior military adviser, General Keitel, was being pressured by Himmler to establish a separate "General Commissioner"—his subordinate General Kammler—a move ineffectually opposed by the Army. Both Dornberger and his rocket program suffered new setbacks during the month. Dornberger strongly denounced the Army's program reorganization. He was officially reprimanded, and program organizational and administrative issues he believed should have been his responsibility began to be decided at the level of the Army Weapons Department. SS General Kammler went so far as to call Dornberger a public danger. Dornberger drafted a memorandum for General Keitel's response to Himmler's demand that Kammler be made "General Commissioner." But he was unsuccessful at convincing General Keitel to send anything more than a softly-worded response that didn't resolve the management and control issue.[157]

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[155] Dornberger: 1952, 1954. P. 168.
[156] Dornberger: 1952, 1954, Pp. 246-247, and Huzel: 1962, Pp. 100-101)
[157] Dornberger: 1952, 1954, Pp. 198-201.

On 18 July, Allied bombers returned to Peenemünde in an attack by B-17s of the American Eighth Air Force. Test stand VII was damaged, but was repaired within two weeks. The production firing test stand however, was destroyed, setting back the process of evaluating rockets supplied by the Mittelwerk production facility.[158]

Two days later, Army Colonel Claus von Stauffenberg attempted to assassinate Hitler at his *Wolfsschanze* eastern front headquarters near Rastenburg in northwestern Poland. The unsuccessful attempt, ironically, gave support to the rocket program when the A-4 was declared operational by neutralizing Himmler's early treason charges against von Braun, Riedel, and Grottrup. On the other hand, it also gave Himmler sufficient excuse to take over control of Fromm's Army Weapons Department.[159]

By the end of July, the Soviet Army had begun its westward offensive into Poland. As a result, the German secret weapon training and test facility *Heidelager*, near Blizna in southeastern Poland, was shut down, and operations were moved northwest to a new facility, *Heidekraut*, west of the Baltic coastal City of Gdansk (wartime Danzig). Rockets from there were tested overland to the south. Testing operations continued at this location through the end of the year. But this facility, too, was evacuated in January 1945.[160]

The new Siemens director at Peenemünde, Paul Storch, began his duties as civilian general manager of the Peenemünde development plant on August 1. Three days later, Kammler, promoted to SS Lt. General, became the provisional supervisor of the A-

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[158] Huzel: 1962, P. 102.
[159] Dornberger: 1952, 1954, Pp. 197, 200-201.
[160] Dornberger: 1952, 1954, Pp. 227-229.

4 program answering directly to Himmler.[161] Dornberger's initial impulse was to resign

in protest, but he says he was persuaded by von Braun and Steinhoff not to do so.[162]

On August 4, 1944, B-17s of the American Eighth Air Force bombed

Peenemünde, this time doing significant damage to the large development facilities, test

stands VII and XI (the oblong A-4 launching site at the north end of the island and the

circular missile acceptance test stand nearer the center.[163]

On August 16, P-51 fighters from the Eighth Air Force performed a special photo

reconnaissance of Peenemünde and Americans bombed Peenemünde for the last time on

August 25. According to Hüzel's memoir, he recalls this as a daylight raid with extended

damage, but sufficient only to delay testing from test stand VII for six months.[164]

However, this had no appreciable effect on the output of the Mittlewerk production

facility, which was producing 600 rockets a month beginning in August. According to

Dornberger, the real bottlenecks in A-4 operational capability was the production of the

two primary rocket fuel components, alcohol and liquid oxygen.[165]

The German political and military leadership continued having second thoughts

about the viability of the A-4 as an effective weapon. Speer and Goebbels, specifically,

had a discussion on August 29 about both the possible inability of the A-4 to have a

decisive psychological effect on the enemy, and about the extended time it was taking to

develop the new rocket weapon.[166] At the same time, the Army challenged Kammler's

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[161] Dornberger, 1952, 1954, Pp. 200-201.
[162] Dornberger, 1952, 1954, Pp. 222-223.
[163] Huzel: 1962, P. 115.
[164] Huzel: 1962, P. 115.
[165] Dornberger, 1952, 1954, Pp. 227-228.
[166] Speer: 1970, P. 556.

authority at a conference in Brussels between him and the army's 15th Army Corps, set up to command the V-weapon operations. Kammler apparently ignored the Army's challenge. Dornberger, who attended this conference, says that the military had to suffer a number of humiliations and began to receive as many as a hundred teletypes a day conveying, in Dornberger's words, Kammler's "ignorant, contradictory, irreconcilable orders."[167]

Operational Launches

Despite the organizational confusion and production delays, the A-4/V-2 became operational in September 1944. On September 4, the Germans began a program of transporting rockets directly to their launch facilities as soon as they were completed at the Mittlewerk. This express shipment was an attempt to mediate a failure rate imposed by degeneration of sensitive rocket components. Dornberger provided technical teams from Peenemünde to be responsible for transportation and supply of spare parts to support the deployed operational rocket troops.[168] The first A-4s were fired at London on September 5 from a launch area near the Hague, Netherlands. The number employed, however, was far short of what Hitler had envisioned. According to Speer's memoirs, there were only 25 of these rockets launched over a period of ten days rather than the thousands intended by Hitler's conception.[169] Dornberger says that only 350 rockets were

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[167] Dornberger: 1952, 1954, Pp. 224-225.
[168] Dornberger: 1952, 1954, Pp. 225-227.
[169] Speer: 1970, P. 369.

launched during September, increased to 500 in October, and then between 600 and 900 every month thereafter.[170]

As the launches began, personnel changes were still being made at Peenemünde and in the forward area. Huzel replaced von Braun's brother Magnus on September 8 as technical assistant to the scientific director. Magnus was being transferred to the Mittlewerk to supervise gyroscope production for the missile's guidance and control system. Huzel, in turn, was replaced by Dr. Kurt Debus as director of the test stand VII launch facility.[171] Control of operational launches in Holland passed to General Kammler, who was given command of a new special service division with authority over the military launch units.[172]

Within the next ten days, as Montgomery's 21st Army Group unsuccessfully undertook Operation MARKET GARDEN to establish a Rhine River crossing point at Arnhem—and in part to deny the Germans their chosen A-4 launch areas in France—the German Army attempted to clarify Kammler's authorities. General Jutner, the new commander of Germany's Home Front, demanded a clear definition of duties. This resulted in negotiations with Kammler and an agreement on September 30 that gave Dornberger power as Kammler's home representative with authority in matters of inspection of long-range rocket field units, formation and training, development, and supply.[173]

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[170] Dornberger: 1952, 1954, P. 225.
[171] Huzel: 1962, Pp. 116-119
[172] Dornberger: 1952, 1954, Pp. 224-225.
[173] Dornberger: 1952, 1954, P. 224.

By the end of October, 1944, something of an air of unreality appears to have been setting into the German senior command structure about the secret weapon capability and the progress of the war. Dornberger reports that he had been paying attention to development of the *Wasserfall*, the anti-aircraft rocket whose guidance system mounted on the larger A-4 had gone astray and landed in Sweden a few months earlier. On October 30, he was giving a lecture on this system to a group headed by Reichsmarshal Goering. Two A-4 rockets were also be launched as part of the program. Goering became excited and demanded that he have these rockets for the first party rally after the war. Dornberger says that he was left speechless.[174]

Both system planning and bureaucratic changes continued through December. Early in the month, Professor Petersen, the head of Speer's Long-range Weapons Commission had a stroke, and on January 12, 1945, Minister Speer appointed Dornberger to take over Petersen's responsibilities on the production commission—which Dornberger did by forming his own special working group.[175]

As the Battle of the Bulge neared, proposals and experiments were conducted as part of the operational rocket development program. The most important of these included the submarine-towed A-4 and a rail car launch system.[176] Neither was developed into an operational system, but together they presaged postwar development of submarine launched and rail-mobile ballistic missiles. Tests were also being planned for a winged version of the A-4, the A-4b, which could have become the upper stage of the

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[174] Dornberger: 1952-1954. Pp. 238-241.
[175] Dornberger: 1952-1954. P. 243.
[176] Dornberger: 1952, 1954. Pp. 232 and 235.

two-stage intercontinental missile, the A-9/10.[177] As the Soviet Army approached the
Heidelager test area, Dornberger was involved in plans for its evacuation of test facilities
and movement of its equipment and personnel to the Heidekraut testing area near Danzig
in northwestern Poland.[178]

By January 1945, Kammler convinced Goering to appoint him to an additional
position as "Special Commissioner for breaking the Air Terror. With the increased
workload generated in his new position, Kammler appointed Dornberger to his technical
staff. This, in turn gave "working staff Dornberger" expanded power over civil industry
and military authorities in matters related to V-weapons and antiaircraft development.
Dornberger attributes Kammler's decision to his realization that he wouldn't be capable
of managing both the operational and technical duties by himself.[179]

Dornberger's development efforts during this period were oriented toward
advancing existing programs rather than initiating additional unproven ones. According
to Speer's memoirs, there were 2210 scientists working on the A-4 and the A-9/A-4b,
while only 220 had been assigned to the *Wasserfall* antiaircraft rocket and 135 to an
uncontrolled antiaircraft rocket project named *Taifun*, or Typhoon.[180] The first flight test
of an A-9, attempted on January 8, failed at launch. However, Dornberger rates a second
attempt on January 24 as a qualified success. It performed much as expected, but a wing
broke during the final glide phase.[181] Further testing was then cancelled.

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[177] Dornberger: 1952, 1954, P. 236.
[178] Dornberger: 1952-1954, P. 229.
[179] Dornberger: 1952, 1954, 243-244.
[180] Speer: 1970, P. 365, and I. V. Hogg, German Secret Weapons of World War 2, New York: Arco
Publishing Company, Inc., 1970. P. 34.
[181] Dornberger: 1952, 1954. P. 236.

By the middle of January, the approach of the Soviet Army caused one more evacuation of the German test and training facility in Poland, this time from the Heidekraut area near Danzig back into Germany proper. The Training and Experimental Unit moved temporarily to the area of Wolgast on the mainland about 10km from Peenemünde.   No rockets were fired from that location and the unit moved west one more time to an area near the Weser River, not far from Cuxhaven, before Kammler ordered on April 3 that it be converted to an infantry battalion of his Fifth Army Corps. Dornberger says this order was never carried out.[182]

On January 31, Hüzel writes that von Braun had called a meeting of Peenemünde section chiefs to go over plans to relocate much of the staff to central Germany. However, Dr. Debus, the test stand VII staff, and the experimental missile assembly effort would stay at Peenemünde.[183] In early February, staff and contractors began their move to the Thuringian southern Harz mountain area a few kilometers west of the Nordhausen/Mittlewerk production facility. The last launch of an A-4 from Peenemünde took place in mid-February and the first evacuation train departed a few days later on February 17. The evacuation brought about the end of development work of the submarine and railcar launch options.[184] Huzel, who left Peenemünde on March 13, recorded that between June 13, 1942 and February 19, 1945, 264 developmental launches had been made from Peenemünde, along with 177 Mittlewerk production missiles, 145 A-4s, and two winged A-4bs.[185]

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[182] Dornberger: 1952, 1954, Pp. 229-230.
[183] Huzel: 1962, P. 133
[184] Dornberger: 1952, 1954, Pp. 232, 237, 249-250; Huzel: 1962, P. 138.
[185] Huzel: 1962, Pp. 128-129.

The End of V-2 Operations

The last operational A-4 was launched from Holland on March 27.[186] Two days

later, ULTRA intercepts described Hans Kammler as being given the title of

Plenipotentiary for Jet and Rocket Aircraft. However, the Luftwaffe apparently continued

to exercise some operational authority. [187]

Kammler ordered Dornberger and his staff to retreat farther south to the

Oberammergau area on April 6 and this further retreat began on Easter Sunday. As part

of the movement, Hüzel was assigned to hide the Peenemünde technical files in an

abandoned mine near Goslar, before leaving Bleicherode—the interim headquarters for

the Peenemünde staff—on April 10. He arrived at a small hotel, Haus Ingeborg, in

Oberjoch, in the vicinity of Oberammergau, about 50 km west of Garmisch-

Partenkirchen.[188] Two days later, President Roosevelt died.

On April 20, Hitler committed suicide in Berlin. By May 2, Magnus von Braun, a

proficient English speaker, contacted American forces in the town of Reutte, about 40 km

west of Oberammergau with an offer to surrender the Peenemünde senior team to the

Western Allies.[189] Two days later, the Soviet Army occupied Peenemünde.

Neufeld comments that the V-2, also known by its military designation, A-4, was

an inconclusive weapon:

> …the A-4 ended by becoming another, much more spectacular, Paris Gun. It shelled
> enemy cities with little political or military effect and was, like its spiritual ancestor, the

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[186] Dornberger: 1952, 1954,
[187] ULTRA: 1980. Pp. 196-197.
[188] Huzel: 1962, Pp. 181-184.
[189] See Huzel: 1962, Pp. 187-194 for a participant's detailed description of the actual surrender to the American Army.

product of a blinkered technological enthusiasm that displayed little insight into the psychology of the enemy.[190]

He attributes this military ineffectiveness to a lack of strategic vision on the part of the German army:

> The blinkered strategic vision of German generals during the era of the two world wars is one likely explanation…. The result was the paradoxical combination of 'battlefield brilliance' and strategic blundering that contributed so much to the 'German catastrophe' of the twentieth century. In this context, it is easier to understand how Becker, Fritsch, and other generals might overestimate the effects of the A-4, or their predecessors the impact of the Paris Gun....[191]

Another interpretation is possible, however. The difference in strategic philosophy between long-range weapons such as the Paris Gun and the V-2 and more conventional artillery and bombing contemporaries may have been less strategically bankrupt than being too farsighted for their contemporary early- to mid-1940s military and political culture to accept. In a sense, these two weapons moved from what would today be called a traditional, military-oriented "counter-force" application against purely battlefield targets to a "counter-value" strategy, aimed at destroying morale in population centers and industrial production areas, as well as military forces in combat.

Had the Germans completed a nuclear weapon during the Second World War, they might have been successful in the early 1940s at combining the technologies that the US and the USSR finally brought to operational status in the 1950s and 60s. Thus, there is possibly an additional stage to the continuity of these technologies that is less obvious than the simple use of longer-range artillery and conventionally-armed rocket hardware.

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[190] Neufeld, 1995. P. 275.
[191] Neufeld, 1995. Pp. 52-3.

This interpretation ties both earlier technologies to the evolution of the nuclear-armed missile and forms the technological underpinning of one of the two major "strategic options" of the Cold War. The fear of such a possibility was a major factor in policymakers' sense of urgency in focusing intelligence organizations and resources on defining the civilian and military threat posed by the possibility of long-range rockets capable of carrying heavy payloads.

CHAPTER 5

USERS' PRACTICE FROM 1930-1943: INTELLIGENCE FROM SPECULATION BASED ON GENERAL THEORIES OF ROCKETRY AND ISOLATED PIECES OF REPORTED DATA

Problem solving strategies constitute one of the elements that Bijker includes in his definition of a technical frame. These were generally accepted ways for the members of relevant groups to organize intelligence technology to answer key problems and meet goals. The three-factor model discussed in Chapter 3 represents such a model, albeit an ideal one, for American and British intelligence organizations as they prepared for war with Germany. It was a road map to provide organization and direction for building knowledge to answer such questions as the existence and nature of German secret weapon research.

In actual practice, the ideal model could serve only as a general guide, and it required adaptation of ideal structures and functions to resolve important problems and meet goals. German information denial measures restricted the information from informants and agents to small snippets of data with little context and often suspect sources, Relatively low levels of American and British domestic research on long-range rocket technology, and limited Allied military interest in adopting this form of propulsion also complicated the situation.

As a result, British and American secret weapon investigation went through three overlapping phases during the war. First, during the interwar period and in the conflict

British and American organizations had to rely upon reporters who supplied limited specific and often conflicting information. Analysis was limited to speculation based on available, frequently misleading, information. Second, increasing reliable observer reporting, application of photographic and signal intercept, and access to captured examples of complete or wrecked German weapon systems improved the ability of analysts to accurately characterize the German hardware and provide senior civilian and military decision makes an improved ideal of the threat facing them. Finally, the most productive period for collecting and producing information on the secret weapons was from late 1944 through the European war's end in May 1945. During this later period, both intelligence and scientific research organizations were able to reflect on the aggregate of reporting and technical collection and to create a more accurate picture of what the German weapons program involved. This information was adequate to differentiate between the flying bomb and the large rocket, allow defensive responses to the flying bomb,. and gain understandings of the long-range rockets' capabilities and limitations.

This and the next two chapters discuss how the problem-solving strategies evolved with the groups involved and the data they had available. The present chapter focuses on the practices within the frames of intelligence–relevant groups dominated by uncertain information and interpretation base on speculation.

Foreign knowledge of the German rocket program was kept under wraps after the German Army Weapons Office gained control of that nation's civilian rocket society, the

Verein für Raumschiffahrt (Society for Space Travel), or *VfR*.[192] While both the Americans and the British had rocket societies working on theoretical and practical problems paralleling those of the Germans, the latter's emphasis on military secrecy severely limited access of the foreign societies' knowledge of the German effort.   The effect was to limit the awareness of current theories being developed by the Germans about liquid fuel, long-range rocket propulsion, thereby restricting the inclusiveness of the technological frame of observers outside Germany.

In the 1930s, bits and pieces of information began to leak out of Germany in reports by disaffected people and chance observation by Britain's growing aerial reconnaissance photography program. This pre-war shortage of current information would be felt during the war, as, for example, when British civilian experts were asked independently of its intelligence offices to assess the German program. This led to differences of opinion on the load carrying capability of the A-4/V-2 that, in turn, led to speculation and conjecture about the rocket's capability to carry a weapon of mass destruction.

Restricting the information within the Allied technological frame frequently led to analytic results based on speculation rather than newly observed and understood data. This would begin to change in 1943 when the Allies were able to examine parts of crashed secret weapons supplied by Danish, Swedish, and Polish allies. But the reporting of intelligence in small bits with little meaningful context and questionable veracity would continue to cause some confusion through the end of the war.

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[192] See Frank H. Winter. *Prelude to the Space Age: The Rocket Societies: 1924-1940*. City of Washington: Smithsonian Institution Press, 1983, chapter IV, The" VfR". Pp 35-54 for a summary of German rocket societies..

Intelligence activities are frequently directed at improving knowledge of topics of which decision makers and planners are already aware. New information is acquired in bits and pieces and added to the existing "encyclopedia" of existing knowledge. However, a stressing case for national security strategy development frequentlyarises when intelligence must largely be developed from scratch. Such is the case with British and American development of knowledge about Germany's secret long-range rocket program.

In such a circumstance, initial awareness of the subject comes from informant reports of unusual types of activity about which they have heard or sometimes seen. There is usually little detail and a considerable concern about the reliability of the informants and their information. What results is frequently more speculation about possibilities than detailed information placed in meaningful context and perspective. The possibility of errors in reporting or evaluation is high, even when experts are asked to give opinions at the margins of their practical experience or theoretical knowledge.

In such cases—which are frequently seen throughout the lifetime of an intelligence problem—policy makers and their advisers and planners start from publicly available knowledge of the general subject. This may come from academic theorists. But it may even start with written or cinematic fiction. Such was the case with interwar knowledge of liquid-fuel rocketry.

Popular and Academic Knowledge of Rocket Technology[193]

Much of the early literature on rocketry was based on science fiction stories of space travel or theoretical writing by academics. By the early 20th century, considerable information on rocketry was becoming available in the United States as well as in Europe due to popular interest generated by science fiction stories of space travel such as Jules Verne's *From the Earth to the Moon,* published in several languages and multiple editions over several decades.[194] While Verne's imaginary manned space vehicle was a shell fired from a large gun rather than a rocket, the fictional concept of space travel generated in the minds of some early- and mid-century rocket scientists and engineers an interest in practical ways in which man might explore outside the earth's atmosphere.

International interest in space travel went well beyond fiction and was reflected in the technical writings of individual researchers and the founding of several different societies dedicated to practical rocket research and experimentation. The involvement of the public in these research efforts varied between those who looked into the rocket propulsion process as a matter of interest and adventure, and those—many with academic or commercial connections—who carried out systematic programs of experimentation and data development. This background conditioned the technological frames of most

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[193] Eugene M. Emme, Editor, *The History of Rocket Technology*, Detroit: Wayne State University Press, 1964 is an especially valuable source on the evolution of rocket technology. The text is largely a transcription of the material in *Technology and Culture*, Volume IV, No. 4 (Fall 1963), with added new material from several authors. David A. Clary of Eastern New Mexico University at Roswell has written a biography of Robert Goddard which presents a balanced picture of Goddard's accomplishments and problems.   It is very helpful to the non-technician in understanding the social context of early American rocket research. See David A. Clary, *Rocket Man: Robert H. Goddard and the Birth of the Space Age*, New York: Hyperion, 2003.

[194] For example, *From the Earth to the Moon* was first published in French in 1865. It's U.S. publication included an undated (probably late 19th Century) "American Edition" by Worthington Co., Publisher in New York, and later—1918—by Charles Scribner's Sons, also in New York.

early rocket flight enthusiasts, as did the small size of the body of researchers and the lack of rocket-related goals in the minds of civilian and military decision makers.

Rockets used in warfare were not an innovation of the twentieth century; short-range, solid-propellant rockets had been developed in Asia and Europe as weapons of war in the eighteenth and nineteenth centuries.[195] The British used unguided black powder rockets in America during the War of 1812, and they later modified their design with an innovation that caused the rockets to spin in flight, thus improving their stability and accuracy. Well into the first quarter of the 20th century, small, solid propellant rockets were employed as barrage artillery. The British had used these limited-range missiles against such large tactical targets as massed troop formations, fortifications, and naval formations and countries such as the United States, Germany, and Russia continued the practice during the first half of the 20th century for tactical offense and defense operations. Worldwide academic writing about the theory of rocket flight and early experiments with liquid rocket construction, propulsion, and control generally was beginning to outpace the public's romantic speculation of space travel in the early 20th century—but it did not replace the central role space travel played in the popular 1930s Buck Rogers and Flash Gordon movie serials .

In the first decade of the 20th century, Konstantin Tsiolkovskii (His name is transliterated from Russian in a number of spellings, including Ziolkovskii and Tsiolkovsky), who wrote both science fiction and explored the mathematics of space flight, published *Beyond Planet Earth* or *Beyond the Earth*. This novel was begun in the

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[195] For a recent summary and assessment of 19th century Indian and British development of rocket weapons see "Technology on the Spot: The Trials of the Congreve Rocket in India in the Early Nineteenth Century" , *Technology and Culture*, Volume 53, No. 3, Pp. 598 – 624.

1890s and finally completed in 1903. His more technically oriented book, *The Exploration of Space by reactive-Propelled Devices* was an attempt to bridge the gap between fiction and fact. However, while Tsiolkovskii is frequently considered a founder of cosmonautics, along with Robert Goddard in America and Hermann Oberth in Germany, Associate Professor James T. Andrews at the University of Iowa argues for caution in such evaluation, and he recommends putting Tsiolkovskii's real contributions in context as at least partially defined by Soviet myth-making.[196]

Rocket activity was slowly increasing during the second decade of the 20th century. In 1912 the French rocket researcher Robert Esnault-Peltrie had written a paper for the French Physical Society, "Considerations of the Results of the Indefinite Decrease in the Weight of Engines." Despite its opaque title, the paper explored factors determining factors in human space travel.

Shortly thereafter, Robert Goddard and his associate, C. N. Hickman, developed tube-launched, solid-fuel ballistic rockets under contract with U.S. Army Signal Corps. While this weapon was developed too late (1918) to see use in World War I, it was the forerunner of the WW II Bazooka and was a practical demonstration of the utility of short-range rocket weapons in modern warfare. By 1919, the Smithsonian Institution published Goddard's theoretical work *A Method of Reaching Extreme Altitudes*, which is recognized as a classic in the field.

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[196] James T. Andrews. Red Cosmos: *K. E. Tsiolkovskii, Grandfather of Soviet Rocketry*. College Station, Texas: Texas A&M University Press, 2009. See especially chapter 4, pages 64-78, and his epilogue and conclusion on pages 97-107. Andrews' point is that Soviet writing about Tsiolkovskii's research probably contained as much Russian propaganda focused on nationalist aggrandizement as it did accurate reporting of his work.

During the 1920s, Goddard became a consultant on solid-fuel rocket devices for the U.S. Navy Bureau of Ordnance, Indian Head, Maryland. In his own research, he abandoned his earlier experimentation with multiple-charge solid-fuel rockets and began developing liquid-fuel rocket motors that developed greater power and could fly longer distances. From 1920 to 1943 Goddard was Professor of Physics at Clark University in Worcester Massachusetts. In 1924, he married Esther Kirk, who became an important partner in documenting his research as his data recorder and photographer.

In 1923 Hermann Oberth published in Germany one of the most important classics of early rocket scholarship, *Die Rakete zu den Planetenräumen*[197] (*The Rocket into Planetary Space*). Oberth became associated with the German civilian rocket society the *Verein fur Raumshiffahrt* and he served as a technical advisor to the society's early liquid rocket experiments.

By 1925, Goddard demonstrated a small liquid-fuel rocket that for the first time was able to lift its own weight. In March 1926, he made the first successful launch of a liquid-fuel rocket at Auburn, Massachusetts. However, Goddard was very protective of technical information derived from his experiments. On May 5, 1926, Goddard asked his Smithsonian benefactors not to publicize the March 16 flight, citing fears over his perception of German focus on rocket development. Similarly, when the German rocket experimenter Max Valier publically proposed a plan for a trans-Atlantic passenger rocket, Goddard quickly responded, calling this a patent infringement.

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[197] Oberth's book was first published in Munich and Berlin by Druk und Verlag Von R. Oldenbourg. A new edition was published in Nuremburg in 1960/1964 by Reproduktionsdruk Von Uni-Verlag, which differed from the original only in the addition of a German introduction by Wernher von Braun.

By 1929, however, support for Goddard's rocket experiments in the United States was increasing. In mid-July, and amid broad international publicity, Goddard launched his first rocket with an instrumented test payload. The press coverage was so sensational and local public reaction so negative that this was Goddard's last flight test in Massachusetts. However, Harry F. Guggenheim's wife, Caroline Guggenheim (nee: Morton), heard about the experiment and arranged meetings between Goddard, Charles Lindbergh, and Harry Guggenheim. This led to a grant of funds sufficient to enable Goddard's construction of a small flight research facility at Roswell NM. By the end of the year, the Carnegie Institution in Washington expressed interest in using Goddard rockets for upper-atmospheric research—at the same time that the German Ministry of Defense was receiving a report that recommended the army pursue rocket propulsion research, to include verification of propulsion laws, consideration of worker safety, and creation of models.[198]

The 1930s saw a dramatic interest in liquid-fuel rocket experimentation. Robert Esnault-Pelterie published, in France, his studies on space travel by rocket, *L'Astronautique* (1930), and Goddard made his first rocket test at Roswell in December 1930, with the backing of a two-year grant from Daniel Guggenheim's foundation. In 1931, the Soviet Union entered the field of practical rocket research with establishment of the Group for Study of Rocket Propulsion, GIRD, which later became the Soviet Government's State Rocket Research Institute. Also in 1931, the German Army gave a contract to the Heyland Works for development of a small 45-pound thrust motor for basic experiments and made its first contact with the VfR.

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[198] Dornberger: 1952, 1954. P. 20.

That same year, Vice President of the American Rocket Society (ARS), C.

Edward Pendray, visited the civilian VfR facility near Berlin, and ARS President David

Lasser published, in the U.S., *The Conquest of Space*[199] to outline his proposed program

for use of rockets. The ARS began a series of independent tests of small liquid-fuel

rockets on Long Island at about the same time.

In 1932 Goddard began the first of several series of relatively sophisticated,

instrumented, and stabilized test launches at Roswell, and the Smithsonian Institution

published his research report on liquid propellant rockets.[200] And, in January 1936,

General Boetticher, Germany's military attaché in Washington, cabled an assessment of

Goddard's writing, experimentation, and financing to the attaché group under a senior

army officer of the War Ministry. The German Army was clearly aware of Goddard's

published research.

In parallel with Robert Goddard's research and experimentation, American rocket

research was also being pursued at the California Institute of Technology. In Early 1936,

Frank J. Malina proposed to Theodore von Kármán a program of work for the design of a

high-altitude sounding rocket (solid or liquid-fueled) to be carried out within the

Guggenheim Aeronautical Laboratory (GALCIT) at Cal Tech. Von Kármán supported

the proposal, and rocket research at Cal Tech expanded to include work of both solid and

liquid propellant motors to use rocket jets to assist aircraft takeoff, or JATO.

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[199] David Lasser. *The Conquest of Space*. Ontario, Canada: Apogee Books, 1931/1971.
[200] Robert H. Goddard. *Liquid-Propellant Rocket development*. City of Washington: The Smithsonian
Institution, March 16,1936. The American Institute of Aeronautics and Astronautics published a facsimile
edition in 2002 containing the texts of both Goddard's 1919 theoretical report and his 1936 research report
under the title *Rockets.*

In the aggregate then, American intelligence had available to it a potentially rich source of openly published academic research and experimentation that could have been useful for focusing government efforts at learning about any potential foreign rocket weapon programs. But the utility of this knowledge presupposed national decision maker interest and government program manager support. Neither would be forthcoming for some years, until Germany demonstrated the practical application of long-range, liquid fuel rocket weapons in the form of the V-2 missile system.

The Impact of Pacifism and Economic Depression on Interwar American Intelligence

The framing and organization of America's intelligence in the 1930s described by Sweeney and Kent in chapter 3 reflected the isolationist and pacifist ethical trend of much of its population. There was strong popular resistance in the United States to becoming involved in another major conflict in Europe and a growing tension over the building Japanese military domination in the Pacific. By the 1930s, Secretary of State Stimson had reduced State Department inclusiveness and support for covert interception and decryption of foreign diplomatic communications. The American military—especially army—had come to rely primarily on publicly available information and reports from declared attachés rather than secret espionage agents or the developing aerial photography techniques, to set the baseline of intelligence knowledge.

World War I was supposed to have been the "war to end wars" and the post-war League of Nations was intended to replace armed combat with international negotiation. With most of the Federal Government facing strong isolationist popular sentiment and

severe budget restrictions following the Great Depression, the intelligence efforts at creating knowledge of German unconventional weapons were small and inadequately coordinated between largely autonomous bureaucracies. What effort existed was more focused on immediate tactical defensive concerns than on defining an existing or potential European enemy's long-range and long-term strategic offensive capabilities. Effectiveness at developing organized American strategic knowledge through intelligence sources was restrained by many legislative and executive decision makers' unwillingness to provide resources to enhance intelligence material and social technologies—or even to direct the intra-governmental exchange of such detailed knowledge as was being compiled by different parts of the existing bureaucracy.

The period between the German invasion of Poland in 1939 and American entry into the war after the Japanese attack on Pearl Harbor in December 1941 was one of ambivalent U.S. popular support for nations that would shortly become its British, French, and Polish allies. There was also a great deal of concern and uncertainty about the form which revolutionary Soviet foreign policy would take—how far would Stalin go to support the National Socialist government of Germany with which he had signed a non-aggression pact on August 23, 1939..

Despite the popular resistance to involvement in another European conflict, this was a period of nascent American government planning and development of a grand strategy for the United States by the Franklin D. Roosevelt Administration. It prepared the nation for its eventual political, economic and military participation in the war that was already underway in Europe. One especially significant innovation in this strategy was the establishment in June 1940 of a National Defense Research Committee

(NDRC)—from the intelligence frame, a potential substitution of civil scientific for military intelligence effort. James Phinney Baxter 3rd, in his early post-war history of the Office of Scientific Research and Development, *Scientists Against Time*, considers this action by President Roosevelt to be especially important, as it provided 18 months of time for resource mobilization. This was followed by scientific information exchanges with the British and Canadian governments.[201]

While these exchanges were not specifically oriented toward secret intelligence, they gave the U.S. the benefit of recent British combat experience with German military equipment and tactics. They were also part of a precedent establishing closer relationships between America and the United Kingdom that enabled American adaptation of British intelligence experience and occasional sharing of sensitive knowledge between the two nations.

However, there were also some preliminary unilateral steps being taken to establish a more coherent American infrastructure for acquiring knowledge of potential foreign enemies. Much of this consisted of formalizing relationships between already existing military intelligence and law enforcement organizations. One of the earliest of these steps was a presidential requirement that attempted to consolidate national investigative efforts into foreign espionage, counterespionage, sabotage, and subversive activities. At the end of June 1939 President Roosevelt directed that all such "negative intelligence" or counterintelligence investigations would become the joint responsibility of the War and Navy Departments and the Federal Bureau of Investigation. Similar

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[201] James Phinney Baxter 3rd. Scientists Against Time. Boston: Little, Brown and Company, 1946. P. 27.

existing activities within such other executive branch organizations as State, Treasury, and Commerce were to turn over such material to the FBI.

The presidential order did not specify the details of how the War-Navy-FBI coordination was to be accomplished. With this lack of guidance, the three War, Navy, and FBI seniors had formed their own Interdepartmental Intelligence Committee or Conference. It would meet periodically, with a senior State officer representing President Roosevelt. (initially Assistant Secretary for Administration, George S. Messersmith and, after he was reassigned as Ambassador to Cuba in 1940, Assistant Secretary of State for Administration Adolf A. Berle, Jr.)

The IIC established a precedent for American intelligence coordination mechanisms that carried with it some inherent problems. It had no specific authority beyond its President's assigned counterintelligence function, and it had no central resource control to enable specific operations. CIA historian Thomas F. Troy provides a useful summary of the difficulties the IIC faced, difficulties that would reappear in later attempts to coordinate cross-agency intelligence activities:

> While the IIC lacked, as a Bureau of the Budget study would note, a chairman, powers to command anybody, and formal machinery for coordination, it did at least provide for voluntary exchange of information and served to bring the heads of the investigative agencies together for mutual discussion.
>
> Small as was this progress, both directive and committee figure importantly in this story. First, they represent the nation's first modern peacetime coordination of the intelligence services. Second, they embody the ideal—self-coordination by a committee—which the services would henceforward trumpet as the answer to the problem of improving their capabilities. Third, they laid the groundwork for the FBI's acquisition of a mandate for operations in South America, and hence, as will be shown, for the conflict between Hoover's FBI and Donovan's COI and OSS. Fourth, they played a role in the country's

first feeble efforts soon to be taken in the field of foreign clandestine collection of both negative and positive intelligence.[202]

As the movement toward American involvement in another European war became more certain, advances were being made in the development of American diplomatic and military observers as information sources, along with improvement of airborne photographic reconnaissance systems, and the employment of signals intercept capabilities. However, these were largely separate parallel efforts, only loosely coordinated between independent military departments and services.

While many nations' militaries—including those of such technically advanced countries as the United States, Germany, the Soviet Union, and France-- began to explore practical applications of rocket technology in the period between the wars, their progress was small scale, uneven, and conditional on the ability or willingness of governmental, academic, commercial, or public organizations to provide funding and resources. In the United States, advanced rocket technology experimentation was largely academic research and experimentation sponsored by educational organizations such as the Smithsonian Institution, Clark University, and the California Institute of Technology, and by public support from Charles Lindbergh, the Carnegie Institution of Washington, and the Guggenheim Foundation. Most of the American practical work was led by two separate groups, Robert Goddard's team in Roswell, New Mexico—supported by Lindbergh and the Guggenheims—and, starting a bit later, the Guggenheim Aeronautical

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[202] Thomas F. Troy. *Donovan and the CIA: A History of the Establishment of the Central Intelligence Agency.* Washington, D.C.: Central Intelligence Agency Center for the Study of Intelligence, 1981, Pp. 13-14.

Laboratory at the California Institute of Technology, especially its work of GALCIT graduate students under the direction of Theodore von Kármán.[203]

What was missing from the equation in America's rocket effort was any interest by its armed forces in design of liquid-fueled rocketry for long-range strategic weapon design—or in the interests of foreign nations in such technology. What American military rocket research was pursued before World War II was more focused on short-range tactical battlefield weapons or short-field takeoff aides for army or navy aircraft. With no operational interest expressed by the military, there was little interest in using the scarce resources available to under-staffed and poorly resourced inter-war intelligence organizations in the post-depression economy to pursue what seemed to the many neutrality-leaning Americans to be theoretical foreign developments in a field that posed no immediately discernible threat to U.S. national security.

An Unsuccessful First American Attempt to Develop Knowledge of German War Rockets

Interest in long-range rocket development was limited in most American military services. But, later in 1944 the Commanding General of the Army Air Forces, General

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[203] The California Institute of Technology publishes an online history of GALCIT up to 2007 at http://www.galcit.caltech.edu/history/index.html. (This history was retrieved on October 9, 2011.) The entries for 1936, What was called "The Suicide Squad" operated the rocket test facility von Kármán set up, and the activities of John W. Parsons, Edward S. Forman, and then-graduate students Frank J. Malina, Apollo Olin Smith, and Hsue-shen Tsien in October 1936. The CalTech history entry for 1942 describes Malina and Parsons as co-founders of the GALCIT Rocket Research Program. Dr. Tsien, whose work was restricted during the 1950s "red scare," left America for China, and later became the "elder statesman" of the People's Republic of China's rocket program. The "Suicide Squad" evolved into the Jet Propulsion Laboratory (JPL), and Malina, as first acting director of JPL, led the effort to build the American WAC Corporal rocket. For a more extensive biography of Dr. Tsien (who died in October, 2009) see the 1995 biography by Iris Chang, *Thread of the Silkworm* (New York: Basic Books.)

Arnold, wanted to include this subject in the air component's operating frame of reference. However, it was an American reserve officer who made the first attempt to better define potential enemy airborne threats—a clearer example of a substitution function involving gathering intelligence data by a civilian observer rather than a member of the existing intelligence bureaucracy.

During the late 1930s, as American neutrality was being questioned by an increasing part of the public, Charles Lindbergh made a series of visits to Germany as a private observer of German air operational and development activity. To parts of the American public his reports branded him as a pro-German propagandist for neutrality and against Roosevelt's emerging foreign policy. However, there is more to the story.

Lindbergh had been appointed a colonel in the Army Air Corps Reserve after his New York to Paris flight in 1927. In the 1930s, he had moved with his family to England to avoid public notoriety in the aftermath of the kidnapping and death of his son. Lindbergh was not a trained intelligence observer, but he was an expert authority on contemporary aviation technology.

His first visit to Germany was in response to an invitation from the German Air Ministry, brokered by the American military attaché in Berlin, Major Truman Smith. This tour began in July 1936, six months after German military attaché in Washington General Boetticher's report on Goddard's research was sent to Berlin. This report mentioned Lindbergh's association with rocket development at the same time the Luftwaffe was becoming covertly involved in the Spanish Civil War. Lindbergh's second tour started in October 1937, a month before the series of A-3 test failures. And

Lindbergh's third visit began in October 1938, shortly after the test drops of small-scale models of the A-5 from aircraft were carried out to determine the relative stability of various tail designs.

There are still strongly-held and differing opinions about whether Lindbergh's reports of these visits served American information needs because of his aeronautical expertise or German needs for a propaganda conduit to impress on Europeans and Americans the strength of its air power in the lead-in to the Munich crisis of October 1938 and the annexations of Austria and Czechoslovakia,. However, in General H. H. Arnold's postwar memoirs, he makes passing reference to the value of Lindbergh's reporting, albeit treating him as a private individual rather than in his position as a colonel in the Air Corps Reserve:

> Looking back on it, I think one of the most wasteful weaknesses in our whole setup was our lack of a proper Air Intelligence Organization. It is silly, in the light of what we came to know, that I should still have been so impressed by the information given me in Alaska by that casual German who called my hotel and told me about their "new bomber." I know now there were more American journalists and ordinary travelers in Germany who knew more about the Luftwaffe's preparations than I, the Assistant Chief of the United States Army Air Corps.

> From Spain, where our Army observers watched the actual air fighting, reports were not only weak but unimaginative. Nobody gave us much useful information about Hitler's air force until Lindbergh came home in 1939….[204]

Thus, a source who Arnold later came to believe was one of the most useful available to him as General of the Army Air Forces on sensitive prewar German air warfare capabilities and who was personally aware of American liquid-fueled rocket research, apparently had no special access to information on Germany's army-run rocket

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[204] H. H. Arnold. Global Mission. New York: Harper and brothers, Publishers, 1949. Pp. 168-169.

program—even though Germany's military attaché had less than six months earlier had

specifically reported Lindbergh's connection to Goddard's rocket research. Apparently,

the Germans were successful practitioners of denial and deception techniques to block

America's prewar knowledge of their weapons research program through creation of a

structure to control access to official information, even by invited, ostensibly neutral,

observers.

Former U.S. Army military attaché Truman Smith, in a response to an official

request in 1953 from the Intelligence Division of the Army, prepared a report on pre-war

air intelligence activities, with an emphasis on the relationship between the Berlin

military attaché office and Lindbergh. Smith's diary entry for 25 July 25, 1936 mentions

the dearth of information available to the Americans from the Germans on their rocket

research:

> Colonel Lindbergh and Captain Koenig [A U.S. Army Air Corps officer attached to the Berlin attaché's office as air adviser] spent the day at the German air research institute at Adlershof, south of Berlin; this institute was headed by Dr. Seewald, a noted aeronautical scientist and was commonly referred to as the DVL. It was comparable to our own research establishments at Langley Field. Air tunnels and other test equipment were found to be modern and efficient. When Colonel Lindbergh returned to Berlin, late in the afternoon, he told the military attaché that while the German scientists talked quite freely in most instances, he could not get them to discuss the subject of rockets. Rocket developments appeared to interest Lindbergh immensely. He had been working for some years in the United States with one of the pioneers in this field, a Professor R. H. Goddard, and he knew that recently rocket developments had been carried on in Germany. The military attaché and Captain Koenig both missed the significance of this remark, and Lindbergh admits he failed to catch its real implications. There is also no indication in the War Department files that any report on rockets was sent to Washington by the Berlin attaché office, an oversight of some importance in view of the subsequent remarkable development of this weapon by the Germans in the Second World War.[205]

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[205] Truman Smith. *The Memoirs and Reports of Truman Smith.* Edited and with an introduction by Robert Hessen. Forward by General A. C. Wedemeyer, (USA ret.) Stanford, California: Hoover Institution Press, 1984, P. 96.

Up to this time, most American knowledge of German rocket development programs had been generated by liaison between private members of the civilian American and German rocket societies. Lindbergh's initial observation tour in association with the American's Berlin attaché office was the first official contact which might have provided some indication of the state of German military progress in the rocket field. While Lindbergh's observations were quite revealing about the general state of the rapidly building German aircraft industry, they provided no useful information on the rocket question.

A number of factors could have been at play in this failure to learn about progress in military rocketry. First, Lindbergh and his air adviser Koenig were talking to Luftwaffe employees and associates, while the German rocket effort at that time was controlled by the army. Second, the German Army was exceptionally secretive about their rocket research, limiting knowledge of it to only a select number of their own personnel and to outside contractors or academic researchers directly associated with the army's program. Finally, and perhaps most importantly, the development of German long-range rocket weapons was still at an early stage in its evolution—the Germans themselves had only rudimentary knowledge of liquid-fuel rocket technology. At the time of Lindbergh's tour of aircraft-associated facilities in July 1937, the Germans were having difficulties with wind tunnel tests of the smaller A-3 rocket design at Aachen[206]— possibly limiting any propaganda value the German's might have expected to gain from revealing new technology, and which they could reasonably have expected Lindbergh to

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[206] Dornberger: 1952, 1954. P. 57.

134

report to both the American and the British militaries had it intentionally been made available to them.

In the follow-on to Lindberg's report, there is a clear example of how a lack of inclusion by the most senior American executive and military leadership within the intelligence frame could lead to harsh criticism of the latter—even using the press as a conduit—when political and technological goals come into conflict. The American reception of Lindbergh's information on significant advancement in the Germans' aircraft development program did not shed any new light on the question of their rocket development. However, it does illustrate a recurrent pattern of different political and intelligence criteria for judging the effectiveness of intelligence-based knowledge and the different technological frames of three different components of America's national decision making and operations structure. Furthermore, it provides an example of how the different components can work positively together, but also how they can sometimes create conflict at separate echelons of the national security power structure:

- when senior political decision makers face information not consistent with their existing goals or advice,
- when representatives in the field report unwelcome information, and
- intermediate staff organizations are trying to balance the desires of their bureaucratic seniors with information being provided by their subordinates.

Former American Berlin military attaché Truman Smith reviewed and concurred with the data in Lindbergh's 1936 report, as well as that from four more observation visits extending through 1939. Smith's memoirs reflect the hostility with which

intelligence describing significant—and politically inconvenient—German advances in

aircraft design and production were received by President Roosevelt and his political

advisors as the likelihood of American involvement in the war in Europe increased in the

late 1930s and 1940. They labeled the Lindbergh/Smith reports as "defeatist" and at odds

with the president's political goals:

> The collapse of France on June 22, 1940, was the prelude to the most unhappy period of
> my life. Almost at once, one columnist after another, among them Drew Pearson and
> Walter Winchell, launched personal attacks on me for being pro-German and anti-
> American. So vicious and widespread became these attacks that I realized they were
> being instigated by personalities high up in the Franklin D. Roosevelt administration. I
> was informed by certain of my G-2 comrades that it was primarily Justice Felix
> Frankfurter and Secretary of the Interior Harold Ickes who were behind the columnists. I
> was also told at this time that these two officials had suggested to the president that I be
> court-martialed….
>
> Such a court martial, I soon learned, General Marshall had opposed. He warned the
> president that a court martial would surely acquit me and that the outcome of the trial
> would estrange administration and the army. I was also told that General Marshall had
> urged the president not to take an action which would make me an American Dreyfus.
> Nevertheless, despite Marshall's disapproval, the attacks of the columnists continued
> week after week….
>
> …I think it was towards the end of July that Colonel Warner McCabe, the G-2 of the
> Army, informed me that he had talked with General Marshall. The latter was much
> disturbed by the continuous press attacks on me with apparent White House support, and
> General Marshall thought it wise to "take these attacks on the oblique." Colonel McCabe
> told me to leave Washington at once, go where I would, and stay away until the political
> heat had cooled….
>
> …Upon my return, I was informed by Colonel Frank McCarthy, Marshall's aide, that Mr
> Bernard Baruch, one of the president's closest friends and advisers, had gone to the
> president at Marshall's request and begged him to put an end to the press attacks.
> Otherwise, in Baruch's words, a misunderstanding over a minor matter might well occur
> between the administration and the army. McCarthy told me that the president had
> accepted Baruch's advice. At any rate, the press attacks ceased.

Smith's troubles with the political administration did not stop with the end of

attacks by hostile columnists. His account goes on to say that in September 1940 he was

accused of criticizing the President Roosevelt as being "paralyzed from the neck up" at a

July 1939 cocktail party given by Scripps-Howard columnist Ludwig Denny. Such

criticism of the president, as Commander-in-Chief of the military services, is a serious

issue for the military Inspector General (IG) of the Army, Major General Virgil Peterson—a former friend of Smith—was assigned to conduct a formal investigation. Peterson apparently slow-rolled the investigation, in Smith's words because "he did not wish to prejudice his future in the army by an investigation, which he knew would clear me and arouse the ire of the New Deal clique." Peterson ultimately assigned an IG officer, Colonel Franklin Babcock to conduct an investigation, during which Smith was successful at proving he had been in Walter Reed hospital at the time he had allegedly criticized the president.

The issue was finally resolved by Secretary of War Stimson, who brought about a meeting between himself, Colonel Smith, and the head of the Rural Electrification Bureau, Mr. Slattery, who had attended the Denny party. Slattery said that Smith was not the officer who had made the comment and that his close friend Harold Ickes was the individual who had accused Smith of the disrespectful comment. This apparently ended the issue.[207]

The foregoing description is the perception of a single individual who was a participant—and target—in the events he describes. Thus, it may be of problematic value for generalizing to system-wide behavior. Nevertheless, it provides an example that contains the major elements and relationships of social groups relevant to the intelligence frame that can complicate political decision makers' acceptance and use of accurately reported information or analysis.

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[207] Smith: 1984. Pp. 32-35.

The pattern described by this series of incidents involved three social groups of actors, each sharing different sets of values in its frame of reference through which they judged the objectives of intelligence and the effectiveness of information they received and used it to craft their responses to it. At one end of the spectrum, the President of the United States and his senior advisers, Justice Frankfurter, Interior Secretary Ickes, and Bernard Baruch, who were responsible for developing or influencing the vision and direction of U.S. policy, evaluated information from a military intelligence-producing agency as "defeatist," and as not providing support for their preferred war-preparation policies.

At the opposite end of the spectrum, the Military Attaché in Berlin, Colonel Smith, and his volunteer informant, aviation expert Charles Lindbergh, produced a series of reports based on their expert observations about what they conclude was a rapidly improving German military air capability. The basis for measuring the effectiveness of their effort is the accuracy of detail, perspective, and context of the information which they report. Thus, they rate reporting by the attaché office and their informant, Colonel Lindbergh, on German air developments as effective, but reporting on rocket developments as ineffective due to their inability to elicit any information on the German rocket program.

In between these two extremes was an intermediate level of organization that was concerned with translating the policies of the national-level decision makers into plans, programs, and resources through which the Army operating units implemented the national policies. In this case, the intermediate level is represented by Secretary of War Stimson—who has a foot in both the senior and intermediate levels of organization, along

138

with Chief of Staff of the Army General Marshall, Army G-2 Colonel Warner McCabe, Army Inspector General Virgil Peterson, and his IG staff officer, Colonel Franklin Babcock. The values of this third subculture revolved around questions of effective military organization and behavior and of managing the relationships between the senior political decision makers and subordinate operating elements.

All three subcultures in this example demonstrate both effective and ineffective behavior, and some of the latter reflects the forms of information blocking and information distorting pathologies that Harold Wilensky describes in his book, *Organizational Intelligence*. As already mentioned, the attaché office was effective at gaining accurate knowledge about many German air warfare capabilities, but was blocked from gathering information on the rocket program by the Germans' lack of open information on the topic. Colonel Smith, at the end of his book includes the rocket case as an example of attaché office failure:

> Although on two occasions, rumors reached the military attachés about German experiments with rockets it failed to follow up these rumors and did not report them to G-2. In view, however, of the secretive measures thrown by the Germans around their rocket development, it is problematic whether much further information could have been obtained.[208]

The attaché office, was also ineffective in influencing the most senior national policy makers on German air programs because of an information blockage caused by a preference for politically acceptable information that they could label as "defeatist" that ran counter to their preferred policy for war preparation. Instead, their reaction was to try to "shoot the messengers."

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[208] Smith: 1984. P. 165.

The middle level of military process managers and planners was concerned with both organizational and personal issues. At the organizational level, Chief of Staff Marshall and G-2 Colonel McCabe accepted the attachés' reporting on air issues as accurate, and therefore effective. However, it also caused friction between the army and the political decision makers that could serve as a block to knowledge flow. Additionally, IG Peterson's delay in proceeding with the investigation ordered by General Marshall—in Smith's opinion—appeared motivated by personal career concerns that an investigation would prove Colonel Smith's version of the alleged slander incident that would "arouse the ire of the New Deal clique" of political decision makers. On the other hand, it was Colonel Babcock from the IG's office, Chief of Staff Marshall, and ultimately Secretary of War Stimson who brought resolution to this issue.

It is less clear from Colonel Smith's account what role President Roosevelt directly played in this issue. It is relatively clear that he believed the Smith-Lindbergh data was defeatist, thus blocking his willingness to accept the evaluation of greatly improved German military capabilities as either current theory or tacit knowledge. It also seems relatively clear that Justice Frankfurter and, especially, Interior Secretary Ickes were working as the President's proxies in an attempt to discredit information arguing against involvement in a European war, counter to the President's policy preferences. Still, it was presidential confidant and adviser Baruch and cabinet secretary Stimson who defused the political issue and thus reopened the potential blockage of knowledge flow from the Army to the President.

All of these factors are elements of a single case. But many of the same factors of senior dissatisfaction or disinterest in particular information, concern with organizational

unity over accuracy, and anticipated negative personal consequences in response to

juniors passing on information that seniors don't want to hear, appear in the story of

developing knowledge of enemy long-range rocket weapons.

Early—But Unrecognized—Success in Discovering Knowledge of the German Rocket Program

From the perspective of Germany's western opponents, the beginning of the war

in September 1939 provided their first hint of a secret rocket weapon development

program—to the British, but not yet to the Americans. This came in the form of what has

been called "The Oslo Report" or the "Oslo Letters" given to the British Embassy in

Norway, which identified Peenemünde as a rocket-related research facility but with no

clear or specific information on the long-range rocket, itself.

The Oslo Report was in eleven sections dealing with the Ju-88 bomber, the

German aircraft carrier Franken, remote-controlled gliders, the FZ 10 autopilot, remote-

controlled projectiles, the Luftwaffe development center at Rechlin, methods of attacking

bunkers, an aircraft warning device, aircraft distance-measuring equipment, naval

torpedoes, and electric fuses for aircraft bombs and artillery shells. The third and fifth

sections of the report identify Peenemünde as a research establishment associated with

development of guided missiles. According to wartime scientific and technical

intelligence chief advisor, R. V. Jones, the material was first received in October 1939 by

the U.K. Naval Attaché in Norway, Captain Hector Boyes and was translated into English

by November 4, 1939. Well after the end of the war, Jones attributed the Oslo Report to

Hans Ferdinand Mayer, a Siemens engineer working in electronic physics, with support from British businessman Cobden Turner.[209] As suggestive as this report was, its shortage of specific detail caused it to be seen as effective only as background information. After its review, it was filed away for future reference until more positive information became available in 1942 from air reconnaissance photography. The information was not shared with the Americans until after they entered the war in 1941. The Americans were not yet fully included into Britain's frame of reference of its sensitive intelligence organizations.

British military intelligence efforts at this time were consumed with the combat support they were providing to their European allies in countries such as Poland and France. American intelligence, on the other hand, was focused on the possibility of German political and economic espionage and subversion in the Americas, on managing its official bureaucracy to meet such possible threats, and especially on Japanese activity in the Pacific. This left little room for either British or American senior national decision maker concern with the details, or even the existence, of revolutionary German weaponry. Still influenced by a popular isolationist sentiment, American emphasis was, for example, on such activity as political and economic relationships between the Germans and Latin American governments.

Nonetheless, America was beginning to focus effort on bringing intelligence knowledge together at the national level. In July 1940, Navy Secretary Frank Knox

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[209] The text of the Oslo Report is reproduced in R.V.Jones, 1989 as Appendix A, Pp. 333-337. It is also reproduced in slightly different form in the British Official History of Intelligence in World War II. See Hinsley, Vol I, 1979, Appendix 5, Pp. 508-512.

convinced President Roosevelt to direct World War I hero William J. Donovan to make

two European investigations that both provided useful information and made for him

friendly contacts in the British Government. The first of these visits was a late-July,

early-August tour of Britain, looking at its capabilities to pursue the ongoing conflict.

The second was a longer visit between December 1940 and March 1941 looking at such

questions as shipping problems, the possible impacts of the situation in North Africa on

American interests, and the importance of political and psychological factors in the

ongoing conflict. Shortly after Donovan's return from his second trip and his report to

the President, Roosevelt on July 11, 1941 ordered the establishment of a new office, the

Coordinator of Information (COI), to be led by Donovan.

Within a period of weeks, President Roosevelt received, through Deputy

Secretary of State Sumner Welles, a proposal from journalist and political supporter J.

Franklin Carter to establish a small intelligence service answering only to the President

and independent of the Federal bureaucracy. This was yet another civilian-for-

intelligence substitution, but the proposal found favor with Roosevelt, who was

suspicious of the studied neutrality and what he perceived of as the defeatism of his

official foreign policy advisers in the State Department. Roosevelt sent Carter back to

see Under Secretary of State Welles. Carter received a lukewarm reception from

Assistant Secretary Berle, who gave him a small amount of operating money, but kept

him at arm's length, not wanting to be involved in the details of Roosevelt's private

intelligence arrangements.

As with the earlier activities of the Room/Club, Carter's operation was focused on

domestic security concerns and the evolving threat in the Pacific. It had no relationship

to the problems of later scientific and technical intelligence production in general or the V-2 in particular. But it does provide some understanding of the fragmented management and duplication of effort of the inter-war intelligence structure in Washington at the time America was beginning to prepare for an unpopular but increasingly certain second major war.[210] It also demonstrates that the President's early-on willingness to experiment with unconventional organizations and relationships extended to the structure of American intelligence.

American Intelligence Preparations and British Intelligence Operational Focus.

America's disjointed intelligence activities in 1941 were focused on illuminating the increasing U.S. political, naval, and military interest in stopping what was perceived as threatening Japanese expansion throughout the Pacific area.

But, perhaps most importantly, America was beginning its first experimental innovation with a centrally integrated organization for the collection and production of national-level strategic political and economic knowledge. The governments of most major powers had long supported such organizations. But much of America's population and political leadership retained a traditional skepticism about any proposal for a national institution for secret information gathering or political action. Such a proposal was seen by many as an unacceptable step toward a police state.

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[210] See Joseph E. Persico. *Roosevelt's Secret War: FRD and World War II Espionage*. New York: Random House, 2001. Persico's description of the Roosevelt-Carter relationship appears of Pp. 57-59.

However, on July 11, 1941, President Roosevelt signed his order establishing the office of Coordinator of Information (COI) under his authority as President and Commander in Chief of the U.S. Army and Navy. The functions assigned to the proposer of COI, William J. Donovan included:

> (T)he authority to collect and analyze all information and data, which may bear upon national security; to correlate such information and data, and to make such information available to the President and to such departments and officials of the Government as the President may determine; and to carry out, when requested by the President, such supplementary activities as may facilitate the securing of information important for national security not now available to the Government.[211]

This July 11th order required Federal Government departments and agencies to provide the new office information as requested by the Coordinator and approved by the President. The Coordinator was also authorized to form interdepartmental committees as he deemed necessary. Donovan was to answer directly to the President, but he was instructed not to interfere with existing duties and responsibilities of the "regular military and naval advisers of the President as Commander in Chief of the Army and Navy." However, he was authorized to employ personnel and acquire supplies, facilities, and services within the limits of allocated funds. Thus, COI created a distinct frame of reference from those of the existing military intelligence organizations and the Department of State.

COI's publicly stated purpose was to collect and analyze information with which to inform the decision making processes of the most senior national executives.

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[211]Kermit Roosevelt. *War Report of the OSS (Office of Strategic Services, with a new introduction by Kermit Roosevelt*. Washington, D.C.: History Project, Strategic Services Unit, Office of the Assistant Secretary of War, War Department. This War Report was published commercially, with minor deletions of still sensitive information, in two volumes--New York: Walker and Company, 1976. A transcription of President Roosevelt's 11 July order appears in Volume 1, page 8. .   An edited version by Anthony Cave Brown was also published as The Secret War Report of the OSS. New York: Berkley Publishing Company, June 1976.

However, the implications of its role were much broader, as described by Kermit Roosevelt in his introduction to the *War Report of the O.S.S. (Office of Strategic Services)*:

> Actually, through COI and its successor, the Office of Strategic Services (OSS), the United States was beginning its first organized venture into the fields of espionage, propaganda, subversion, and related activities under the aegis of a centralized intelligence agency.
>
> In themselves, these functions were not new. Every war in American history has produced divers examples of the use of spies, saboteurs and propagandists. Every major power, except the United States, has used espionage, for example, in peace as well as in war, for centuries. The significance of COI/OSS was in the concept of the relationship between these varied activities and their combined effect as one of the most important weapons in modern warfare. [212]

In practical terms, however, the Coordinator of Information was not the head of a fully integrated intelligence organization. He was to have broad powers to collect open and secret information through publications and secret agents, and he was to build an independent analytic capability and become involved in what would later be termed "special operations," such as psychological warfare. But his organization did not control aerial photographic reconnaissance resources nor the separate communications interception and code breaking activities of the armed services or civilian agencies.

And, despite this early innovation in coordinating intelligence production, American efforts continued to reflect competition for authority and resources. For example, FBI Director Hoover—with some support from the State Department—was claiming Latin America as the Bureau's turf for intelligence and counterintelligence activity, while the Army and Navy Departments asserted their independence in collecting information in the same areas through their recognized attachés. In late 1940 just before

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[212] Roosevelt:1976. Volume 1, Pp. 5-8

146

Donovan's second European tour, these competitions had motivated the already-mentioned presidential decision in the Bureau's favor for authority within the Americas and led to a new form of largely voluntary military-civilian intelligence coordination mechanism in the form of the IIC to work out details of collaboration and recommendations for resolving conflicts of mission and resource management.[213]

Further, American Army and Navy cryptanalysts had already succeeded in breaking some of Japan's codes—including its diplomatic "PURPLE" code messages that included information about the impending Japanese attack on Pearl Harbor and the Philippines. However, the code breakers' efforts but were not effective in providing sufficient warning to U.S. forces in Hawaii in time to counter the air attack from quietly deployed Japanese aircraft carriers. As a result of the internal executive and legislative investigations of this perceived intelligence failure, America's focus was strengthened on the Pacific region, and the management of events in Europe was largely left to the British and its continental allies.

Assistant Secretary of State for Administration Adolf Berle—who had World War I army intelligence experience and was President Roosevelt's designated senior governmental coordinator for intelligence and his representative on the IIC—provides a succinct summary of the atmosphere surrounding these issues from the perspective of the diplomatic service:

> We started work on organizing the Intelligence Division for the Department [in November 1940]. Intelligence is beginning to be interesting in the Department now, so

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[213] See, especially, Raymond J. Batvinis, *The Origins of FBI Counter-Intelligence*. Lawrence, Kansas: The University Press of Kansas, 2007. His commentary on pages 207-208 is helpful in understanding the positions of important players in these discussions and relationships.

everybody wants to be in on it. The surprising thing is that what they say rarely, if ever, reveals any great knowledge of what it is all about….[214]

The Europeans—already at war for nearly two years—clearly had immediate military and political intelligence problems. The United Kingdom's reaction to Rommel's spring 1941 offensive in North Africa was complicated by Germany's summer and fall Operation BARBAROSSA against the Soviet Union. One impact of these events: they generated intense discussion and debate within Europe and between the Europeans and Americans about how to relate to a Russia, which had a history of cooperation, if not support, with the German military. Was Russia to be seen now as a committed western ally or was it really only an opportunistic associate more committed to its internal interests than to defeating a now-common enemy?

American and British diplomats and their internal security and civilian intelligence associates met in early February 1942 to discuss the impact of the U.S. Foreign Agents Registration Act. The British thought it would seriously hinder the U.K.'s activities to identify and track German agents—some of whom likely were operating in America. Meetings were also held between the American FBI, and British and Canadian intelligence and included Assistant Secretary of State for Administration Adolf Berle as the U.S. State Department's representative. Berle was something of a skeptic about the need for "a British espionage system in the United States."[215]

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[214] Adolf A. Berle. *Navigating the Rapids, 1918 -1971: From the Papers of Adolf A. Berle*. Edited by Beatrice Bishop Berle and Travis Beal Jacobs. Introduced by Max Ascoli. New York: Harcourt Brace Jovanovich, Inc. 1973. P. 351.
[215] Berle: 1973. P. 400.

Berle, in March 1942, also became the State Department representative on a new

panel suggested by the U.S. Navy, which would operate in Washington to coordinate

American and Allied intelligence relationships and activities. Berle was ambivalent

about this effort:

> Whether we can do anything remains to be seen. My first preoccupation has been the
> defense of the Middle East, especially Syria. I presume the Army and Navy people have
> already gone over this thoroughly, but I am not taking anything for granted....[216]

This was a watershed period for America's organization for war. It followed the

series of events that lent support for the creation of new forms of U.S. military

organization and forced recognition of a need for more meaningful coordination between

both the "joint" components of the American military and between "combined"

American and British war fighting planners and operators. As a result of the first meeting

of U.S and British Chiefs of Staff at the ARCADIA Conference (24 December 1941 to 14

January 1942), the two allies created a Combined Chiefs of Staff (CCS) committee to

resolve problems of military strategy and resource allocation. The American participants

modified the organizational coordination structure from the existing Army-Navy Joint

Board system to a broader system that included the newly reorganized Army Air Forces

and paralleled the existing British defense structure under the direct authority of their

national leader. Admiral William D. Leahy, in his capacity as President Roosevelt's

Chief of Staff, became the Chairman of this new Joint Chiefs of Staff committee. This

parent JCS committee, in turn, created an expanded set of subordinate committees to

resolve American problems of planning, intelligence, transportation, communications,

logistics, mission allocation and other such subjects. JCS would establish U.S. policy

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[216] Berle: 1973. P. 405.

positions on these issues and then would take these positions to their Allies in the

Combined Chiefs of Staff forum for discussion and resolution.[217]

From the point of view of intelligence organization and coordination, one of the

results of this military reorganization was the renaming of the Coordinator of Information

as the Office of Strategic Services and its re-subordination from its direct line of

Presidential authority to operating under the supervision the new Joints Chiefs of Staff.

The range of its functions generally paralleled those of the earlier COI, but with some

transfers of authority to other organizations in areas such as propaganda and political

warfare. OSS responsibilities retained the fuzzy definitions of COI, and this created

tensions between OSS and the more doctrine- and control-oriented armed services that

continued to the end of the war. Admiral Julius Furer, Director of Naval Research,

provides an example of the ambivalent military view of OSS's little-defined charter that

he saw as now properly including OSS within the military-naval frame of reference:

> Placing the office under the Joint Chiefs of Staff had several advantages over its former
> status as an independent civilian agency. The new arrangement provided broad military
> control over an activity that frequently had to work closely with the military services and
> prevented the mushrooming of its activities to unnecessary proportions along lines that
> paralleled those of the military services. The OSS, for example, entered into such work
> as the development of air-sea rescue equipment and air-sea rescue operations…. Much of
> its military personnel had to be given military status and could, therefore, be drawn from
> the military establishments. The new arrangement furthermore, made available to the

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[217] Three American official histories contain valuable information on the development of the Combined Chiefs of Staff/Joint Chiefs of Staff Process. The Air Force study by W.F. Craven and J. L. Cate was published earliest, between 1948 and 1958, by the University of Chicago Press: their Volume One of *The Army Air Forces in World War II, Plans and Early Operations, January 1939 to August 1942*, discusses the establishment of these organizations in its Chapter 7 "Establishment of the Fundamental Bases of Strategy," pages 234-267. Ray S. Cline in the volume of *The United States Army in World War II, The War Department, Washington Command Post: The Operations Division*, Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1951. Cline's chapter VI, "Organizing the High Command for World War II," Pp. 90- 106 presents the War Department-Army perspective. The Navy view is provided by Rear Admiral Jules Augustus Furer in *Administration of the Navy Department in World War II*, Washington: Department of the Navy, 1959, Chapter XVII, "External Relations," Pp. 648-690. Admiral Furer and Dr. Cline were direct participants representing their government agencies, while Craven and Cate wrote as academics from Princeton University and the University of Chicago respectively.

JCS an organization that was elastic and not restricted to working in rigidly prescribed military channels.[218]

An additional outgrowth of the creation of the American Joint Chiefs of Staff was establishment of two sets of U.S. Committees under JCS authority, some of which were either directly related to intelligence or would become primary users of intelligence information. The first set was designed to parallel already existing British committees so that the U.S. would be better prepared to address such issues as intelligence, military transportation, meteorology, logistics, civil affairs and munitions allocation. One of these, the JCS Joint Intelligence Committee, was an adaptation of the American's existing Army-Navy Joint Board structure. According to Admiral Furer's history of WW II Naval Administration:

> The Intelligence Committee of the United States JCS was a continuation and enlargement of the Joint Board Committee of the same name. It was reorganized in March 1942, but received no charter from the Joint Chiefs of Staff until May 1943. Its primary function was to furnish intelligence in various forms and gathered from various sources to other agencies of the JCS, and to represent the Joint Chiefs of staff on the Combined Intelligence Committee. The U.S. Joint Intelligence Committee was assisted by ten or more full-time subcommittees. The Combined Intelligence Committee consisted of the U.S. Joint Intelligence Committee, the British Joint Intelligence Committee in Washington, and representatives of the British Joint Intelligence Committee in London.[219]

The second group of JCS committees had no British counterpart. One of these, the Joint Committee on New Weapons and Equipment—often referred to only by its initials as "JNW"—was a mechanism to coordinate the research activities of the Office of Scientific Research and Development, the Army, and the Navy. OSRD Director

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[218] Furer: 1959. P. 660.
[219] Furer: 1959. Pp. 652, 654.

Vannevar Bush served as JNW chairman and each service provided one high-ranking officer as its member. Admiral Julius A. Furer served as the Navy's Coordinator of Research and Development, and Captain Lybrand P. Smith served as Furer's deputy and became the Navy member of NDRC.[220] Army representation was more complicated, but by 1943, it had established a new component of the War Department Special Staff named the New Developments Division under Major General Stephen G. Henry, which dealt with JNW issues.[221] Neither Admiral Furer's nor General Henry's organizations were intelligence producers. But under responsibilities for overseeing new systems and countermeasures development, both were vitally concerned with intelligence on new enemy weapon developments.

Despite the German success in V-weapon design and testing and the new construction on the Channel coast, relatively little new V-2 intelligence came available to the British during 1942, although a camera-equipped Spitfire fighter had taken some unscheduled photographs of the Peenemünde area on May 15th while the pilot was on his way to another assigned target. Constance Babbington-Smith, a photo interpreter at the Royal Air Force imagery interpretation center at RAF Medmenham, was one of several people to look at these pictures. Her description shows something of how U.K. joint army-air force photo interpretation worked during the early war—and the systemic difficulty caused by assigning responsibility for reporting on very-narrowly-defined individual service-related targets:

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[220] Irvin Stewart. *Organiziing Scientific Research for War: The Administrative History of the Office of Scientific Rearch and Development.* Forward by Vannevar Bush. Boston: Little, Brown and Company, 1948. Reprint edition 1980 by Arno Press Inc. P152.
[221] Baxter: 1946. P. 33.

I remember flipping through the stack of photographs and deciding the scale was too small to make it worthwhile looking at the aircraft. Then something unusual caught my eye, and I stopped, to take a good look at some extraordinary circular embankments. I glanced quickly at the plot to see where it was, and noticed the name Peenemünde. Then I looked at the prints again. 'No,' I thought to myself, 'those don't belong to me. I wonder what on earth they are. Somebody must know all about them, I suppose.' And I then dismissed the whole thing from my mind. But when the sortie finished its rounds, no one had staked a claim for the mysterious 'rings' at Peenemunde, and the cardboard boxes full of photographs were set in place on a shelf in the print library, for future reference when required. There the matter rested, as far as Medmenham was concerned, for the next seven months."[222]

Babbington-Smith's description reveals a situation that would reappear occasionally in the search for information on the characteristics and operations of enemy secret weapons. The number of different organizations involved in collecting, analyzing, and using sensitive information and the complexity of their relationships caused by their differing technological frames would sometimes hinder effective use of information acquired. Later examples in different contexts reflect this difficulty in differing British and American October 1943 assessments of the possible use of the V-2 as a delivery system for atomic warheads, and the more general preference of some analysts and decision makers for sources such as imagery, even when of limited value in answering a question being asked. In the present example, this arose because of different components of the imagery interpretation organization disregarding images they believed to be of targets assigned to other components.

The three rings mentioned by Babbington-Smith in the center of the island were, collectively, known by the German Army as Test Stand XI, the missile acceptance test stands. A stadium-like oval at the northeastern tip of the island was Test Stand VII, the A-4 launching site and mobile A-4 engine test stand. A triangular projection on the

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[222] Babington-Smith,1957. Pp. 204-205.

shoreline east of test stand VII was Test Stand X, the launching facility for military A-4 batteries. The airfield to the west of Test Stand VII was a separate Luftwaffe facility known as Karlshagen Airfield, or Peenemünde West. It was the development facility for a parallel set of air force-managed weapons including the V-1 (Fi 103) and the Me 163 rocket-powered fighter.[223] The reconnaissance images were of the German Army side of Peenemünde and Babbington-Smith was a Royal Air Force photo interpreter.

Thus, the two potentially most valuable pieces of information on Peenemünde's rocket development up to early 1942, the "Oslo Report" of 1939 and the May 15, 1942 "bonus" photographic coverage, were new and unexpected information. They were shelved by the British in the face of uncertain analytic responsibility and pressing demands for clear definition of what would be operationally useful for supporting immediate tactical combat decision making in North Africa—Montgomery's battle against Field Marshal Rommel's Africa Corps at El Alamein in October and November, followed shortly by the American/Allied North African TORCH landings in November . The two unrecognized "nuggets" of Peenemünde knowledge would remain shelved until December 1942, when two new agent reports were received and analyzed by the U.K.'s Air Force and Special Intelligence Service scientific and technical expert, Dr. R. V. Jones. In Jones' recollection:

> (T)here arrived in my office a telegram from Stockholm dated 19th December 1942 saying that a new source 'overheard conversation between Professor Fauner of Berlin Technische Hochschule and engineers Stefan Szenassi on a new German weapon. Weapon is a rocket containing five tons explosive with a maximum range of 200 kilometers with a danger area of 10 kilometers square.'

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[223] Dieter Hölsken. V-Missiles of the Third Reich: The V-1 and V-2. Sturbridge, Massachusetts: Monogram Aviation Publications, 1994. Pp. 32-33.

This initial report from a Danish chemical engineer was followed quickly by another report from Sweden in mid-January 1943 that specifically mentioned a factory at Peenemünde, where there was a new weapon in the form of a rocket 'which has been fired from the testing ground.' While there was some British uncertainty about elements of both these reports, Jones says that they were interesting enough to provide "as good a warning as we could hope to achieve in view of our lack of Scientific Intelligence before the war which had forced me to concentrate on detecting the development of new weapons at the trial stage i.e. later than the research stage but, hopefully, before the operational."[224]

At about the same time that Jones was reading these reports, Speer convinced Hitler to sign an order authorizing completion of A-4 designs, acquisition of long-lead time tools, and start of negotiations with parts suppliers.[225] Prototypes of a special rail-car launching option were also ready for testing at Peenemünde by the end of the year.[226]

Thus, up to 1943, there were disconnects in the relationships and inclusion within American intelligence organizations and between the American and British intelligence technical frames. American and British intelligence on the German secret weapon program was buried under rapidly increasing organizational complexity—only partially coordinated—that was concentrated on tactical resource and operational planning rather than on more far-reaching, if sometimes obscure, strategic issues. What information on the German rocket program was available was based on observations and speculation by civilian informants and military observers not trained to look for technical detail on the

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[224] R.V. Jones. *The Wizard War: British Scientific Intelligence, 1939-1945.* New York: Coward, McCann & Geoghegan, Inc., 1978. Pp. 322-323, 333. Originally published in the U.K. as *Most Secret War.*
[225] Speer: 1970. P. 367 and note 8 on P. 556.
[226] Dornberger: 1952-1954. P. 235.

secret weapons and unable to put what data was available into meaningful context and perspective for political and military decision makers.

This first phase of American and British intelligence production on Germany's secret weapon effort demonstrated the importance of a number of the factors that Bijker includes in his Social Construction of Technology (SCOT) model. A number of relevant groups—American and British national leaders, American political and military leadership, the public, various intelligence specialists, for example--were relevant to the relationships and tensions that were forming an American intelligence complex. Differences in political and economic goals had impacts on available resources and organizational development. Key problems differed between the perceived need of the American President and the intelligence efforts that were to help inform his policies, as well as the resource policies of military forces with different areas of operation and mission. Substitution functions such as reliance on civilian informants were a frequent occurrence. But new experiments in coordination practice were also being carried out in the founding of the largely-voluntary IIC, the establishment of the organization of the Coordinator of Information and the various intelligence committees related to the new Joint Chiefs of Staff.

Nonetheless, there was little information yet available to define the nascent German secret weapon threat. Some of this was a result of limited appreciation of America's senior leaders in liquid-fueled long-range rocket technology. Some was the result of German measures to hide their rocket development. And some was caused by differences between British and American political and intelligence frames, especially when questions of providing sensitive British intelligence information were concerned.

Inconsistency in goals and methods would begin to change as access was gained to examples of German rocket technology. The lack of inclusiveness in cooperative relationships and the decision not to include the long range rocket in its priorities of key problems allowed the existing intelligence structure to overlook the potential danger of a radically new technology. The ability to examine and evaluate material artifacts in 1943 and 1944 would encourage mutual understanding of the secret weapon threat within the various intelligence producer and user groups, as well as increase commonality in intelligence collection, analysis, and distribution processes and procedures.

CHAPTER 6

USERS' PRACTICE FROM 1943-1944: KNOWLEDGE FROM DIRECT ACCESS TO

GERMAN MISSILE TECHNOLOGY

As the British and American governments gained experience from combat with

the German Army, the credibility and utility of their intelligence increased. While some

agent reports were still of uncertain value, others were beginning to be considered valid

and important. Still, the existing analysis of German secret weapons within the political,

military and intelligence frames led to speculative judgments based upon questionable

data. This began to change with the integration or coordination of political and military

power structures into a common intelligence frame and the merging of American and

British war interests. This was directly reflected in the evolution of joint problem solving

strategies and practices, increased closure on procedural matters, and common

approaches to gaining direct access to German activities. In the case of intelligence

collection, this was accomplished through two categories of enabling technologies:

common applications of signals intercept and aerial photography, and establishment of

physical access permitting direct examination of German equipment and captured

personnel.

In early 1943, British intelligence assessments, especially those developed for the

Air Staff and MI-6 by Professor R. V. Jones, continued to be the primary Allied focal

point of secret weapon knowledge. At the time in December 1942 and January 1943 that

Dornberger was negotiating with Speer for intercession with Hitler for higher priorities

for rocket development and approval for a test production facility, Jones was receiving

agent reports from Sweden that confirmed construction at Peenemünde and that facility's

involvement in rocket testing. According to Jones, these reports had the effect of

stimulating new interest, which was "as good a warning as we could hope to achieve in

view of our lack of Scientific Intelligence before the war which had forced me to

concentrate on detecting the development of new weapons at the trial stage i.e. later than

the research stage but, hopefully, before the operational."[227]

American Intelligence Becomes an Increasingly Important Actor in Europe

Inclusion of American participants within the frame of British intelligence

organizations and procedures, while not directed specifically at the secret weapon

problem, would constitute one of the earliest concerted American efforts to collect and

report on-scene intelligence information about the wartime situation in Europe. The

increased cooperation was aided by the setting up of an office of the new OSS in the

American diplomatic establishment in Bern, Switzerland. As a neutral country during the

war, Switzerland was a convenient focal point for any nation looking to gain information

on events in Germany, Italy, or France. The OSS station chief in Bern was Allen Dulles,

later the fifth Director of Central Intelligence and head of the post-war Central

Intelligence Agency during the Eisenhower administration from 1953 to 1961.

Dulles arrived in Bern in November 1942 and set up shop in a combination house

and office at Herrengasse 23. His appointment to that position was a tangible example of

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[227] R.V. Jones. *The Wizard War: British Scientific Intelligence, 1939-1945*. New York: Coward, McCann & Geoghegan, Inc., 1978. Pp. 322-323, 333. Originally published in the U.K. as *Most Secret War*.

how the frame of American intelligence was shifting toward centralized inclusion of

civilian political concerns as well as military goals and key problems. In his 1996 book

focused on Dulles' intelligence reports, former State Department Deputy Historian Neal

Petersen provides a brief description of the environment in which Dulles worked:

> …He bore the title of Special Assistant to the Minister, Leland Harrison, a State Department acquaintance of long standing, and drew on the Legation for staff and communications support. His small contingent consisted of a few true OSS officers and whatever help he could get from Americans trapped in Switzerland by the war, downed airmen, and foreign nationals. His top aide was Gero von Gaevernitz, a German-American businessman residing in Switzerland. He relied heavily as well on Gerald Mayer, the Legation's representative of the Office of War Information, and worked closely with Military Attaché Brigadier General Barnwell Legge. Late in the war, with the border again open, the staff was augmented by OSS operatives Paul Blum, Gerhard Van Arkel, Henry Hyde, and Tracy Barnes. Dulles friends resident in Switzerland included American Mary Bancroft, British scholar Elizabeth Wiskemann, and psychologist Carl Jung. OSS maintained posts at Geneva, Zurich, Basel, and Lugano.[228]

One of Dulles' first reports from Bern contained information suggesting German

secret weapon production. Telegram 44-45, dated February 5, 1943, recounted

information provided by German Businessman Walter Bovari (given the OSS Source

Number 490) that the Germans were working on "a flying contraption perhaps in the

form of an aerial torpedo. He believes that one of his factories in Germany is making one

small part of the machine. It is believed that the tests have not been completed to the

satisfaction of the Germans…." As with many other secret agent weapon-related reports,

Bovari's information does not provide enough detail or perspective to reveal with

certainty whether the weapon in question was a flying bomb, a rocket, or some other

device. However, Bovari provided the Americans knowledge "nuggets" that secret

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[228] Neal H. Petersen, editor and commentator. *From Hitler's Doorstep: The Wartime Intelligence Reports of Allen Dulles, 1942-1945.* University Park, Pennsylvania: The Pennsylvania State University Press, 1996, P. 5. Petersen says at the beginning of his "Preface" that "This volume is based primarily on the Operational Records of the Office of Strategic Services (Record Group 226) at the National Archives, Washington, D.C."

weapon research was going on, partially at one of his own factories, and that the Germans were not yet satisfied with the weapon's test performance.[229]

While American military intelligence organizations were beginning to focus as early as mid-1942 on European war-related problems using tools and techniques such as aerial photography and signal interception, their practical value in informing American policy makers and planners of German rocket development would not be realized until later in 1943. When early access to technical collectors looking at secret weapons became available to Americans, it was primarily when representatives of American military intelligence organizations were being cautiously integrated into restricted British intelligence photographic collection and interpretation, signals collection and cryptographic analysis, and dissemination structures.

The British had already been applying their photographic collection technologies to intelligence problems for several years and were capable of photographing Peenemünde from specially equipped fighter aircraft. They had established their central facility for photo interpretation at RAF Medmenham and provided it with separate sections of analysts staffed by U.K. army and air force photo interpreters.

However, as mentioned above, photo interpreters from the two services were assigned to look at different parts of Peenemünde. This caused a certain amount of confusion in responding to objectives and key problem definition, since early information led them to look for a rocket that could be launched from a long inclined ramp such as that seen in photographs of the Luftwaffe airfield at Peenemünde West. What they saw

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[229] Peterson: 1996. Pp. 37-38.

on photography appeared to be something else. The team of interpreters under Army

Major Norman Falcon:

> …with several new covers of Peenemünde to work on, prepared a detailed statement.
> They reported a huge elliptical embankment and three circular earth banks 'not unlike
> empty reservoirs.' These were facts that could not be denied, but they did not in the least
> tally with the hypothesis of a projector a hundred yards long. Nothing seemed to tally
> with anything."[230]

This British organizational arrangement of photo interpretation reflects

decentralization strategies in its bureaucracies. The British Army photo interpreters were

watching for what was really a Luftwaffe program for Fi-103/V-1flying bomb

development, while the RAF interpreters were searching for the A-4/V-2—a German

Army long-range rocket program. It seems possible that knowledge was being blocked

because they were missing other sorts of related background information—

communications intercepts or agent reports, such as Dulles' information from Sweden—

because it was going into another organization's inbox.

A similar problem was developing in the case of signals intelligence. While the

Americans had demonstrated proficiency in breaking Japanese diplomatic codes related

to the Pearl Harbor attack, in 1943 they were not yet fully welcomed into the British code

breaking operation at Bletchley Park. For example, Colonel Telford Taylor, who had

joined the U.S. War Department "Special Branch" in August 1942, initially became part

of what was little more than an arms-length relationship between the Americans and the

British cryptologic effort at Bletchley Park. Prior to Taylor's involvement in England in

1943, the Special Branch had been working on improving cooperation with what was

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[230] Babbington-Smith, 1957. P. 206.

known as the information translation and evaluation facility named "Hut 3" at Bletchley that received already decrypted signal traffic from its sister facility, "Hut 6." According to Taylor's recollection, there had been "…friction, and it was not until April 1943 that McCormick, Friedman, and I went to London…."[231] Again, different people working on similar problems were blocked from access to useful knowledge by organizational boundaries and security practices.

At the time in 1943 the British were being confused by unanticipated details in photography of Peenemünde, the Americans were negotiating with the British for participation in the Bletchley Park operation, and the Germans had been going through their process of convincing Hitler, through Speer, of the need for higher A-4 resource priorities. This was the period in which Hitler dreamed that no A-4 would ever reach England.[232], Dornberger was increasingly anxious about the possibility of Allied bombing at Peenemünde, and Speer's Ministry of Munitions was establishing the Long-Range Bombardment Development Commission and arguing out competing production plans put forward by various authorities. The Germans were also continuing construction work on the "large sites" on the northwestern French coast that Hitler believed should be the primary facilities for secret weapon launching.

An information breakthrough occurred in early 1943 with a new source of information that became available to the British at the end of March: direct access to senior German officer prisoners of war. German generals Cruewell—Rommel's Africa

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[231] Telford Taylor. "Anglo-American signals intelligence co-operation" in F.H. Hinsley and Alan Stripp, Editors, *Code Breakers: The Inside Story of Bletchley Park*. Oxford: Oxford University Press, 1993. P. 71.
[232] In March 1943, Hitler reportedly had a dream that the A-4 would never reach England. This dream was sufficient within the German decision structure to downgrade the rocket's resource priority. Dornberger discusses this situation in his Chapter 9, "Hitler's Momentous Dream." See Dornberger:1952/1954, Pp. 89-93.

Corps second in command—and von Thoma had been captured in North Africa after Montgomery's victory at el Alamein. They were being interrogated at a British POW center near London, where it was British practice to eavesdrop on selected prisoners outside routine interrogations. On March 22nd they recorded a conversation which according to R. V. Jones was translated:

> --But no progress whatsoever can have been made on this rocket business. I saw it once with Feldmarschall Brauchitsch, there is a special ground near Kunersdorf(?) ….They've got these huge things which they've brought up here….They've always said they would go 15 kms. into the stratosphere and then…. You only aim at an area…. If one was to…every few days…frightful…. The major there was full of hope—he said 'Wait until next year and the fun will start!'…. There's no limit (to the range).

Jones was made aware of the translation on March 27 and saw this to be the turning point in establishing British acceptance of the threat of secret long-range rocket weapons as a key problem:

> Von Thoma also said that he knew their prison was somewhere near London and since they have heard no loud explosions, there must have been a hold-up in the rocket programme…. His remarks transformed the situation. An intelligence organization bears many resemblances to the human head, with its various senses. These will generally be on the alert, each searching its own domain and then as soon as the ears, for example, hear a noise and the signals are received in the brain, the latter will direct the eyes in the appropriate direction to supplement the information from the ears by what the eyes can see. So, if one kind of intelligence source produces an indication, the intelligence organization should then direct other kinds of source to focus on the same target. This was obviously what we had to do, and I started to take the appropriate steps.[233]

Telford Taylor had been actively firming up the cooperation between the U.S. Army and the British in SIGINT affairs. There was still resistance to American participation at Bletchly Park and the Head of the Secret Intelligence Service was opposed to sending anything but selected diplomatic decryptions from Bletchley Park to

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[233] Jones, 1978. Pp. 332-333.

Washington. Taylor, who at that time came under the administrative direction of the American military attaché in London, spent his time "...seeing that diplomatic material that our Signal Corps was not reading was duplicated and sent to the Special Branch. I was a bit lonely, but I became close friends with" important members of the British SIGINT establishment.[234]

Scientific intelligence adviser Dr. Jones had better access to restricted information. Based at least in part on his warnings, the senior British decision makers, up to and including Prime Minister Churchill, were becoming more concerned about the ill-defined, but increasingly worrisome, threat posed by German secret weapon development at Peenemünde. Jones described himself as a watchdog, sensitive to the negative effect of "crying wolf." In his view, the military intelligence organization in the War Office was reaching the same conclusions but was premature in raising to the Chief of the Imperial General Staff the issue of German rocket development as an imminent threat.

However, on the 15th of April, General Ismay, Chief of Staff to Churchill as Minister of Defence, notified him of the General Staff's concern: "The Chiefs of Staff feel that you should be made aware of reports of German experiments with long-range rockets. The fact that five reports have been received since the end of 1942 indicates a foundation of fact even if details are inaccurate." It was the consensus of the Chiefs of Staff that a single ministry-level investigator, Mr. Duncan Sandys, should lead an investigation by scientific and intelligence advisers of all known facts. Jones was not told of this recommendation by Churchill's Science Adviser, Professor Lindemann, for several days.

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[234] Taylor, 1993. Pp. 71-72.

What the Chiefs of Staff Committee was proposing was a substitution function in which a new and politically–connected panel of civilian experts would be given priority over intelligence analysts—R. V. Jones and his small team—in the provision of secret weapon information and recommended countermeasures. It was also an example of the hierarchical power of the political leadership--an organizational restriction proposed by the policy implementation planners and approved by the senior policy makers rather than the evaluators of specialized intelligence knowledge. It had unintended consequences in delaying understanding of the total secret weapon threat posed by the Germans.[235]

While believing the Sandys Committee—first given the codename BODYLINE and later CROSSBOW—would only duplicate the work of his own team, Jones opted to take a passive stance but to stay aware of new information as it came available and to help with analysis and interpretation where needed. This was not a very successful strategy from Jones' perspective and he perceived that he was being intentionally blocked from immediate review of new photo reconnaissance coverage of secret weapon development targets. In his telling, it was his established Air Staff relationship with the photo interpreters at Medmenham that enabled Jones, rather than the photo interpreters answering directly to Sandys, to identify the first photograph of the A-4 rocket:

> …it was 'Pop' Stewart and his colleague Roddie Nicholson, who played an essential part in my finding the first rocket. When they heard of a veto on the Peenemünde photographs going to anyone but Sandys, 'Pop' said to me, "Our instructions from the Air Staff have always been to pass any photographs to you that might interest you, and so we propose to see that you get a copy of every photograph that goes to Sandys. [236]

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[235] Jones: 1978. Pp. 334-335.
[236] Jones, 1978. Pp. 336-337.

The official history, *British Intelligence in the Second World War*, acknowledges

Jones' criticism, but poses a different interpretation of the necessity for a separate

committee, directly responsible to the most senior government policy and decision

makers, to look at the potential threat of German rocket weapons. The official history

notes that Duncan Sandys held the position of the Joint Parliament Secretary to the

Ministry of Supply. (He was also Churchill's son-in-law.) This placed him at the

intersection of the political leadership and a planning and implementing staff

organization. ADI(Sc) Jones, on the other hand, represented in the eyes of War Office

and the Chiefs of Staff, the opinions of a single service, the Air Staff—his parallel

responsibilities to the Secret Intelligence Service are not mentioned. In the words of the

official history:

> …it may be argued that against even the possibility of so great a threat it was imperative
> to avoid delay in taking steps to reduce it , and that, like civil defense preparations, those
> steps, probably bombing of essential facilities, would be essentially the same whatever
> the nature of the weapon.[237]

The official history also addresses a second criticism of the function of the Sandys

Committee, that individuals used to looking at specific enemy weapon systems rather

than more general forms of theoretical knowledge may be in a better position to judge

what is practical rather than what is theoretically possible. The official history's

treatment seems to have been more comfortable with this argument than with the

question of a policy level investigation. Its authors accept the suggestion that the Sandys

Committee's rocket experts did have an "unfortunate consequences for the collection and

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[237] Hinsley, et.al. Volume 3, Part 1: 1984. P. 365.

interpretation of the intelligence." However, the authors also suggest that the Sandys

Committee's approach:

> …was practically unavoidable in view of the novelty of the V-weapons, the
> paucity of intelligence about their performance and technical characteristics
> while they remained in the research and development stage and – not least
> because these were subjects on which Sigint was throwing no light and with
> which SIS agents had no familiarity – the difficulty of distinguishing what was
> reliable from what was not in the intelligence that was coming in.[238]

The authors of this passage in the 1984 intelligence history refer back to an earlier

(1957) volume in the official history series written by Basil Collier. It is helpful to read

through an extended portion of Collier's original reference to gain a better understanding

of the nuance in his description of opinions surrounding the establishment of the Sandys

Committee—written nearly twenty years before the1970s public release of most

formerly classified UK intelligence information, and based in part on a post-war

interview with Duncan Sandys. What Collier describes is a situation in which the

political and military frames of reference differed from the intelligence frame in their

identification of key problems and goals:

> The position thus created was unusual and led to some misunderstanding. It was argued
> at the time and afterwards that, if the object of the investigation was to establish more or
> less precisely what the enemy was doing, the best co-ordinator would have been an
> intelligence officer who either was himself a trained scientist, or had a trained scientist
> experienced in the evaluation of intelligence reports at his right hand. Not unreasonably,
> it was claimed that an investigator accustomed to found his conclusions on evidence from
> the enemy's camp would be more likely—precisely because his outlook was more
> limited—to establish the nature of the new weapon than someone used to working in a
> wider field and therefore more apt to be influenced by the views of British experts as to
> what was feasible. On the other hand it is clearer, perhaps, to-day than it was to many at
> the time that the assumption underlying these arguments was not necessarily valid. If the
> purpose in view was not so much to discover what the rocket was like as to find out
> whether it existed and, if it existed, to take immediate steps to counter the worst threat
> that it might present, then there was a good case for the appointment of a co-ordinator
> with the broad outlook and wide powers of a minister.

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[238] Hinsley, et.al. Volume 3, Part 1: 1984. Pp. 364-365.

> Mr. Sandys had no doubt that to satisfy himself of the existence of the rocket and, having so satisfied himself, to ensure that countermeasures were not neglected, were far more urgent tasks than discovery of the precise nature and performance of the weapon. At the same time it seems certain that his task would have been easier if more had been known about the rocket in its early stages. As Mr. Sandys discovered, it was sometimes difficult to persuade all those with whom he had to deal to assent to energetic and far-reaching measures of defence against a threat of which they could be given only vague and at times exceedingly misleading notions.[239]

This view of the Sandys Committee demonstrates the cultural values reflected in the goals that differentiate three groups of actors in planning, implementing, and utilizing the human and mechanical components of intelligence knowledge technologies. It also illustrates the complexity of making judgments about what constitutes effective knowledge.

The focus of the working intelligence specialists (Jones and his associates) was on the accuracy of detail and development of a coherent and convincing picture that could be presented to senior policy makers and operators when they needed it to develop policies or responses. The efforts of senior professional planners and managers of broader operational structures (the Chiefs of Staff and their subordinate military staffs, for whom intelligence was only part of their concern) were largely focused on coordination and control of the intelligence processes of their component elements and their responsiveness to the perceived needs of policy implementing organizations. Finally, the need perceived by the political decision makers (the U.K. Prime Minister and his senior political and scientific advisers) was that of what Richard Haass calls "bureaucratic entrepreneurs" and others have called "policy entrepreneurs" or "moral entrepreneurs":

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[239] Basil Collier. *The Defence of the United Kingdom*. London: Her Majesty's Stationary Office, Crown Copyright 1957. Reprinted 1995 jointly by The Imperial War Museum, London and The Battery Press, Inc., Nashville, Tennessee, Pp. 342-343, and note 21, P. 584.

creation of a "compass" for concepts of grand strategy in ways that support policy

definition consistent with their experience and judgment and give authoritative direction

to subordinate implementation planning.[240]

One result of this disconnect between frames of members of hierarchical

organizations was that ADI(Sc) Jones' arrangements with the photo interpreters at RAF

Medmenham for informal access to photographic material supplied officially to the

Sandys Committee demonstrated the importance of informal relationships within

complex formal organizations. This was true especially in situations involving perceived

bureaucratic conflict in which the flow of potentially useful knowledge was being

blocked or distorted by some of the participants.

Whatever the motivation for the decision to establish a policy-level secret weapon

review panel independent of the ongoing intelligence effort, establishment of the Sandys

Committee represented senior decision makers' increased concern with the potential

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[240] The policy-oriented definitions of entrepreneurs are discussed in Richard N. Haass. *The Bureaucratic Entrepreneur: How to be Effective in any Unruly Organization*. Washington, D.C.: Brookings Institution Press, 1999, see especially chapter 1, Pp. 1-14. Also see Paul A. Sabatier, editor, *Theories of the Policy Process*, Second Edition, Boulder, Colorado: Westview Press, 2007, Pp. 74 and 108; and Micheal Mintrom, *Policy Entrepreneurs and School Choice*, Washington., D.C.: Georgetown University Press, 2000, Pp. 4-5, for various definitions of entrepreneurs. An older, sociologically-oriented treatment is a fundamental component of the analysis of deviant behavior in Howard S. Becker, *Outsiders: Studies in the Sociology of Deviance*, New York: The Free Press, 1963, Pp. 147-163. Howard Becker concentrates on two common characteristics of "moral entrepreneurs": rule making and moral crusading. Both the direction/control of the policy perspective and the rule-making/crusade of the sociological perspective are essential components of the entrepreneur being defined here. There is also a telling passage in Becker: 1963 that points out on pages 149-150 an important distinction between the reformist entrepreneur and the practical implementer:

> Naturally, many moral crusades draw support from people whose motives are less pure than those of the crusader. Thus, some industrialists supported Prohibition because they felt it would provide them with a more manageable labor force. Similarly, it is sometimes rumored that Nevada gambling interests support the opposition to attempts to legalize gambling in California because it would cut so heavily into their business, which depends in substantial measure on the population of Southern California.
> The moral crusader, however, is more concerned with ends than means. When it comes to drawing up specific rules (typically in the form of legislation to be proposed to a state legislature or the Federal Congress), he frequently relies on the advice of experts. Lawyers, expert in the drawing of acceptable legislation, often play this role. Government bureaus in whose jurisdiction the problem falls may also have the necessary expertise, as did the Federal Bureau of Narcotics in the case of the marihuana problem.

threat posed by poorly understood German secret weapons. As such, it had rapid and significant impacts on the collection and analysis of new information with which to better define the true danger of the German effort, as well as on military reactions to the perceived threat.

For intelligence, this was especially true in the case of innovations in the organization of photographic intelligence analysis, where a consolidated effort was put in place that crossed individual service boundaries. In April 1943, The RAF commander at Medmenham, Group Captain (army colonel-equivalent) Peter Stewart was directed to establish a unit focused on the secret weapon target. Another officer, an RAF Wing Commander (army lieutenant-colonel equivalent) was given responsibility for the unit and one of the RAF interpreters. Flight Lieutenant André Kenny and three others were assigned to look at possible cases of experimental work. Three army interpreters were given the task of looking for operational clues—largely indications of possible new launching areas along the French Channel coast.

At about the same time, the Americans were becoming a more active partner in collecting information on German secret weapon research. American reconnaissance aircraft were taking part in collection of airborne imagery of German research and operational facilities and feeding that information to the interpretation effort in a shared mission with the Royal Air Force. Driven largely by the requirements of the British Sandys Committee, flying units from both countries were tasked to photograph the entire Channel coast from the Cherbourg Peninsula north to the Belgian-French border. This exhaustive area coverage requirement was driven by the uncertain definition of what they might find. As Babbington-Smith describes it:

…No one really quite knew what they were looking for, although the Air Ministry did suggest that the interpreters should be on the lookout for three things: a long-range gun, a remotely controlled rocket aircraft, and "some sort of tube located in a disused mine out of which a rocket could be squirted."[241]

R.V. Jones saw that this resource-challenging photographic intelligence effort had at least one potential benefit. Compared with incomplete, sometimes muddled, and occasionally made-up reports from secret agents, photography allowed a methodical and detailed look at everything visible at the time a picture was taken. It provided a new form of exemplary artifact for the combined photo interpretation unit to feed to Allied weapon analysts. At Peenemünde, the aerial photography from April-June 1943 indicated a high level of activity at the German army facility on the eastern coast, as well as at the Luftwaffe airfield on the northwestern tip of Usedom Island. This information was funneled to Duncan Sandys.

It also demonstrated an unfortunate potential weakness of imagery interpretation: the sensitivity of individual photo interpreters to their level of experience and imagination. In this case, what were later identified as flying bomb launch ramps at the Luftwaffe airfield had initially been "terpreted as 'sludge pumps', a theory perhaps colored by the interpreter's experience as an engineer with a river Catchment Board.[242]

On April 29, 1943, Flight Lieutenant Kenny, one of the Peenemünde interpreters, briefed Duncan Sandys on the information initially available from the Channel Coast photographic "blitz." For the first time, a representative of the policy making establishment was given relatively clear—if still incomplete—evidence of the flying

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[241] Babbington-Smith, 1957. P. 207.
[242] Jones, 1978. P. 339.

bomb portion of the secret weapon threat. The policy makers had an indication of a

strategic threat, and the military policy implementers had a well-defined target. In

Babbington-Smith's words:

> This was the first time that Mr. Sandys had come into touch with a photographic interpreter, and he was much surprised by the amount of detailed information the photographs could yield. Before the meeting broke up, he was firmly convinced that the whole Peenemünde site was an experimental station, and that its circular and elliptical earthworks were probably for testing rockets."[243]

Up to this point, Signals Intelligence, or "SIGINT," was a major contributor to

many parts of war planning and operations analysis. But, so far, it had played little part

in the investigation of German secret weapon developments. The British had established

listening posts (the "Y-Service" ground radio signal intercept facilities and a few

specially equipped aircraft) in England that were capable—contingent on favorable

weather conditions—of intercepting certain kinds of radio and radar transmissions as far

away as eastern Germany and western Poland. They had also established their structured

approach to code breaking centered at the Government Code and Cypher School at

Bletchley Park.[244]

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[243] Babbington-Smith, 1957. Pp. 207-208.

[244] While SIGINT appears to have played a minor role in developing knowledge of the development and production phases of German secret weapons, it played a much broader and significant role in the overall war effort and there is a growing literature about the theory and practice of code making and code breaking. Perhaps the best historical treatment of the overall field remains David Kahn's *The Codebreakers: The Story of Secret Writing* (New York: Scribner, 1967, revised edition 1996.) A number of participants in the wartime SIGINT operation have written memoirs and provide a good idea of both the atmosphere and the techniques in use at the time. The system for collection of signal intelligence is described by Y Service veteran Aileen Clayton in *The Enemy is Listening: The Story of the Y Service* (London: Hutchinson & Co. (Publishers) Ltd., 1980.) An overall view of Bletchley operations by participants is provided by F.H. Hinsley (the senior author of the first four volumes of *British Intelligence in the Second World War* and himself a WW II intelligence officer) and Alan Stripp in *Codebreakers: The Inside Story of Bletchley Park* (Oxford: Oxford University Press, 1993.) The code-breaking analysis of high-grade intercepts at Bletchley's "Hut 6" is described by former senior officer Gordon Welchman in *The Hut Six Story: Breaking the Enigma Codes* (New York: McGraw-Hill Book Company, 1982), while Hut 6's breaking of

The Americans also had a history of code-breaking expertise. However, American intercept capabilities from the European mainland were limited, forcing reliance on British SIGINT collection capabilities. This, in turn, was the motivation for establishing liaison positions such as that of Col. Taylor and the American intelligence officers who reported to him at Bletchley Park. However, the British initially still controlled the Allies' European SIGINT effort.

At nearly the same time that the Sandys Committee was established, ADI(Sc) Jones tasked the British signals intercept "Y-Service" and the code breakers at Bletchley Park to identify any signal activity of the Luftwaffe 14th or 15th companies of the German Air Signals Experimental Regiment as a possible tip-off to long-range rocket activity at Peenemünde. His thinking was that he had seen these elite units earlier during the 1940-41 "battle of the beams" using radio transmissions for unconventional purposes. In his opinion these experimental units would be the most likely to be involved in tracking secret weapon testing.[245] Jones' supposition proved correct and SIGINT began to provide useful detail on German test launches of what became the V-1 and V-2.

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less high-grade ciphers is discussed by Gwen Watkins in *Cracking the Luftwaffe Codes: The Secrets of Bletchley Park* (London: Greenhill Books and St Paul, MBI Publishing, 2006.) The evaluation and analysis in Hut 3 of the material from Hut 6 and the distribution of intelligence is covered by former Hut 3 senior officer Peter Calvocoressi in *Top Secret Ultra* (New York: Pantheon Books, 1980. Ralph Bennett, another Hut 3 veteran, describes the production and use of signals intelligence in the D-Day invasion in *Ultra in the West: The Normandy Campaign of 1944-45* (New York: Charles Scribner's Sons, 1979) and in the earlier Mediterranean theater in *Ultra and Mediterranean Strategy* (New York: William Morrow and Company, Inc., 1989.) The first insider published work on British WW II code breaking—F.W. Winterbotham's *The ULTRA Secret* (New York: Harper & Row, Publishers, 1974)—dealt with these latter concerns of secure distribution and use of sensitive SIGINT but only superficially discussed the actual process of converting encoded messages into useful knowledge. While not by a veteran of the WW II SIGINT operations, Thomas Parrish's *The ULTRA Americans: The U.S. Role in Breaking the Nazi Codes* (New York: Stein and Day/Publishers, 1986) provides a useful description of the relationship between the British and American SIGINT operations.
[245] Jones, 1978. P. 336.

As a British duty officer in Hut 3 at Bletchly Park, Ralph Bennett described the success of this effort:

> …I seem to recall, to illustrate what the indexes could do (but can memory be accurate after fifty years?), that a pointer to the location of the research establishment for V1s and V2s was discovered from a message of 1942 or early 1943 indicating that a junior Luftwaffe NCO, known to have belonged in 1940-1 to an experimental signals regiment supporting the beam-bombers, had now been assigned for duty to a place named Peenemünde on the Baltic (perhaps to track the early rockets?).[246]

Another officer serving at Bletchly Park later described the type of information the resulting intercepts provided, and he speculated on the possible value of the information:

> When the Germans test-fired their V-weapons along the Baltic, the firings and landings were reported between the outstations and the base at Peenemünde in a home-made code so simple that it virtually be read on sight. Presumably they had escaped the discipline of the normal signals-monitoring hierarchy. These reports may have helped calm some of the wilder speculation about the size, range, and accuracy of these missiles.[247]

Improving Allied Intelligence Assessment of the Secret Weapons

While the German long-range bombardment programs were struggling with their resource competition and priority problems, the Allies were gaining more detailed information on the secret weapons. American Army representatives were improving their position within the British SIGINT structure by the transfer of Telford Taylor from London to Bletchley along with other American SIGINT personnel, leading to increased inclusiveness within the combined intelligence collection structure.

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[246] Ralph Bennett. "The Duty Officer, Hut 3", in F.H. Hinsley and Alan Stripp, editors. *Code Breakers: The Inside Story of Bletchley Park*. Oxford: Oxford University Press, 1993, P. 35.
[247] Peter Gray Lewis. "Tactical signals of the German Air Force", in Hinsley and Stripp, Eds. 1993, P. 253.

A little more than a month after the British had established their Sandys Committee, Dulles sent to OSS telegram 338-42, June 24, 1943, that contained information from an agent, Hans Bernd Gisevius, a German Abwehr (military intelligence) officer serving in Switzerland. Gisevius appears to have been describing the flying bomb rather than the A-4 rocket, but he accurately located the assembly and testing grounds as "Tpeonemuende between Greifswald and Swinemuende." He says that this system is at a stage where "quantity production is expected for use in September, October," and a "much larger model is in the experimental stage." Dulles was cautious in agreeing with Gisevius' information because of the possibility that his agent was only quoting internal propaganda being circulated about "secret reprisal weapons". But Dulles concluded that he felt "that there is some evidence here which would indicate that the Germans are trying to develop such a rocket weapon."[248]

The British were also getting new agent reports in June—from sources with more direct information than those reporting through Dulles to the Americans. Jones commented on two in particular, both from Luxembourg. He makes a point of having seen these reports before Sandys, unlike the photography that he saw only after a few days delay. One agent was a student, Leon Henri Roth, who had been conscripted into work at Peenemünde, and whose father was a member of a Belgian agent network. Roth was able to get a letter to his father that described a large rocket being developed at Peenemünde. The other agent was a Dr. Schwagen, director of the State Biological Laboratory in Luxembourg, who had contacts with a resistance network, "Famille Martin" that transmitted his report to the British on microfilm. Schwagen provided the

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[248] Petersen: 1996. P. 75.

British a sketch of Usedom Island, with Test Stand VII (the A-4 test launching facility) marked at the north end of the island.[249]

Aerial photography was also improving the base of Allied knowledge of advancing secret weapon deployment. British Army interpreters had reported the unexplained clearing on the French Coast at Watten in May, but without any follow-up collection or interpretation tasking. However, Babbington-Smith, reports a visit by Duncan Sandys to the Photographic Interpretation Unit at Medmenham on May 9, when he asked specifically about "remotely controlled pilotless aircraft," as well as rockets. She comments that none of the existing photography was good enough to provide what Sandys wanted. But his question did provide motivation to monitor the western airfield as well as the eastern side of the island.[250]

The first sighting of an A-4 on photography of Peenemünde happened later in June, on RAF reconnaissance sortie N/853, although there was some dispute about which analyst first made the identification, R.V. Jones or the interpreters at Medmenham. In Jones' opinion, the Medmenham interpreter supplying Sandys' information initially missed identifying the rocket on the image taken on June 12, and it was not until Jones received a copy of the image on June 18, that he saw a not-very-clear image of "a whiteish cylinder about 35 feet long and five or so feet in diameter." Jones reported the "find" to Churchill's science adviser, Prof. Lindemann, who instructed him to notify Sandys. Shortly thereafter, Sandys' interpreter issued an addendum to his first report

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[249] Jones: 1978. Pp. 337-339. Schwagen's map is reproduced on page 338.
[250] Babbington-Smith: 1957. Pp. 208-209.

mentioning that an object was visible—but without an acknowledgment of Jones' part in the identification.[251]

There was less disagreement about a much clearer image taken of Peenemünde on June 23, by Flight Sergeant E.P.H. Peek, flying a photo-equipped Mosquito fighter on sortie N/860. Babbington-Smith noted two rockets on their road transport vehicles, along with a clear view of the facilities at Test Stand VII. She says that Prime Minister Churchill's reaction was to declare that "photographic intelligence should be enabled by every possible means to make a maximum contribution to the secret weapon investigation."[252] There was no longer doubt that the rocket existed—the photograph provided evidence that would be difficult to refute, even if it did not reveal all the desired technical details.

Science Advisor Lindemann (raised to the peerage in July 1941 as Baron Cherwell) directed Jones to prepare a presentation to the Prime Minister on June 29 describing the newest appreciation of the rocket. Jones' description provides a good summary of what was known at the time Lindemann:

> …told me that he had told Churchill that he did not know whether I was going to agree with him about the rocket or not, but that my record was such that Churchill must hear me…. It was this pressure from Lindemann, almost certainly, that was the cause of Churchill calling me to his side after the Window meeting of 23rd June…and asking me whether Mr. Sandys had been in touch with me. So with his instructions to hold myself in readiness for the following week, I sat up that same night until 2.30 a.m. writing a report to summarize what I could now see of the rocket picture.
>
> The report discussed and rejected the idea that the rocket story could be a hoax, and I appended my drawing of the rocket…as being about 35-38 feet long and 6 feet in diameter. It concluded that the scale of firing at Peenemünde was small, in that on no

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[251] Jones: 1978. Pp. 340-341. A copy of the photograph of Test Stand VII with the first image of a large rocket that was taken on Sortie N/853 is plate 19a in the illustration section between pages 300-301.
[252] Babbington-Smith: 1957. Pp. 209-210. See, also Jones: 1978: the image is reproduced as Plate 19b in the Illustration section between Pp. 300-301.[252]

photograph had we seen more than one rocket whereas if there were, say, twenty available for test at any one time we should probably have caught more than one in the open at the same time.

As for the imminence of attack, this did not seem to me serious—in contrast with some other assessments—but there was always the chance that Hitler would press his technicians into firing a few against London if he was stung by our bombing attacks on German towns. For countermeasures almost the only thing we could do would be to bomb the development and production facilities, and in recommending an attack on Peenemünde I gave a written undertaking: 'Peenemünde would demand considerable priority over all other places, despite our curiosity to watch the development of the trials. Intelligence would be prepared to take the risk of the work being re-started elsewhere.'

I also noted that the long shot that I had planned in April showed some promise, for the 14th Company of the Air Signals Experimental Regiment had in fact moved a Würzburg to Peenemünde, and a radar detachment to the Island of Rügen, just north of Peenemunde. It might simply be a strengthening of the air defenses, but dared we hope that we were 'on to something'?[253]

On June 22, the day before Peek's mission, a bombing raid aimed at destroying a radar production facility at the Zeppelin Works at Friedrichshafen, had an unintentional side benefit for Allied long-range rocket countermeasures.[254] The factory that was manufacturing the new Giant Würzburg radar was also intended to house one of the three assembly plants for the A-4 rocket. Damaging the radar construction facility had the side effect destroying a production facility that German plans were relying on to produce one-third of the operational rockets, 300 a month. Jones calls this a valuable addition to the damage caused in the later, mid-August, bombing raid on Peenemünde itself—although this turned out to be only a temporary setback, resolved by German dispersal of A-4 assembly activities to other parts of the Friedrichshafen complex.[255]

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[253] Jones: 1978. Pp. 341-342. Window was a radar countermeasure: packages of aluminum foil strips dropped from aircraft.

[254] Jones says of the evidence prompting the raid: "A photographic sortie over the works showed them surrounded by scores of Giant paraboloids. I showed the evidence to Lindemann, now Lord Cherwell, and on 22nd June—on Churchill's personal intervention—the works were attacked by No. 5 Group of Bomber Command…. As we shall see, we had unconsciously struck a blow at more than the Würzbergs." Jones: 1978. Pp. 230-231.

[255] Jones, 1978. P. 348.

The day after the Zeppelin Works in southern Germany were bombed, Flight

Sergeant Peek made another flight that took the additional clear photographs of a rocket

at Peenemünde. Churchill called his meeting on the 29th and this latest evidence was

presented to a full session of the War Cabinet Defense Committee. R.V. Jones' report,

the agent material, and the clear photographs provided sufficient basis for a military

operational decision to direct the RAF Bomber Command strike on Peenemünde "on the

heaviest possible scale on the first occasion when conditions were suitable." However,

this would not occur for nearly six more weeks.[256]

In the meantime, Babbington-Smith was reviewing earlier photography and had

identified a new rocket-powered aircraft, the Me-163—named by the photo analysts the

"Peenemünde 30" based on its estimated wingspan—at the Luftwaffe airfield on the

northwest corner of the island. Her description of the process provides an enlightening

look into the uncertainties involved in the production of intelligence from imagery:

> The process of going back over earlier photographs was something that was happening the entire time in the V-weapon investigation. For the sequence of photographic flights and of interpretation finds did not run smoothly parallel to the sequence of what was happening on the German ground. That is not the way photographic intelligence works. Each new find was likely to throw new light on earlier photographs which had meant nothing when they were first examined. So, quite apart from the normal time lag between the date of actual photography and the date of the interpreter's report, 'first photographed' and 'first seen' often did not refer to the same cover at all….. Duncan Sandys had already reported to the War Cabinet that the development of jet-propelled aircraft was probably proceeding side by side with the work on rockets and 'airborne rocket torpedoes.' The photographs of the 'Peenemünde 30' definitely confirmed this— although we now know, of course, that it did not have any direct bearing on the secrets of the *V-1* and the *V-2*. [257]

As the Germans were working through their internal management problems in

1943, British intelligence organizations continued collection of data on what could be

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[256] Jones: 1978. Pp 342-346.
[257] Babbington-Smith:1957. Pp. 210-211.

seen of the launch site construction program on the French Channel coast. According to Babbington-Smith,[258] an agent report drew attention to the construction activity near the village of Watten—the cleared area that had been photographed a couple of months before and then forgotten. Based on the agent's report, new mission tasking was given to the photo reconnaissance units, resulting in additional photography of "large site" construction.

There was still little reliable information available on actual rocket characteristics, and the estimates of overall rocket weight posed by some investigators were as high as 40- or 45-tons. A rocket of this size could carry a large—possibly nuclear—weapon. But there was also a good bit of skepticism—especially from Lord Cherwell—that such a monster rocket was feasible. He preferred the notion of the pilotless aircraft as the single threat, and believed it to pose a significant near-term danger.

One apparent result from Lord Cherwell's skepticism about the rocket's size and capabilities was caused by accepting a simplifying assumption that all the various nuggets of information known so far about German secret "rocket" research were describing a single weapon. This type of confusion would continue for another year, until American and British intelligence could gain access to physical evidence revealing actual characteristics of two separate systems, the Fi-103 flying bomb/pilotless aircraft and the A-4 liquid-fueled rocket.

One significant organizational innovation in British Intelligence that could have become useful during July and August 1943 was proposed but not used: the exploitation

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[258] Babbington-Smith: 1957. Pp. 211-213.

of double agents and deception resources. In the United Kingdom, the Security Service

("MI-5") had already captured the important German agents in England. A senior and

very secret Committee—the Twenty (or "XX") Committee—had been set up to manage

the use of these now-double agents for intelligence and deception purposes. The

Americans were aware of some of these activities, since the British had sent their

especially trusted double agent, Dusko Popov (codenamed TRYCICLE) to the United

States in 1941 with information that could have led to better understanding of Japanese

intentions in the Pacific before the Pearl Harbor attack, and possibly to continental

American targets for attack by yet-to-be-developed intercontinental aircraft or rocket

weapons.

In the earlier TRYCICLE case, the information was ineffective in 1941 because

of conflicts between Popov and J. Edgar Hoover. In 1943, the use of the double agents in

Britain was restricted by a decision of the Chief of the Secret Service ("C.S.S." or "C").

One of the most senior players in the deception organization, Sir John Masterman,

described the situation in his 1972 book *The Double-Cross System in the War of 1939 to

1945*:

> Quite early we had become alive to the possible use of so-called secret weapons by the
> Germans, and we learned in fact a great deal about their probable nature and the extent of
> the menace through the traffic of the agents. In July 1943 Home Forces reported to the
> Twenty Committee that they were laying on certain security measures to deal with the
> possible use of rockets by the Germans, and asked to be informed of any developments
> which might come to our notice; in August D.N.I. [the U.K.'s Director of Naval
> Intelligence] considered the question of long-range rockets of such importance that he
> proposed that the Twenty Committee should go into the whole question in detail with a
> view to using the agents to gain further information about this matter. In particular he
> thought that it might be possible to discuss what part of the German plans was deception
> and what part was real. It was, however, agreed that this was really a matter for M.I.6

and for the Sandys Committee, and C.S.S. told D.N.I. that assistance at this stage was not needed.[259]

The First Allied Decision to Attack the Secret Weapons

The practical impact of the Chiefs of Staff April recommendation to form Sandys' committee of experts and the increased application of intelligence collection resources was the RAF bombing of Peenemünde in mid-August 1943. While Lord Cherwell had raised the possibility of the rocket being a German deception, the "Double Cross" system was not employed as part of long-range rocket countermeasures planning effort in July and August 1943. It would be of considerably more value a year later, when the Germans began large scale attacks on London by the V-1 flying bomb a week after the D-Day invasion in June—and the V-2, three months later.

Based on what they knew at the time, the War Cabinet opted for the more direct countermeasure of mass bombing, initially approved at Churchill's meeting on June 29th. The aggregate of available espionage and photographic evidence was deemed by the top British civilian and military leadership as sufficient to warrant an attack on the facility thought to house secret weapon development. The Oslo Memorandum had identified the general type of research and associated it with the new facility at Peenemünde; espionage and prisoner of war reports provided suggestive—if incomplete and sometimes contradictory—detail on the long-range rocket; aerial photography had refined the target locations within the production facility. On the night of August 17-18, at the same time the Western Ally armies' invasion of Sicily was nearly complete, the RAF carried out its

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[259] J.C. Masterman. *The Double-Cross System in the War of 1939 to 1945*. New Haven and London: Yale University Press, 1972. Pp. 177-178.

first bombing raid directed specifically at the secret rocket weapon threat.[260] The

American bomber force was to play a follow-up role to the RAF bombing of

Peenemünde, but was not employed as the RAF was thought to have satisfactorily

damaged the facility.

Estimates of the effect of bomb damage on Germany's rocket development

differed. At one extreme, the British interpreted the damage as delaying the German

program by months and being the cause of moving production underground. The British

Official History summarizes this view, based on post-bombing photography:

> The raid on Peenemünde was carried out on the night of 17-18 August. Peenemünde was
> bombed not as a general area but as a collection of precise targets, selected priority being
> made possible by a study of the excellent PR evidence, and with the particular objectives
> of killing or injuring technical personnel and damaging the factory area and many of the
> installations. From photographic reconnaissance the following day, it was clear that
> damage to buildings had been severe—so severe that the Air Staff asked the USAAF to
> defer its planned daylight attack on Peenemünde until there had been a detailed
> assessment of the damage and Sandys had produced his next report.[261]

At the other extreme, Dornberger, as already mentioned, downplayed the effect of

the physical damage. He states in his memoirs that he had received warning of possible

air raids from the Air Ministry days in advance of the raid and was also aware of the

presence of British reconnaissance aircraft during clear weather. This, he said, provided

adequate time to duplicate production blueprints and files, and to move them to safer

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[260] For a highly-detailed popular presentation of the Peenemünde raid, see especially Martin Middlebrook,
The Peenemünde Raid: The Night of 17-18 August 1943, Indianapolis and New York: The Bobbs-Merrill
Company, Inc., 1982. Middlebrook is a British military historian and Fellow of the Royal Historical
Society, who frequently writes on aviation topics.
[261] Hinsley, et al. Volume 3, Part 1: 1984. P. 382.

locations.[262] He acknowledges the death of important staff and their families, but

minimizes his estimate of physical damage:

> Material damage to the works, contrary to first impressions, was surprisingly small. The test fields and special plant such as the wind tunnel and Measurement House were not hit at all. As a result of the immediate help given to us on a most generous scale, we were assured of being able to work on with a delay of only four to six weeks. Moreover, by repairing only essential buildings, and by camouflage, we maintained the effect of complete destruction for nine months, during which we had no more raids. The project could not be prevented now from coming to fruition.[263]

Ultimately, the British official history came to agree with Dornberger's shorter estimate

of about a two-month delay in programmed production.[264]

Further, it seems clear from Speer's and Dornberger's commentaries that, unlike

the Allied perception of a single bombing raid driving German construction underground,

the plan to create the underground production facility at Nordhausen/Mittlewerk had

already been under consideration for some time. It may, in hindsight, be more accurate to

say that by bombing Peenemünde and causing the collateral—if temporary—damage a

month earlier to the planned A-4 assembly areas in Friedrichshafen, the Allies had set

back the German timetable by forcing significantly earlier reliance on the SS-operated

facility that was already intended to have provided nearly half of Hitler's desired A-4

production capacity.

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[262] Dornberger: 1952, 1954. P. 159.
[263] Dornberger: 1952, 1954. P. 164.
[264] [264] Hinsley, et al. Volume 3, Part 1: 1984. Pp. 384-385.

European Resistance Movements Encounter the Secret Weapons

At the same time that the British were planning and implementing the August bombing attack on the Army side of the rocket research facility, new information was being gathered by the Allies about the flying bomb, although much of this information was confused with reporting on the A-4 rocket. The information was frequently incomplete or inaccurate, thereby continuing to confound military intelligence analysts, civilian experts, and the decision makers who wanted information about the identity of the "rocket weapons," their capabilities, and the purposes for which the Germans intended to use them.

According to Babbington-Smith, in early July an agent report had linked the village of Watten near the northwestern French Channel coast to suspected secret weapon activity. The agent report was followed-up by additional reconnaissance flights, and the photo interpreters at Medmenham detected the construction of a total of three immense concrete bunkers. The presence of rail lines at these three sites was taken by some of Britain's rocket experts to be confirmation of what they believed to be rockets weighing up to 45 tons. These could only be delivered to launch areas by rail. However, other observers, notably including Lord Cherwell, didn't accept the prediction of rockets of that size and thought it more likely that a pilotless aircraft was the weapon to pose the most immediate threat.   Babbington-Smith describes this as thoroughly confusing to the photo interpreters:

> Both in London and at Medmenham it was a time of frustrating confusion in the secret
> weapon investigation, which by now had been given the codename *Bodyline*—a time of
> groping in the dark, of trying to lay foundations in a swamp. It was as though the parts of
> two or three jigsaw puzzles had been jumbled together, and it was sorely tempting to try
> to find only *one* answer, only *one* weapon. It seemed a triumph when two or three bits of

186

a puzzle fitted together and could be identified as 'Rocket'; and it was all too easy to ignore the bits which did not fit in with these.[265]

This was also the time at which the Twenty Committee, following a suggestion by the Director of Naval Intelligence, was proposing using German double agents to gather information to aid U.K. Home Forces in the creation of civil defense measures against the as yet ill-defined secret weapons. The final decision left the secret weapon problem to the Sandys Committee and the Secret Intelligence Service (MI-6). [266]

But, it is also the point at which a French informant network under the direction of Michel Hollard began to provide detailed information about secret weapon sites near the Channel coast in northwestern France. Sometime in August, Hollard's French Resistance *réseau "Agir"* learned from a railway engineer named Daudemard of construction near Rouen. Hollard started an investigation that lead to identification of what the photo interpreters later called Fi-103/V-1 launcher "ski sites" near the Channel coast. This was reported to Hollard's British Secret Intelligence Service contact working out of Lausanne, Switzerland. Hollard assembled a team of informants, who proceeded to identify a hundred "ski sites" by October 1943.[267] By inserting an agent into one of the site production offices, Hollard obtained a detailed copy of the site diagram for one of the sites near the Bois Carré that revealed all the operating components of a launch facility and their relationships.[268] Hollard, himself, gained access to an Fi-103 storage facility and made measured drawings of a V-1 that were passed to the British. Hollard's

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[265] Babbington-Smith: 1957. Pp. 211-213.
[266] Masterman: 1972. Pp. 177-178.
[267] George Martelli. *The Man Who Saved London*. Originally titled *Agent Extraordinary*. New York, London, and Richmond Hill Ontario: Scholastic Book Services (SBS), 1960, Pp. 136- 153.
[268] Martelli: 1960. Pp. 154-172.

information was used in planning later bombing attacks on the flying bomb "ski sites" in December 1943 and January 1944.[269]

Another example of strikingly detailed information being given to the British concerning rocket bomb activity in western France is a report dated August 15, 1944 from a network known as "ALLIANCE" or "NOAH'S ARK"—so called because many of its agents had animal cover names. Noah's Ark was directed for most of the war by Marie-Madeleine Fourcade. One of her contacts, Jeannie Rousseau , later Vicomtesse de Clarens, provided a variety of information on Peenemünde. This included its administrative procedures, association with the emerging Fi-103/V-1 Luftwaffe operational organization, and suggestions of the A-4, the possibility of bacteriological warheads; and recent accuracy problems were provided by a serving Luftwaffe officer at Peenemünde. The information was first given by the officer to interpreter Jeannie Rosseau, who then passed it to agent "Petrel" (George Lamarque, head of the ALLIANCE sub-service DRUID), who in turn passed it to Fourcade.[270]

The Americans were also getting more valuable agent information at this time, but with comparatively little usable strategic detail on technical subjects. For example, Allen Dulles in Berne sent OSS HQ his Telegram 5003 on August 16, which contains information from two informants in Switzerland (Egedio Reale of the Partito d'Azione,

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[269] Martelli: 1960. Pp. 173-188.

[270] Jones, 1978, Pp. 351-352. With minor differences in translation, this same report appears in Marie-Madeleine Fourcade, O.B.E., *Noah's Ark: A memoir of Struggle and Resistance*. New York: E.P. Dutton & Company, Inc., 1968/1973/1974, Pp. 258-259. A photo reproduction of the first page in French is included in Fourcade as Figure 13, between pages 224 and 225. Rousseau/AMNIARIX's reporting gives some flavor of the operational atmosphere within which French resistance intelligence organizations were operating. At the time Fourcade received Rousseau's report her organization was under constant attack by the German field police and GESTAPO Many ALLIANCE officers and agents were arrested, including Rousseau, largely because of turncoats within the organization.. Several were killed while in prison. However, Rousseau survived the war. See, especially Fourcade, chapters 28-31, Pp. 287-309.

and Count Sforza) on a range of topics. It includes the observation that German "rocket guns" had been reported by three separate sources not to be successful because of the small amount explosive that they carried and their inaccuracy.[271] This report's major contribution to Allied knowledge of the rocket weapon appears to have been confirmation of problems with weapon accuracy. The informants may also have been describing the never-completed long-range cannon or *HochDruckPumpe*, sometimes called the V-3, that was being constructed at Mimoyecques, near Calais.[272]

Within days of this report, Dulles had his first contact with Fritz Kolbe, an officer in the German Foreign Ministry. Kolbe was given the cover name "George Wood" and his reporting on a range of topics was so important that it was specially flagged with its own OSS designator, "KAPPA" material. Kolbe's reporting was largely political and strategic in character, but sometimes included interesting items on German weapons technology.

Examination of Secret Weapon Wreckage

Another new form of information was also added to the Allies' knowledge of German secret weapons development at this time: direct observation of crashed test vehicle wreckage. This type of data became very important, as it resolved many of the ambiguities surrounding estimation of secret weapon size, physical make-up, and the weapons' destructive capacity.

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[271] Petersen: 1996. Pp. 102-103.
[272] Jones:1978. Pp. 462-464.

The first example of secret weapon wreckage that became available to the Allies was given to the British by the Danish government in late summer 1943. An unidentified object, later identified as a research version of the flying bomb, crashed on the Danish island of Bornholm, about 125 miles from Peenemünde. It had gone off course on August 22nd after a test launch over the Baltic from a Luftwaffe bomber. The Danish senior naval officer on Bornholm photographed and sketched the wreckage. He forwarded his material to the chief of the Danish Naval Intelligence Service, who passed it on to the British. A memorandum from the Special Operations Executive (SOE, a British "special operations" sabotage organization separate from the U.K.'s intelligence agencies) to the Prime Minister, dated September 29 describes the provision of the material by the Danes and gives many construction details. [273] From this information, the British were better able to calculate size and weight details that had not been accurately revealed from airborne reconnaissance photography. [274]

While the American Air Force had not participated directly in the Peenemünde raid on 17/18 August 1943, it did bomb the "large site" facility under construction at Watten on the Channel Coast a few days later. In a status review prepared by Duncan Sandys on August 21st, he concluded that "it was a reasonable conjecture that Watten was a part of the programme,[275] and Sandys had recommended that it be bombed as soon as possible so that the impending threat from the A-4 rocket would, at a minimum, be

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[273] An image of the Home Office file copy of this document can be found online from the UK National Archives, Catalogue Reference:HS/8/897, Image Reference:135. Three of the photographs are reproduced in Jones, 1978 as illustrations 20 a, b, and c, in the illustrations section between pages 300 and 301. Jones also reproduces the agent's (Hasager Christiansen) sketch as Figure 19, on page 350 of the reference. The memo attachment's description of the "cylinder" most likely is a portion of the pulse jet engine that was mounted on the top of the body, not underneath it. If true, the length and diameter in the attachment should have been 2 meters/35cm rather than ".2 m. long and .35 cm. in diameter."
[274] Jones, et al.: 1978. Pp. 349-350.
[275] Jones, et al.: 1978, P. 384.

delayed. The American 8th Air Force carried out this bombing on August 27, while the concrete structure was still hardening. Babbington-Smith says that a British expert engineer commented after the raid that it would be easier for the Germans "to start all over again." And, "according to General Dornberger, the German engineer in charge shared his view."[276]

Within a few days of the attack on Watten, another agent report was received by the British that had particular significance for adding to their knowledge of the "rocket bomb" question. This report had been originated by an officer in the German Army Weapons Office on August 12. However, it had no effect on the planning of the August 17/18, 1943 RAF attack on the eastern side of Peenemünde, It was only reviewed at a ministerial meeting on August 30, called to consider another BODYLINE summary report from Duncan Sandys. Both the position of the agent and the detail he provided give his information strategic importance, unlike the tactical, fragmented, and often contradictory reporting of detail by less well informed agents. Jones' summary gives a flavor of its value to senior Allied military and civilian decision makers. He said that the report:

> …had originated on 12th August from the same disgruntled officer in the Army Weapons Office who had told us some weeks earlier of the plan for winged rockets. His new report was much more specific, and said that a pilotless aircraft officially known as Phi 7 was being tested at Peenemünde, but he know nothing about it as it was not an Army project. In addition there was a rocket projectile known as A4. 20th October had been fixed as Zero Day for rocket attacks on London to begin.[277]

A number of details were of particular significance, confirming that:

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[276] Babbington-Smith, 1957. P. 213.
[277] Jones: 1978. P. 350.

1. there were two different "rocket" weapon programs underway at Peenemünde—a pilotless aircraft being built by the Luftwaffe and the A-4 rocket being built by the Army,

2. the estimates or size of the A-4, its launch technique and its range were nearly correct, although somewhat uncertain,

3. A-4 component construction details and test launch data were accurate, as was the existence of an accuracy problem that could delay employment, and

4. the planned operational date for the A-4 was to be October 20, 1943.

5. A number of types of warhead were being considered, including gas, making the A-4 what would be called now a "weapon of mass destruction." [278]

The ability to gain access to German rocket technology, either indirectly in the forms of photography, SIGINT, and reports by careful observers, or by direct examination of wreckage from crashed test weapons, served as a corrective to errors in earlier inaccurate speculative analysis about secret weapon characteristics. For intelligence technology, it also served to modify problem-solving strategies, current theories, and user's practices. This led in turn to a third stage of knowledge production when enough credible data had been amassed to provide detail, context and perspective supporting more informed reflection on the aggregate of information available.

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[278] The text of the original agent report appears in the British Official History (Hinsley, et al.: Volume 3, Part 1, 1984, Appendix 25, Pp. 585-587)

CHAPTER 7

USERS' PRACTICE FROM 1943-1945 INTELLIGENCE AND ACTION FROM

REFLECTION ON ACCUMULATED KNOWLEDGE

The period between late 1943 through 1944 was a time of functional innovation

within British and American intelligence organizations, each strongly motivated by the

increasing perception of a secret weapon threat. Increasing evidence of secret weapon

construction and deployment began to be accepted as a key problem within the Allied

political, military and intelligence frames of reference. One impact this had was creation

of formal intelligence collection and analysis requirements supporting defensive and

offensive countermeasures as part of their combined problem-solving strategy. By

combining agent and observer reports with intercepted communications and direct

participation in examination of captured hardware, Allied intelligence analysts were able

to reflect more deeply on the true nature of the threat and on offensive alternatives for

combatting the long-range rocket.

Responding to the latest Sandys report's estimate of possible rocket operational

readiness by the end of 1943, the British ministerial Defence Committee saw increased

urgency in crafting not only military countermeasures but increased emphasis on civil

defense measures for the British homeland. The information in Sandys' report from

agents and photo reconnaissance still did not precisely define the rocket's capabilities.

Nonetheless, his experts' reflection on earlier speculations and examinations of wreckage

led Sandys to conclude that as the rocket could reach London, it was capable of inflicting

serious damage and had likely been manufactured in numbers in excess of those needed

for experimentation.

Organizational Innovation

As credible information was accumulated, the British intelligence frame of

reference evolved in several ways. The photo reconnaissance central Interpretation unit

was given a single officer to oversee imagery production on the secret weapon problem,

the British and American Governments signed a far-reaching agreement on SIGINT

management, and a scientific coordinating committee was created within Dncan Sandys'

BODYLINE investigation. These changes in problem-solving strategies made it easier to

aggregate collected information and provided an alternative mechanism for reflection on

the threat posed by the unmanned aircraft and the long-range rocket.

Lord Cherwell, especially, wanted more precise and complete detail, both on the

rocket and on the Ministry of Home Security's estimate of casualties possible from an

attack on London. In response to a proposal for a panel of scientists to look at these

problems, the Defense Committee asked the Minister of Home Security, Lord Cherwell,

and Duncan Sandys to prepare a questionnaire that the scientists constituting the

BODYLINE Scientific Coordinating Committee were to address. This questionnaire was

completed on September 29, 1943 as was an evaluation nominally written by the head of

the Secret Intelligence Service—but actually written for him by ADI(Sc) Jones in his SIS

role—of the reliability of the intelligence received to date. This evaluation agreed with

Sandys' interpretation of the key evidence, and concluded that there was no sufficient

information to justify accepting the thesis, proposed by Lord Cherwell and others, that

the rocket program was only a deceptive cover for development of the pilotless aircraft.[279]

Apart from establishment of the BODYLINE Scientific Coordinating Committee,

the most apparent change in British intelligence at this time was a reordering of the

organization for secret-weapon-related photographic interpretation at the Central

Interpretation Unit at Medmenham. Since April 1943, the RAF interpreters at the CIU

had focused specifically on Peenemünde, while the Army interpreters focused on Watten

and other suspected secret weapon launch sites on the French coast. In September,

another reorganization of secret weapon-related photo interpretation was directed at

Medmenham. A single individual, RAF Wing Commander (Lt Col equivalent) Douglas

Kendall was charged to oversee the entire secret weapon interpretation effort. The Army

interpreters' focus was broadened to include all possible types of secret weapon activity

in France. This reorganization led to discovery of a number of suspicious facilities

between the Pas de Calais and the Cherbourg Peninsula—approximately the area to be

covered by the D-Day invasion in June 1944. However, there was still insufficient

information to pin-down exactly what role each of the "large site" facilities was intended

to play in German strategy. Babbington-Smith summarizes the situation:

> In retrospect, it is not surprising that the heavy sites were so hard to understand for they
> were not, in fact, a related system of launching sites for a single type of weapon. Four of
> them were intended as 'launching shelters' for *V-2s*; two as mammoth launching sites for
> *V-1s*; and Mimoyecques was to have housed a multi-barreled long-range gun which never
> materialized at all.[280]

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[279] Hinsely, et al.: 1984. Pp. 386-390. See also Jones description of his three conclusions at Jones: 1978,
Pp. 358-359.

[280] Babbington-Smith: 1957. Pp. 213-214.

In addition, there was a broader revision of missions on September 6th which gave the Air Ministry responsibility for assessing new jet aircraft, while Sandys would retain responsibility for long-range rockets, guns, and other projectiles. The pilotless aircraft bomb would be a special case assigned to the Air Ministry, but with the requirement that it provide periodic reports to Sandys for inclusion in his reports to the Defense Committee.[281]

One of the major changes was in integration of the SIGINT relationship between British intelligence and the Americans, who were an increasingly large presence in the UK. This resulted in the signing of an Anglo-American agreement in September 1943 that began the inclusion of U.S. personnel into the existing British ULTRA SIGINT intelligence production and distribution structure. This formalized the arrangements begun several months earlier by the group that included Telford Taylor.

While not specifically focused on the secret weapon problem, having Americans as direct and full participants in the activities at Bletchley Park provided a degree of access to sensitive SIGINT information that had been very selectively released up to that time. It also represented a shift from an emphasis on immediately useful tactical SIGINT to a more strategic and long-term perspective through appointment of an American officer to select which very sensitive ULTRA SIGINT material would be sent to Washington in the care of a diplomatic courier. [282] Some of this material would reflect secret weapons knowledge, especially of deployment and operation of the flying bomb by German units in France.

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[281] Hinsley, et al.: 1984. P. 392.
[282] Slusser, 1993. P. 75.

Some idea of the breadth of information now available to both the British and the Americans is provided by a former Bletchley Hut 3 watch officer, William Millward:

> Three subjects were treated differently from the others. Anything with a scientific interest was extracted at the preliminary scanning stage and passed to a back room which provided a direct channel to 'ADI Science', i.e. Dr R.V. Jones. The reason for this was presumably the difficulty which the non-specialist would have encountered at the stage of evaluation. There was some contribution from the source to all the scientific problems which succeeded each other as the war progressed—navigational beams, radar, V-weapons, etc. The work of Huts 6 and 3 was confined to Army and Air Force communications. For naval communications the Admiralty demanded quite different procedures, and the naval Enigma was tackled elsewhere in BP. There was, however, naturally, a certain amount of naval information in the communications of the other services, and to ensure that this was handled in a way acceptable to the Admiralty, a small office manned by naval officers was housed in Hut 3. Lastly, special arrangements were made for the handling of any material which related to the success of Allied deception operations, especially important in the run-up to the Normandy landings. One other type of report was given special restricted treatment—anything that might have a 'gossipy' value with its increased risk of a leak to the 'media'. The causal case of this was a report that Rommel was ill and had returned to Germany for treatment.[283]

One specific example of this secret-weapon-related SIGINT available to the British was an ULTRA message dated 7 September that provided information identifying a ground organization "Flak Zielgeräte 76." The message informed the flying bomb organization that the Germans had captured a French agent "who had the task of establishing at all costs their position of the new German rocket weapon. The English, it is stated, have information that the weapon is to be employed in the near future and they intend to attack the positions before this occurs."[284] This message led Jones to increase the intensity of search for flying bomb secret weapon sites.

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[283] William Millward. "Life in and out of Hut 3", in *Codebreakers: The inside story of Bletchley Park*, F.H. Hinsley and Alan Stripp, editors. Oxford: Oxford University Press, 1993, P. 25. The "note" is drawn from a reference on P. 37, by Ralph Bennett. Bennett says the back room was run as "a research party linking Professor Norman in Hut 3 with Dr. R.V. Jones at the Air Ministry" (P. 37).
[284] Jones, 1978. Pp. 355-356.

However, resistance continued within the British SIGINT management hierarchy over distribution of material to Americans not directly a part of American commands physically located in Europe. Telford Taylor recounts a story of a visit to England by Army G-2 General George Strong, in which a senior British SIGINT director convinced him that there was no need to forward the sensitive information back to Washington. Regular digests of that information should suffice. Taylor says this decision was reversed once General Strong returned to the Pentagon and discussed the matter with Army G-2's Special Branch. According to Taylor, "After this settlement, as far as I know, there were no disagreements of any importance from then until the end of the war."[285]

In addition to the Americans' new access to especially sensitive SIGINT, Allen Dulles in Bern continued to receive nuggets of secret weapon-related information from his agents. On September 9, Dulles sent his Telegram 703-5, based on information provided by German industrialist Eduard Schulte, which included reference to both the previously discussed weapon accuracy problem and the effect of the bombing of Peenemünde a few weeks before. In part, Dulles' report reads:

> …Source stressed the point that rocket bomb should be taken very seriously. It is his conviction that, at the present time, the weapon is sufficiently perfect to allow the effective bombing of cities; further, that the margin of error has been cut to 1000 yards. A delay of 1 to 2 months in assemblage work was caused as a result of the bombardment of Peenemuende; however, there is still much there to be destroyed. It appears that some assembly plants on the island are located underground; however, there are important surface objectives which have not yet been demolished.[286]

However, another message from Dulles (Telegram 5752, dated 15 September) demonstrated further that some agent material continued to mix erroneous or confusing

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[285] Taylor, 1993. Pp. 72-73.
[286] Petersen: 1996. P. 121.

detail with valuable information. Telegram 5752 refers to two secret weapons "already mentioned" and raises the possibility of another, but with little substantiating detail, possibly a rocket-powered plane. The telegram also notes that their informant claiming damage of 80-90% of the above ground facilities bombed in the air raids on Peenemünde were much higher than other reports.[287]

Allied Concern with a German Atomic Weapon Program

While useful information on rocket characteristics was being gathered, little was known yet about the type of warhead the secret weapons might deliver. This shortfall led to addition of a new key problem and the addition of a new American investigating team to explore possible alternatives. This team was made-up of scientists and counterintelligence officers and was an example of a substitution function within the American political and military frames of reference.

One possibility of considerable concern was that the secret weapons might carry atomic weapons. An organizational innovation to investigate this possibility was taking place in Washington rather than London. On September 25, 1943, Colonel Boris Pash, an Army Counterintelligence Corps officer was selected to be military commander of a special investigating team that was attached to the Manhattan District under the command of General Leslie Groves. The "ALSOS" mission had its functions recommended by U.S. Army chief of intelligence General Strong, and approved by General George Marshall, Chief of Staff of the Army. The purpose of ALSOS was to determine whether

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[287] Petersen: 1996. P. 126.

or not the Germans were working on an atomic bomb, and if so, where, by whom, and how far along had they progressed.

In his memoir, Col. Pash attributes the urgency for establishing ALSOS to President Roosevelt and Prime Minister Churchill, in consultation with OSRD Director Vannevar Bush and Army G-2 General Strong. He also describes his own skepticism about "the highly touted cloak-and-dagger boys of our Office of Strategic Services." The result was formation of an independent military-scientific team that was to "cover all principal scientific military developments," and its "investigations should be conducted in a manner to gain knowledge of enemy progress without disclosing our interest in any particular field". [288]

While Pash understood the ALSOS mission to be focused specifically on acquiring knowledge of German work on nuclear weapons, his scientific director, Dr. Samuel A. Goudsmit, took a broader view of the team's responsibilities. Some of them would relate directly to rocket and aeronautical research:

> …It was only after I had been briefed and had passed my "screen test" in Washington that I understood fully what the job called for. I had thought it was to look into the German radar development and physics in general. I was, therefore, taken somewhat by surprise when a major on the screening committee took me aside and said, "You understand, of course that what you are really going to do is to look into the atomic bomb development."
>
> However, my instructions were to find out what the Germans had been doing in scientific work in general. Despite the fact that the atomic bomb people interpreted this as just so much camouflage to hide the real project of the Mission, I tried to the best of my ability, and the capacities of the Mission, to see that other fields of scientific activity were not neglected.

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[288] Colonel Boris T. Pash. *The ALSOS Mission*. New York: Award House, 1969. (Later republished in a paperback edition at New York: Charter Communications, Inc., April, 1980.) P. 9.

I was the only scientist on the Mission who was officially briefed about our own A-bomb project..[289]

This difference of opinion between the team's military commander and his scientific director about the mission of a special investigation team and the commander's low opinion of existing intelligence organizations demonstrated tensions that had a high potential for blocking information flow among intelligence producers, intelligence managers, and intelligence users. Producers spend resources and effort in pursuit of information and knowledge that goes beyond what managers think users want. Therefore some portion of the discovered knowledge, while potentially valuable, is subject to being ignored as "off- message" by intelligence production managers who hold too narrow a view of their assigned missions, or operational users who are unable or unwilling to accept information that they perceive as unnecessarily broadening the "decision space" within which they are forced to operate. This situation repeated itself in similar investigation team situations as the war reached its climax.

Speculation on the Timing of Secret Weapon operations

Another key intelligence problem increased in importance for both the Americans and the British as preparations began for a cross-channel invasion of France in mid-1944: when would the unmanned aircraft and the long-range rocket begin operations? This question resulted in new approaches to photographic reconnaissance, and it further increased exchanges of sensitive information between the Americans and the British.

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[289] Samuel A. Goudsmit. ALSOS. New York: Henry Schuman, Inc., 1947, Pp. 15-16. This book was republished in 1996 by American Institute of Physics, with a new introduction by David Cassidy.

British counterintelligence, which had earlier been evaluated as not directly pertinent to the secret weapon problem, began to provide useful information during the fall of 1943. Double agent TRICYCLE (the same Dusko Popov who had received the poor reception from FBI director Hoover when he tried to give him information that could have shed light on Axis interest in Pearl Harbor before America became directly involved in the war) was warned in September by his German controller not to live in London because of rockets that would be fired against it from the French coast. Popov's information was given to the chief of the SIS to pass to the Sandys Committee. The British then asked if any other agents whom the Germans thought to be valuable had received similar warnings from their handlers. There was little response—although double agent GARBO apparently was similarly warned in December. According to Sir John Masterman, this allowed British decision makers to infer that a rocket attack was not imminent.[290]

SIGINT also was making contributions when on October 7 a diplomatic telegram from the Japanese Ambassador in Berlin was decrypted. This message had been originally sent to Tokyo on the last day of September, reporting experiments that suggested bombardment could be used against London and manufacturing towns by the middle of December. Churchill passed this message Sandys. The British official history suggests that while the U.K. had not yet made such an interpretation, the Americans may have been influenced by this message to make "extreme" interpretations of the threats posed by the V-weapons:

> …such as the use of biological and chemical warfare and "unusually violent" explosives
> of a revolutionary character, which might enable the Germans to stop the Allied bombing

[290] Masterman, 1972. P. 178.

offense by the devastating bombardment of England, and believing that if the Germans withheld the V-weapon attack until D-day they might disrupt the entire operation.[291]

This British interpretation seems consistent with the Americans' establishment of the ALSOS teams, but it doesn't reflect Pash's opinion that Prime Minister Churchill personally was part of the motivating force behind this effort.

Given the continued indications of secret weapons being emplaced in France, Duncan Sandys directed a third comprehensive aerial photography coverage of the northwest French coast beginning on October 21st. As Babbington-Smith describes it, this involved a "flying program involving about a hundred separate sorties…each consisting of hundreds of photographs, each one of which had to be scanned with care."[292]

The Allied effort at uncovering accurate information about the secret weapons continued through this three-month period. Much of the British effort was focused on the question of the likely date of first attack—most likely on London, and most likely by the flying bomb rather than the rocket. The flying bomb was increasingly being accepted by British decision makers as the most immediate threat. But staff interest continued in the long-range rocket program, and in late October Prime Minister Churchill decided to raise the issue personally with President Roosevelt. Churchill sent his first cable to Roosevelt on October 25, personally notifying him of the state of British knowledge of long-range rockets.[293] In this cable, he summarizes information availableand acknowledges the

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[291] Hinsley, et. al. :1984, Volume 3, Part 1, P.48.
[292] Babbington-Smith: 1957. P. 214.
[293] Churchill's cable is reproduced as Document C-474 in Warren F. Kimball, Editor. *Churchill & Roosevelt: The Complete Correspondence.* Volume II, "Alliance Forged November 1942 – February 1944." Princeton, New Jersey: Princeton University Press, 1984. Pp. 559-560. Kimball notes that

disagreements between experts. He describes the bombings undertaken to damage the German effort, with special attention to bombing of Watten in which the American 8th Air Force participated.

Three days later, R.V. Jones received a very thorough agent report on theV-1 site being built at Bois Carré, and noted the site's alignment directly toward London. This information corresponds to the report from Hollard, mentioned earlier. A photo reconnaissance flight (sortie E/463 on November 3) confirmed the agent report and provided enough detail that the model shop at Medmenham was building a model of the entire site, including an unidentified ski-shaped building. [294]

Photo interpreter Babbington-Smith described the activity at Medmenham when the material from sortie E/463 was presented for analysis, and how they came to be called "ski sites":

> Into this rocket-conscious atmosphere there came suddenly on November 4, 1943, a major new discovery, which at first did not seem to fit anywhere. On the contrary, it merely seemed to add a new complication. A few days earlier, a report had reached London from an agent in France, telling that the construction firm he worked for was engaged in building eight 'sites' in the Pas-de-Calais, not far from Abbeville. He could not understand what they were for, though he strongly suspected they had to do with secret weapons; but he could describe where they were. On November 3 the eight places in question were photographed….
>
> Late that evening, when Douglas Kendall got back from a day's meetings in London, he made straight for the Army section. With Simon and Rowell he looked quickly at each of the eight sites—each one partly in a wood, and each apparently to have a set of nine standard buildings, some of them strangely shaped. Then he settled down to gaze at the site which was furthest advanced. It was near Yvrench, in a wood called Bois Carré. Three of the buildings were unlike anything he had ever seen in his life. Except—yes— they *were* like something.   They took his mind back to winter sports before the war, for they reminded him of skis.

"Although British and American technical experts had exchanged information about the German work on rockets and self-propelled bombs, this was the first leader-to-leader message on the subject."

[294] Jones: 1978. P. 360.

'Skis,' he thought aloud. 'That's what they look like—skis.' Two of them seemed to be identical, and the third was shorter; and each, in plan view, had one gently curving end. They were like giant skis laid down on their sides..[295]

On November 8, President Roosevelt acknowledged Prime Minister Churchill's October 25 cable. This short reply shared what information he said the Americans had on the subject. Much of this information showed that the Americans shared the problems of confusing, inaccurate, and misleading information. The response was drafted by a naval officer on the President's Map Room staff rather than by any of the military or civilian intelligence agencies. Churchill-Roosevelt correspondence editor Warren Kimbell's note assesses the accuracy of the President's reply:

> The log sheet attached to this document indicates that it was drafted by Lieutenant George Elsey, USNR, of the Map Room staff, and that it was derived "from various sources." Those sources, including the unnamed informant in Turkey, were confused as to the facts. The commandant of the Peenemünde facility was Major General Walter Dornberger, not Shemiergembeinski. In fact no one of that name or anything similar seems to have been associated with German research and production. Moreover, of the factories listed by Roosevelt, only Peenemünde and Wiener Neustadt were directly connected with rocket manufacturing or research..[296]

It would be misleading, however, to accept the Prime Minister's initiative or President's response as representing the sum of shared knowledge between American and British authorities. The British official history notes that the U.K.'s Joint Intelligence Committee recommended to the British Chiefs of Staff on 29 October that latest information on the rocket problem be shared verbally, albeit under strict security conditions, with American officials in Europe and in Washington. This was preceded by more general discussions between American and British rocket experts in June

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[295] Babbington-Smith, 1957. Pp. 214-216.
[296] Document R-414 in Warren F. Kimball, Editor. *Churchill & Roosevelt: The Complete Correspondence*. Volume II, "Alliance Forged November 1942 – February 1944." Princeton, New Jersey: Princeton University Press, 1984. Pp. 589-590.

concerning topics such as development of rocket fuels, and by discussions between Ministry of Economic Warfare and American authorities earlier in November. [297]

The BODYLINE Scientific Coordinating Committee was reviewing all this human, photographic, and SIGINT material but generally found it to be too inconsistent to give clear answers to questions about weapon characteristics and performance. The result, as described in the Official History was "indecision and acrimonious disagreements."[298]

In his 24 October report to the Defense Committee Sandys reviewed the scientific opinions and reiterated his views that an extended bombardment was unlikely before early 1944—but that operationally capable rockets may have been produced on a smaller scale. The next day, Churchill called a Defense Committee meeting at which all the various inputs were to be considered. The Committee accepted Sandys' recommendations, despite Lord Cherwell's continued disagreement about the rocket. It directed that countermeasures be undertaken, including bombing of suspected launch sites and construction facilities, intensified reconnaissance of northern France, and increased attention to obtaining accurate intelligence. Consideration was also given to the use of poison gas against the secret weapon sites and the advisability of warning the Germans of such a retaliatory measure in case of secret weapon attack.[299]

Disagreement among the experts continued after the 25 October meeting, and Churchill appointed Sir Stafford Cripps from the Ministry of Aircraft Production to make another independent assessment of the real threat posed by the rocket. R.V. Jones was

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[297] Hinsley, et al: 1984. Volume 3, Part 1, Pp. 396-399.
[298] Hinsley, et al: 1984, Volume 3, Part 1, P. 396.
[299] Hinsley, et al.: 1984, Pp 398-399. Also see Jones: 1978. Pp. 358-360.

given authority to show Sir Stafford all of his evidence, including the SIGINT

information that the German Air Signals unit that Jones had asked Bletchley to monitor

had been heard tracking flying bomb tests launched from Peenemünde. [300]

While the American intelligence agencies appear not to have been involved in

preparing the President's November 8th reply to Churchill, they were still active in

collecting data. For example, in Telegram 1023-28, dated November 9, 1943, Dulles

reports on information from agent 515, Count Max Egon Hohenlohe von Lagensberg.

This information contains a short passage that describes German differences of opinion

about operational use of "the secret rocket weapon," although not specifically naming it

as the A-4 or V-2: "There are opposing views about the secret rocket weapon. Opinions

differ whether it should be employed now, because of the serious doubts as to its

effectiveness and a dread of the effect on morale should it turn out to be worthless…."[301]

Sir Stafford Cripps was just beginning his independent investigation at the time of

the President's November 8 response to the Prime Minister. Cripps had called his first

meeting on November 8 to examine the facts as known. The meeting was held in the

Cabinet Offices, attended by senior military and naval officers, distinguished scientific

advisers, Duncan Sandys representing the Prime Minister, and three senior photo

interpreters from Medmenham, Douglas Kendall, Neil Simon, and André Kenny.

According to Babbington-Smith, the evidence first presented was vague, often confusing,

and indirect, but began to get some clarity once photography was considered. Douglas

Kendall discussed earlier photography and then turned to the newly-found ski-sites.

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[300] Jones, 1978. Pp. 358-360.
[301] Petersen: 1996. P. 156.

Their review of photography had revealed 19 sites as of the night before the meeting. Babbington-Smith says that at that point "Sir Stafford immediately decided to adjourn the meeting for two days, so as to give the interpreters a day and two nights to complete their search for the new weapon sites, and to prepare a detailed analysis."

When Sir Stafford's meeting reconvened On November 10, a total of 26 sites had been identified. He concluded in a report to the War Cabinet that the pilotless aircraft was a more immediate threat than the rocket, and that photo reconnaissance of both Peenemünde and north western France should continue.[302]

In the aftermath of Sir Stafford's meetings, Medmenham began to research earlier photography of Peenemünde. And on November 13, Babbington-Smith detected the first blurry image of what she called the Peenemünde 20, again named after its estimated wingspan. This proved to be the first recognized image of the long sought-after "flying bomb" pilotless aircraft.

CROSSBOW Replaces BODYLINE

Once again, there was a change in British problem-solving strategy through reorganization of the Sandys BODYLINE investigation and placement of it under military rather than civilian ministerial control. The change in British control of the effort led to establishment of a parallel organization under the control of the Joint Chiefs of Staff.

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[302] Babbington-Smith: 1957. Pp. 217-219. Also see Hinsley, et al.: 1984, Pp 404-405.

In mid-November 1943, responsibility for investigating the secret weapons was transferred from the existing ministerial-level Sandys Committee to the Air Ministry and a new body, the CROSSBOW Committee took the place of Sandys' BODYLINE investigation. The CROSSBOW Committee was actually a sub-committee of the British Chiefs of Staff Joint Intelligence Committee (the JIC) and was formed to prevent unnecessary duplication by the increasing number of organizations becoming involved in some part of the search for secret weapons. As a component of the Air Ministry, a Directorate of Operations (Special Operations) was set up to manage countermeasures and its chief (initially Air Commodore Claude Pelly and later Air Commodore Colin Grierson) also served as the chairman of the JIC's CROSSBOW Committee. [303]

As with the original Sandys investigation, R.V. Jones took exception to the founding of the CROSSBOW Committee, which he saw as diminishing his established role from that of analyst and expert to that of simply a provider of information that would then be translated into intelligence by the Committee. Not the least of his worries was that he would have to spend at least half of each day attending meetings rather than keeping track of new information coming in from the many sources concerning secret weapon developments. He stood his ground and was given an element of freedom that was acceptable to him, but still within the purview of the new committee. [304]

On November 28, a photo reconnaissance of the Peenemünde general area revealed ski sites at a flying bomb training facility near the city of Zempin, on the Baltic coast about 10 km south of the main facility. An interesting difference in treatment has

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[303] Hinsley, et al: 1984. Footnote on Pp. 411-412. Also see [303] Babbington-Smith: 1957. P. 219.
[304] Jones:1978. Pp. 365-366.

arisen between Jones and Babbington-Smith over how this photography came to be taken. In Babington-Smith's early-post war telling of the story, the image was taken as a "target of opportunity" by a pilot en route to planned coverage of Berlin, which was cloud covered. Given the weather, the pilot decided to try to obtain photographs of a suspected radar installation at Zinnowitz at the south end of Usedom Island and to use up his remaining film when he reached the Peenemünde area. These photographs, she wrote, led to the identification of V-1 launching ramps at Peenemünde West airfield[305]

Jones' version is likely the more authoritative. In his version, he had specifically ordered the mission based on agent reports and the SIGINT intercepts of radar tracks from both Peenemünde and the nearby training facility at Zempin. The aerial photos showed the same type buildings that Hollard's agent had seen in France, and having clear photos of the catapult ramps at Zempin made their identification at Peenemünde West airfield simple. And it was on one of these ramps that Babbington-Smith had first seen the V-1. [306]

By December, the Americans were still receiving agent reports concerning rockets. These were as confusing as those received by the British. On December 9, 1943, for example, Dulles sent to Washington Telegram 1257-61, which recounts information on German rocket development provided by "source Sanders," or agent Number 321 (Evert Smits) to OSS officer Frederick Loofbourow (Number 493). This is a good example of the confusing information received from agents, where confirmed data was mixed with other unverifiable and inaccurate information. It led to confusion over

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[305] Babbington-Smith: 1957. Pp. 224-225.
[306] Jones: 1978. Pp. 360-367.

calculation of the warhead weight and the speculation that the V-2 was capable of

delivering a heavier load—perhaps a nuclear warhead—than was true. It also served to

continue the mistaken perception in the minds of some experts that there was only one

secret weapon system under development. [307]

On the other hand, a group of December 1943-dated documents now in the U.S.

National Archives makes it clear that senior scientific and military advisers in

Washington were taking the long-range rocket problem quite seriously. In a December 4

memorandum from OSRD Director Vannevar Bush to War Department New

Developments Division chief General Henry, Bush calls the rocket "a subject of great

importance" and a very real threat to which the British are giving "concentrated

attention." He suggests that the British concern was obvious from its proximity to likely

launch areas and the physical vulnerability of a target the size of London, even if the

rocket possessed only mediocre accuracy.   In Bush's opinion, developing accuracy

capable of threatening militarily significant "point targets" would be "exceedingly

expensive" but that the rocket technology could become very important. His greatest

concern was how to counter the German threat. He acknowledged the British "high level

committee" and believed that the American 8th Air Force was in touch with the

committee. He discussed several bombing techniques that might be used in attacking

rocket launch areas, mentioned his awareness of intelligence communications, and

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[307] Petersen: 1996. P. 175.

suggested to General Henry that this topic should be an agenda item for discussion at a meeting of the JCS's JNW committee.[308]

Two memoranda dated December 24 from Secretary of War Stimson's Special Assistant, Harvey Bundy, to General Marshall dealt with the possibility of connection between uranium and the German rocket program and with requests for information from the British. The first says that while Dr. Bush had disregarded the possibility of an "S-1" (a codename for uranium) connection, he had changed his mind and thought it conceivable that the Germans might be considering using uranium "as a poisoning and not an explosive agent."[309] The second is a list of questions proposed by Dr. Bush to be put to Field Marshal Dill—head of the British Military Mission and senior British officer in the Combined Chiefs of Staff organization in Washington— related to bombing techniques against flying bomb "ski sites," along with an offer to provide special operations assistance in attacking them.[310]

Two additional sets of minutes dated December 29 and 30, 1943, describe the first meetings of a new American committee formed "on oral instructions of the Secretary of War" to "consider all matters pertaining to the subject, including appropriate countermeasures." The committee was to operate under the direction of General Henry's War Department's Special Staff New Development Division. It was to have access to all Army G-2 and OSS information, evaluate the information, and pass it as appropriate to

[308] Memorandum, , no subject, Vannevar Bush to Major General S. G. Henry, December 4, 1943. Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4. Box 176, Entry 489. National Archives at College Park, MD.

[309] Memorandum, no subject, Harvey H. Bundy to General Marshall. December 24, 1943, Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at Collage Park, MD.

[310] Memorandum, , no subject, Harvey H. Bundy to General Marshall, December 24, 1943. Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

the Secretary of War, certain staff elements, and Theater Commanders. It was to make contact with the existing British committee. Topics discussed at these first two meetings included the possibility of enemy use of bacteriological and chemical warfare and possible electronic and physical countermeasures against rocket sites.[311] Neither set of minutes specifies a name for the new committee, but an exchange of correspondence on December 29 and 30 between Vannevar Bush and General Henry uses the British codename CROSSBOW.[312]

As 1943 came to a close, the photo interpreters at Medmenham spent much of their effort searching for evidence that would indicate the number and geographic orientation of the newly identified ski sites. As Babbington-Smith describes the situation, the analysts were now able to estimate such factors as the time it was taking to construct a ski site, the readiness of the individual sites being built, and the likely first time an attack might take place—perhaps as early as sometime in January 1944. The Allied response was heavy bombing by the American 8th Air Force of all the located sites, whatever their operational status. The German reaction was mixed. Babbington-Smith observed:

> When the bombing of the ski sites first began, the Germans had tried frantically to repair all the damage. But as the attacks grew heavier the policy seemed to change, and repair work was concentrated on the firing point and the square building. 'So those must be the real essentials,' thought Kendall, as he saw this happening at site after site.

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[311] Memorandum, "Minutes of meetiings "A" and "B", 29 and 30 December 1943. Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

[312] Memorandum, no subject, from Vannevar Bush to Major General S. G. Henry, dated December 29, 1943, with attachment (memorandum dated December 20, 1943, no subject, Dr. Suits, OSRD Division 15 to Dr. Vannevar Bush. and reply, S. G. Henry to Vannevar Bush dated 30 Dec 43). Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

The elaborate storage 'skis' and certain other buildings at the sites were not essential to the actual launching, although they would have been essential to the really heavy bombardment that the Germans originally planned.[313]

Related countermeasures of a more psychological nature were also undertaken. For example, just before Christmas Air Marshal Portal, Chief of the British Air Staff and Foreign Secretary Anthony Eden exchanged correspondence about dropping leaflets warning of impending bombing to the civilian workers in the area of the ski site construction. Three million of these had been dropped in November and Portal was ordering another drop on December 21st. [314]

ADI(Sc) Jones closed out the year with a report on December 23 summarizing the aggregate knowledge of both the V-1 flying bomb and the A-4 rocket. Among other conclusions, he speculated that the V-1 was not yet operationally ready, based on his observation that the Luftwaffe was reconstituting its bomber force in the west, likely as a substitute for the delayed secret weapon program. In his memoirs, Jones also comments on reasons why he mistook the type of engine driving the V-1, thereby creating an unnecessary intelligence problem:

> What I had done, after congratulating myself on spotting a clue that nobody else had seen, was to employ the principle known as Occam's Razor: *essentia non sunt multiplicanda praeter necessitatem* (hypotheses are not to be multiplied without necessity). For if you start allowing more complicated hypotheses than are essential to explain the facts, you can launch yourself into a realm of fantasy where your consequent actions will become misdirected…. Time after time when I used Occam's Razor in Intelligence it gave me the right answer when others were indulging in flights of fancy leading towards panic. But every now and again it will be wrong, as it was on this one occasion in my experience. By accident you may just have collected a set of facts that can be explained by a simpler hypothesis than what is really occurring; the answer is never to be satisfied but always to search for fresh facts and be prepared to modify your hypothesis in the light of those facts. But in general Occam's Razor gives much the greater chance of establishing the truth…. [315]

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[313] Babbington-Smith: 1957. Pp. 230-231.

[314] A copy of this memo is online at the UK National Archives, Catalogue Reference: FO/954/8B, Image Reference: 206.

[315] Jones: 1978, Pp. 372-372

Jones concluded his 23 December report with an exhortation that the decision makers not forget that while the flying bomb attack was likely to be delayed even as the most immediate threat, they should not forget that the Germans were still testing the rocket—even if not as frequently as the flying bomb. It remained a serious threat that would have to be faced eventually.

Allied bombing and reconnaissance sorties were apparently having an effect on German deployment of its Luftwaffe flying bomb organization. At the end of December, Jones received a report from the French Alliance Network saying that the weapon's headquarters unit was being moved to a chateau in the Criel region near Paris. The full staff was expected to be moved by early January 1944, security measures were being tightened, and its officers were expecting commando or parachute attacks.[316]

D-Day Approaches

The planning for the D-Day invasion caused a shift in American and British intelligence emphasis with different key problems and modifications of intelligence problem-solving strategies. Where up to this time intelligence effort had been directed to identifying potential German threats at some undefined point in the future, it was now constrained by a planned date of late May to early June 1944. More information was required on specific threats at specific locations. The long-range strategic interest in German weapons technology was replaced with more operational and tactical

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[316] Jones: 1978. Pp. 373-374.

considerations of the degree to which German technology could interfere with invasion plans.

By the start of 1944, many of America's intelligence preparations were coming to fruition. In the SIGINT arena, Telford Taylor's involvement and contacts with the British at Bletchley Park were leading to closer integration of handling procedures for the especially sensitive information derived from ULTRA code breaking. As preparations were made for the forces to take part in the invasion, Taylor successfully proposed to General Marshall that a cadre of middle-grade American officers be trained at Bletchley before they were sent out to manage use of SIGINT in operational units. General Eisenhower, as the new Supreme Commander in Europe, approved of this commonality of procedures between the British and American SIGINT managers, although his Chief of Staff General Walter Bedell Smith, considered this "a Pentagon invasion" of the independent authorities of the Theater Commander-- a tension caused by differing frames of reference between components of the military power structure that would arise in other forms in the last 18 months of the European war.[317]

British secret weapon analysis at this time remained focused on the German flying bomb, still assessed to be the most immediate threat of the V-weapons to their most likely target, London. The American 8th Air Force was already using heavy bombers—B-17s— against the identified "ski sites" in the attempt to lessen the threat by eliminating the launch areas. However, the British assumed that not all the launchers could be successfully destroyed and were upgrading southern England's defenses in the forms of

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[317] Taylor: 1993. P.73.

fighter aircraft, anti-aircraft guns systems, and the use of new proximity fuses designed in Britain but manufactured in America.

This led to a complex combination of goals reflecting different national frames. For the U.K., useful knowledge had to address both the issues of its offensive invasion plans and the defense of its home territory. For the U.S., the cross-channel invasion was the primary focus of useful knowledge, with the defense of Britain being something of a secondary objective. This tension channeled the thinking of senior leaders in slightly different directions.

Jones describes how this difference of emphasis generated a visit by a senior OSRD officer, H. P. Robertson, Professor of Applied Mathematics at Princeton. Robertson was to review British assessments of the flying bomb and make recommendations to the Joint Chiefs of Staff about the utility of American assistance. According to Jones, Robertson thought the British assessments were "entirely reliable, and that the Americans should give us all the aid within their power."

Special American emphasis was put on identifying the dates at which the Germans could be ready to use their flying bombs. As Jones describes it:

> One point of special American concern was the timing of the flying bomb campaign and its likely targets. Would the bomb be ready before D-Day, and could it knock out our embarkation ports? Charles Frank prepared a report for S.H.A.E.F. (Supreme Headquarters, Allied Expeditionary Force) showing that the only worthwhile target, given the inaccuracy of the weapon, was London. As for timing, he and I reckoned that our bombing could probably postpone the opening of the campaign for some months, and that it would also take this time for the Germans to improve their accuracy in trials to an acceptable level. We might therefore be able to land in Normandy before the first bomb was launched, but we thought that the landing would provoke Hitler into ordering the pilotless bombardment forthwith, whatever the state of the trials. And since we reckoned that a military machine of the scale of Flak Regiment 155(W) would have a reaction time

of about a week, we suggested Day (D+7) as the best guess for the opening of the bombardment.[318]

A case can be made that up until late 1943, British intelligence and planning agencies dominated the effort to learn about Germany's rocket weapons. Testing of the A-4 had been visible outside Germany since the first successful test launch on October 2, 1942. Before then British intelligence had received strongly suggestive evidence of Peenemünde development activity from the 1939 Oslo Report had reconnaissance photographs of that facility as early as May 1942, and agent reports since the end of that year. Perhaps most importantly, they had already established the joint Royal Air Force/Secret Intelligence Service science and technology analytic unit led by R. V. Jones at the beginning of the war—it had proven its competence by supporting radio countermeasures against German bombing systems during the Battle of Britain. These efforts were followed by the Sandys BODYLINE and CROSSBOW investigations.

The Americans, however, first had independent agent reports received through Dulles' O.S.S organization in the Spring of 1943 and were receiving some British intelligence appraisals from the middle of the year. Churchill did not directly inform Roosevelt of British intelligence on the rocket threat until late October and the information Roosevelt sent to Churchill in return was largely inaccurate. However, by the end of December 1943, the Americans were also rapidly gaining knowledge of the secret weapon threat and were giving significant thought to their own interpretation of viable measures to counter what they had begun to speculate on as a nascent weapon of mass destruction.

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[318] Jones: 1978. Pp. 378-380.

While the British were struggling to clarify the existence of two different German secret weapon programs, American intelligence agencies were making their own independent estimates of the German long-range rocket program. The Americans had the published research of Robert Goddard, the work of Theodore von Kármán and Frank Molina at Cal Tech, and the experiments by members of the American Rocket Society to use as background material on liquid-fueled rocket mechanics. OSRD's Vannevar Bush, Secretary of War Stimson, and the military and naval officers on JCS's Joint New Weapons committee were concerned about the possible future applications of long-range rocket technology. And yet at the beginning of 1944, published accounts do not credit the American level of knowledge about German progress in this class of secret weapons with being equal to corresponding British knowledge.

One place where the aggregate of American knowledge could have come together was in the Research and Analysis Branch of the new Office of Strategic services. In fact OSS/R&A published a seven-page secret paper on 4 January 1944 on this topic entitled "The German Long-Range Rocket Projectile"[319]—one month after the exchange of memoranda between Vannevar Bush and General Henry. This paper was described as "a summary and analysis of available intelligence on German rocket projectiles, together with an hypothesis as to the fuel used in propulsion". As the description suggests, this paper was primarily speculative. In large measure, it attempted to define a possible German rocket weapon from an analysis of fuels potentially available in the German economy. The emphasis on fuels is consistent with the early October American-British

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[319]Office of Strategic Services. Research and Analysis Report No. 1748, The German Long-Range Rocket Projectile, 4 January 1944. General Records of the Department of State. Record Group 59, publication 1221, microfiche 59. National Archives at College Park, MD.

exchange of information about various fuels that could lead to improved understanding of a rocket's performance potential. An appendix to R&A 1748 summarizes over 20 reports available to the OSS analysts—all from human sources. Most frequently, these came from prisoner of war interrogation (about half) and agents reporting to OSS secret intelligence (about one third.) The other sources cited include military attaché reporting and liaison with the Polish intelligence service.

In their summary and conclusions, the authors of R&A report 1748 remark that "The many intelligence reports on the long range rocket projectile are largely contradictory, and with few exceptions vague." Their list of sources, however, is as interesting for what it does not include as for what it does. There is no reference to either aerial photography or to SIGINT intercepts. And the OSS analysts appear to have had the same problem the British had been having in assuming that there was a single long-range rocket secret weapon. However, the British had recently resolved this issue through their combination of prisoner of war, agent, and French Resistance reporting, airborne reconnaissance imagery, and SIGINT, all brought together by some combination of ADI(Sc) Jones, the Sandys investigation and its BODYLINE scientific committee, and Sir Stafford Cripps' independent review. This information apparently was not available to the OSS's analysts. Thus, at the beginning of 1944, the American agency originally established to bring together all available information did not always report "all-source" information from either U.S. military or British liaison sources.

The American military, however, was bringing multiple sources of intelligence together, not in its intelligence organizations, but in organizations for planning military countermeasures to new German weapon developments. Vannevar Bush's JCS Joint

Committee on New Weapons and Equipment (the JNW), General Henry's War Department Special Staff New Developments Division, and Admiral Furer's staff as Coordinator of Research and Development for the U.S. Navy all played important roles.

For example, on January 6, 1944, the JNW forwarded a report to the JCS on its evaluation of "Recent Intelligence Regarding Alleged German Secret Weapon."[320] This report suggests that America's military planners were more aware of up-to-date British knowledge than were the American intelligence authors of OSS R&A 1748, written at the same time. The detailed appendix makes reference to "about 100 sites for launching against England what are apparently pilotless rocket-propelled aircraft" and "about six sites for a larger type of rocket." It speculates that the payload could be "high explosives, incendiaries, conventional gas, biological toxins or possibly other materials," although it makes no prediction which of these the flying bomb or larger rocket would actually be carry. An Annex proposes three studies "to supplement present knowledge of German secret weapons."

Two of these studies deal with modern aspects of gas warfare and the possibilities of biological warfare and are not restricted to the rocket/flying bomb delivery systems. The first of the three studies, on the other hand, is limited to just the category of delivery vehicle. The JNW proposal suggests a focused study should be managed by a committee under General Henry's War Department New Developments Division. The proposal provides a clear statement of the scope desired of the study and appears to reflect a

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[320] Joint Chiefs of Staff Note by the Secretaries, 908-3 (J.C.S. 625/1) "Implications of Recent Intelligence Regarding Alleged German Secret Weapon," with Enclosure and Appendix, January 6, 1944. Records of the War Department General and Special Staffs. Records Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

concern with understanding the potential rocket threat from a total system-based

perspective:

> This study will include evaluation of all intelligence information available through G-2, ONI, OSS and British sources.
>
> It will include the two or more types of long-range land-launched missiles, including propulsion means, control means, facilities at the launching sites, etc. It will include examination of probable payload, including high explosive, incendiaries, toxic gas, biologicals.
>
> It will be aimed primarily at the study of possible countermeasures.
>
> Its scope is limited to the enemy long-range rocket program, and it is not expected to cover, for example, the entire program of defense against biologicals however delivered.

The JNW proposal recommends that JCS provide the authority to perform all

three studies. It also recommends that strategic planners be directed to "give due

consideration to technical information on this subject" and that the proposal be forwarded

to the Commanding General, European Theater of Operations for his advice and to solicit

his recommendations, as "(t)his matter is of pressing importance and may conceivably

affect the entire plan for the European Theater." In American eyes, the Rocket had been

accepted as a key problem.

American speculation about the possibility of what would now be called weapons

of mass destruction (WMD) is reinforced by a memorandum from General Henry to

Chief of Staff Marshall drafted just two days before the JNW study proposal.[321] This

memorandum supports a proposal from General Brehon Somervell, Commanding

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[321] Memorandum for the Chief of Staff from the New Developments Division, subject: Protection Against Bacteriological warfare, dated 8 January 1944, with Enclosure, Memo to C/S frm CG, ASF re above subject dtd 6 Jan 44. Records of the War Department General and Special Staffs. Records Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

General of the Army Service Forces,[322] which recommended immediate development of WMD detection measures and antidotes—a recommendation with which Vannevar Bush specifically agreed.

Another memorandum from January 6, this one to Major General Henry from Lt. Col. R. L. Snider, Air Corps, specifically addressed the possibility of American support for radio countermeasures proposed by Air Commodore Pelly's CROSSBOW subcommittee of the U.K.'s Joint Intelligence Committee.[323] The technical proposal was to investigate the earth's magnetic flux in the area of London as an aid to developing countermeasures against the flying bomb. As a side-light, Lt. Col. Snider notes that "U.S. Army representatives of G-2 and Eighth Air Force have been invited to sit on this subcommittee." Thus Americans had become active participants in the British deliberations.

On January 15, General Henry sent a memorandum to Brigadier General E. L. Sibert, the Assistant Chief of Staff for Intelligence (G-2) for the American army and soon to become General Bradley's 12th Army Group G-2 in the European Theater of Operations (ETOUSA). General Henry's memorandum introduced Dr. H. F. Robertson, formerly of the London mission of OSRD. Dr. Robertson was then a member of the Enemy Secret Weapon Committee established in General Henry's Division. This was Dr. Robertson's official visit to which Jones had referred earlier. He would be making

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[322] At the time, the American Army had three components: The Ground Forces, the Air Forces, and the Service Forces. The latter component performed the non-combat functions such as logistics, communication, ordnance, chemical warfare, signals, and medical support.
[323] Memorandum from R. L. Snider to Major General S. G. Henry, Subject: Radio and Radar Countermeasures – Aspect of Crossbow, dated 6 January 1944. Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

his tour of London at the end of January "to assist our committee in interpreting and evaluating the available data on enemy secret weapons and installations known to be in existence across the English Channel"—at that point in time, the "large sites" and the flying bomb-related "ski sites".

Robertson's visit was a follow-up to an exchange of correspondence between General Marshall and Field Marshal Sir John Dill, Vice Chief of the Imperial General Staff. General Henry requested Gneral Sibert's help in introducing Robertson to the "British Committee on this same subject," which would have been Air Commodore Pelly's CROSSBOW Subcommittee of the British JIC.[324]

At nearly the same time, two pieces of correspondence in the New Development Division administrative files discuss an American study of bombing techniques related to the subject "CROSSBOW Project." The first is a proposed study outline sent to the Executive Director, Army Air Force Board in Orlando Florida. The second is a memorandum from the Executive Director of that board to the Commanding General, Army Air Forces that provides more detail on the proposed study and specifically designates "ski sites" and "large sites" as CROSSBOW objectives for destruction.[325]

A final document in this January series of NDD correspondence is a typed transcription of raw notes of an interview with Dr. E. L. Bowles in the Office of the

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[324] Memorandum from S. G. Henry to E. L. Sibert, no subject, dated 15 January 1944. Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

[325] 1) Memorandum from Assistant Chief of Air Staff, Operations, Commitments and Requirements, to Executive Director, Army Air Forces Board, Subject: CROSSBOW Project, dated 13 January 1944, and 2) Memorandum from Executive Director Army Air Forces Board to Commanding General, Army Air Forces, subject: CROSSBOW Project, dated 24 January 1944 . Both are filed in Records of the War Department General and Special Staffs. Record Group 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

Secretary of War on January 31, 1944. Dr. Bowles was an MIT pioneer in radar research

and had been appointed a special assistant to Secretary of War Stimson. James P. Baxter

comments on Bowles' "great role in bringing civilian science and the High Command,

especially the Army Air Forces, closer together."[326] At the end of January, Bowles had

just returned from a visit to London to discuss the evolving plans for CROSSBOW

countermeasures, and he had talked to a wide range of people, including General Sibert,

Lord Cherwell (misspelled as Charwell in the notes), Dr. Robertson, and General Spaatz

(head of the Strategic Air Forces). Bowles commented that he was able to get more

comprehensive information from the G-3 (Operations and Training) than he was from the

G-2, although General Sibert was very forthcoming with what he had.

Bowles was especially critical of his meeting with Lord Cherwell:

> I purposely went to see Lord Charwell (sic) and to see if I could make out what he knew.
> He dismissed the whole problem, I think much too lightly, but thought it was possible
> that Hitler had been misled by the local (German) scientists, and that they (the scientists)
> themselves were beginning to be in doubt as to whether they had produced a successful
> weapon. Lord Charwell (sic) is taking a negative position, which, in turn, may account
> for the lack of an effective program by the British against these efforts.

Bowles' conclusion was that the Americans should undertake an independent look

at the countermeasures problem and come up with their own set of recommendations. He

was very complementary of Dr. Robertson's selection, and he strongly advocated

embedding scientists such as Robertson in the theater staffs as advisers, leaving the

Washington staff to perform planning and analysis that would then be offered to the

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[326] Baxter: 1946. P. 33.

theater commanders actually fighting the war. The embedded scientific advisers were there to answer theater commanders' technical questions.[327]

Taken together, this series of memoranda from the files of the New Developments Division clearly shows that Americans at the senior levels of the War Department and NDRC were by this time aware of the British CROSSBOW effort. They were independently reflecting on the nature of the possible rocket-related threats and countermeasures. And the British authorities had invited selected American intelligence and strategic air force participation in the London subcommittee looking at defining the threat and investigating potential countermeasures.

America's participation was not restricted to committee discussion. According to Dornberger, on January 12, General Marshall gave highest priority to discovering the best way to attack what came to be called by the generic name "CROSSBOW sites." Army Air Forces commander Arnold instructed the commanding officer at Eglin Field, Florida, General Grandison Gardner, to build duplicates of the sites at a remote part of Eglin, with the design based on aerial reconnaissance photographs and engineer's estimates of an actual ski site in France. These replicas were completed on the Gulf Coast in 12 days and cost $1 million. They were attacked by a number of different aircraft and bomb combinations. The experiment led to General Gardner's recommendation to General Eisenhower that the most cost-effective technique would be to use low-level attack by fighter aircraft carrying the heaviest possible bomb.

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[327] Transcript of raw notes, "Interview with Dr. E. L. Bowles, Office of the Secretary of War, on 31 January 1944."   Records of the War Department General and Special Staffs. Record Group RG 165, 390/40/1/4, Box 176, Entry 489. National Archives at College Park, MD.

There were never-resolved disputes with the British over the Americans'

experimental design and results—the British and the Americans had slightly different

problem-solving strategies in their respective technological frames. The tension

increased when in February agent reports led to identification of the less complex and

harder to find "modified" flying bomb sites. The British operational frame preferred the

use of heavy bombers flying at medium-to-high altitudes and using the more

conventional smaller bombs. Heavy bomber targeting emphasized the more permanent

and complex ski sites, although limited experiments were also performed in France with

variations of the Eglin Field concept flown by American and British fighter and medium

bomber aircraft of the Allied Tactical Air Force.[328]

Britain Focuses on the Flying Bomb in Preparation for the D-Day Invasion

Reflection on available information led to a consensus that the flying bomb

presented the most immediate threat and was the first priority for the development of

operational countermeasures. This required a new problem-solving strategy for

collecting detailed information on German pilotless aircraft deployment and on the

physical vulnerability of related German facilities.

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[328] This description is based on Dornberger: 1952, 1954, Pp. 167 and 168, and John F. Kreis, editor, *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, Washington, D.C.: Air Force History and Museums Program, Pp, 220-221 (especially the footnote on P. 221.) Dornberger's description relies heavily on that in Volume Three, "Europe: Argument to VE-Day, January 1944 to May 1945;" Chapter 4, "CROSSBOW" in Wesley Frank Craven and James Lea Cate, general editors, *The Army Air Forces in World War II*. Chicago: The University of Chicago Press, 1951 (reprinted in Washington, D.C.: Office of Air Force History, 1983.) Craven and Cate's discussion provides much expanded operational detail not included in Dornberger's presentation. See, especially Pp. 97-106.

While the Germans were struggling to resolve administrative and technical delays in rocket testing and production and the Americans were independently experimenting with more effective countermeasures than those they perceived as being pursued by the British, Air Commodore Pelly was warning the British Government of possible near-term bombardment of London—possibly as soon as January 1944. R. V. Jones, on the other hand, believed the earliest the Germans could attack would be the coming March. In his view, Pelly's staff was "less than able to form an accurate assessment of the threat." SIGINT intercepts of the radar tracks of V-1 testing at Peenemünde and Zempin gave evidence that the German Air Force program had not solved its accuracy problems. As a result of the information from these intercepts, Pelly assigned the task of monitoring German test flights to Jones' unit. In addition, photo reconnaissance of the French Coast identified a number of probable flying bomb supply sites that were more heavily defended than the identified ski site launchers. Bombing focused on the identified launch facilities, which the Chiefs of Staff believed could be made ineffective by the end of April.[329]

Significant intelligence attention was also beginning to be paid to the flying bomb testing and training ground the Germans had recently built near Blizna, Poland. In Jones' opinion, the basic knowledge of flying bomb capabilities had already been established and there was little else that he thought could be learned from Blizna. However, the SIGINT information from that facility was ambiguous and left open the possibility that the large rocket might also be associated with that facility. SIGINT monitoring continued, and photo reconnaissance of Blizna was requested in March from the air base

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[329] Jones: 1978. Pp. 413-415.

that the Allies now controlled at San Severo, Italy. The first photo mission to take images of the portion of the Blizna facility reported by the Polish Army flew from Italy on April 15.[330]

At the same time that the photo reconnaissance missions targeted at Blizna were being flown from Italy, reconnaissance aircraft from the United Kingdom were periodically photographing the Channel Coast. By the end of April, they had discovered a simplified variant type of flying bomb launch facility. This consisted of pre-surveyed and prepared locations that were made ready for launch with prefabricated equipment just before they were to be placed in operation. About a dozen of these, given the identifier "Modified Sites," were found and this stimulated another "blitz" of photo coverage of the entire area of France within 150 miles of London. Combined with Jones' SIGINT monitoring of flying bomb accuracy and ULTRA SIGINT informing the British that Hitler had ordered establishment of a special headquarters to control V-1 operations (the 155th Flak Regiment commanded by Colonel Wachtel.) British assessments predicted that attacks with that weapon were becoming imminent.[331]

By the May 5, Jones requested that a second photo reconnaissance mission be sent to cover Blizna. Photographs of a flying bomb launch ramp were taken, but there was still no clear indication that the larger rocket was being tested in Poland. None of the A-4-related facilities that appeared at Peenemünde had been identified so far. But on the May 5th reconnaissance mission a rocket was seen in the open. When compared with older pictures from Peenemünde, it was conclusive evidence that the A-4 was there, but it

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[330] Jones: 1978, Pp 430-431, and Babbington-Smith: 1957, Pp. 233-234.
[331] Babbington-Smith: 1957, P. 234; Jones: 1978, Pp. 415-417, and Winterbotham: 1974, Pp. 120-121.

left differences in the minds of some British experts about rocket function and launch technique.[332]

Then, two weeks later, a new source of information on the A-4 became available. The Polish forces had been collecting any equipment or wreckage they could find left over from the German testing at Blizna. On May 20, an A-4 had impacted near the River Bug without exploding and the Poles had recovered useful material from the wreckage before the Germans reached the scene. The Poles would share the captured material with the British, giving them physical access to A-4 hardware for the first time, although it would take over two months for that captured material to reach London.[333]

Just before the invasion, at the end of May, A SIGINT intercept between the flying bomb operational commander, Luftwaffe Colonel Wachtel and his senior commander, General Heinemann, reported 50 sites ready for operations. On the day of the Allied invasion, Wachtel was ordered to begin an all-out offensive to start on June 12. The first flying bomb was fired at London on June 13.[334]

The Secret Weapons Become Operational

General Eisenhower's invasion plan (code-named OVERLORD) was to land strong ground forces in Normandy, build up resources in that area, and then apply the forces of General Montgomery's 21st Army Group and General Bradley's 12th Army Group to secure northern ports, and thereafter move east to the boundaries of Germany to

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[332] Jones:1978, P. 431, and Babbington-Smith: 1957, P. 234.
[333] Jones: 1978, P. 443.
[334] F.W. Winterbotham. The Ultra Secret. New York, Evanston, San Francisco, London: Harper and Row, Publishers, 1974, P. 121.

threaten the Ruhr industrial area. In the September time frame, these Army Groups were to link up with General Devers' 6th Army Group, after it entered the south of France at the Mediterranean Coast and moved overland north to the area of Saarbrücken and Strasburg. The combined forces were intended to defeat the German forces west of the Rhine, capture the Ruhr, and move across the Rhine into Germany by the best route that presented itself. [335]

A deception plan, code-named BODYGUARD—later FORTITUDE—was intended to convince the Germans that the western Allies intended to invade the continent at the Pas de Calais—the nearest point to Britain—rather than farther south at the actual invasion point, the Normandy beaches. The Allies assumed the Germans generally knew about their invasion preparations. But if the German military leaders could be convinced to position a large portion of their defending forces away from the actual point of Allied invasion, they would pose a temporarily diminished threat to the actual invading armies.

As the invasion neared, changes were being made in the structure of America's stateside national headquarters intelligence structure. The Joint Chiefs of Staff organization established a standing secretariat for the Americans' Joint Intelligence Committee in April to "serve the Joint Intelligence Committee and to coordinate its work with other agencies of the Joint Chiefs of Staff organization." It was assigned a wide range of functions, one of which was to "serve as the U.S. Secretary of the Washington-

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[335] Dwight D. Eisenhower, *Crusade in Europe*. Garden City New York: Doubleday & Company, Inc., 1948, Pp. 228-229.

based Combined Intelligence Committee,"[336] on which representatives of both the British and American JICs participated.

Within the European Theater, the Western Allies shifted their intelligence arrangements to manage direct examination of German weapons technology expected to be discovered when the Allied Expeditionary Force crossed the Channel and came into direct contact with its German enemy. While both the American and British militaries maintained their independent intelligence structures, a new combined staff was created to coordinate the activities and organizations of the independent nations. When American General Eisenhower was transferred from North Africa at the end of 1943 to become Supreme Commander, Allied Expeditionary Forces, his G-2 would be a senior British Army intelligence officer. Initially this would be British Major General Whitely. But by May 23, it would be Major General Kenneth Strong (no relation to American General George Strong, General Marshall's G-2 in Washington), who had advised Eisenhower as senior intelligence officer in the Mediterranean Theater. In his memoirs, General Strong says that Eisenhower was recreating the form of staff that he had employed at Allied Force Headquarters in North Africa. But he was largely dealing with new people. His method was to intermingle staff that in earlier organizations had maintained social separation. Eisenhower's goal was to improve overall operational coordination.[337]

According to Eisenhower's comments in *Crusade in Europe*, the German secret weapons were a significant source of uncertainty for the Allied invasion planners. Given

[336] J.I.C. 185, 29 April 1944, *Standing Operating Procedure, Joint Intelligence Committee Secretariat, Note by the Secretary*, with enclosure. Records of the Joint Chiefs of Staff. Record Grooup 218, 190/2/22, Entry 343A, Box 55. National Archives at College Park, MD.
[337] Major-General Sir Kenneth Strong. *Intelligence at the Top: The Recollections of an Intelligence Officer*. Garden City, New York: Doubleday & Company, Inc., 1969. Pp. 176-177.

his position as the most senior Allied commander in Europe and his responsibility for planning the invasion, his observations and speculation about the threat secret weapons posed are worth reproducing in full. They reveal his mind set and the state of his knowledge of the secret weapon problem:

> Alarming Intelligence reports concerning the progress of the Germans in developing new long-range weapons of great destructive capacity…indicated the advisability of attacking early.

> From time to time during the spring months staff officers from Washington arrived at my headquarters to give me the latest calculations concerning German progress in the development of new weapons, including as possibilities bacteriological and atomic weapons. These reports were highly secret and were invariably delivered to me by word of mouth. I was told that American scientists were making progress in these two important types and that as a result of their own experience they were able to make shrewd guesses concerning some of the details of similar German activity. All of this information was supplemented by the periodic reports of Intelligence agencies in London. In addition, aerial photographs were scrutinized with the greatest care in order to discover new installations that would apparently be useful only in some new kind of warfare.

> The finest scientific brains in both Britain and America were called upon to help us in evaluation and in making estimates of probabilities. Our only effective counteraction, during the preparatory months of 1944, was by bombing. We sent intermittent raids against every spot in Europe where the scientists believed that the Germans were attempting either to manufacture new types of weapons or where they were building launching facilities along the coast.

> During this long period the calculations of the Intelligence agencies were necessarily based upon very meager information and as a consequence they shifted from time to time in their estimates of German progress. Nevertheless, before we launched the invasion, Intelligence experts were able to give us remarkably accurate estimates of the existence, characteristics, and capabilities of the new German weapons….

> It seemed likely that, if the German had succeeded in perfecting and using these new weapons six months earlier than he did, our invasion of Europe would have proved exceedingly difficult, perhaps impossible. I feel sure that if he had succeeded in using these weapons over a six-month period, and particularly if he had made the Portsmouth-Southampton area one of his principal targets, Overlord might have been written off.[338]

One of the "staff officers from Washington" and "finest scientific brains" mentioned by General Eisenhower, would have been ALSOS Scientific Director Samuel Goudsmit. In his recollections on the same spring, Goudsmit gives his assessment of the

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[338] Eisenhower: 1948. Pp. 229-230, 260.

secret weapons and ties the concept of the atom bomb to the V-1 and V-2 as its likely

delivery vehicles:

> These were the conditions that prevailed among us at the time our armies were being readied for the invasion of Europe. We knew strictly nothing about the development of the German uranium project. We assumed that their progress must be parallel to ours and, in all probability, ahead of ours, and we were plenty jittery. Hitler had boasted about secret weapons. What else could he have in mind but an atom bomb? We had obtained intelligence data on the V-1 and V-2. What final use could they be to the Germans unless they were meant to carry atomic explosives? Reconnaissance planes brought us pictures of mysterious installations along the coast of France. Might these not be bases for uranium piles to produce bombs or at least huge amounts of radioactive poisons? It was not surprising that our invasion troops were equipped with special detectors for radioactive materials. Fortunately they proved to be unnecessary.[339]

Taken together, Eisenhower's and Goudsmit's recollections paint an interesting

picture of the character of knowledge in the minds of the American senior Allied military

decision maker and of one of the America's foremost scientific advisors. Their frames of

reference contained many closely related concepts. First, in the absence of

incontrovertible evidence about the secret weapons, they both assert the high value of

intelligence data. But the operational decisions were primarily swayed by the

recommendations of recognized scientists whose opinions depended largely on

speculation and "mirror imaging" from the narrow perspective of their own research and

experience—rather than the unique, but often fragmentary, information received from

intelligence sources. Second, both seem to focus more on "worst-case" speculations

about the estimated German weapon of mass destruction component of the secret

weapons than on the increasingly concrete intelligence about the known physical

capabilities and limitations of the flying bomb and long-range rocket as delivery vehicles.

Finally, both specifically mention reconnaissance imagery as important to formulating

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[339] Goudsmit, 1947. Pp. 12-13.

their judgments of threats and countermeasures—pictures seem to count for more than words. These emphases would change to give higher weight to intelligence after the invasion, when direct contact with the enemy allowed certainty to be increased as the ability of Allied representatives enabled them to examine wrecked or intact items of enemy equipment and to interrogate the developers, producers, and users of the secret weapons.

CHAPTER 8

MERGING SECRET WEAPONS INTELLIGENCE INTO OPERATIONAL DECISION
MAKING

The overlapping stages of knowledge production through speculation,

examination, and reflection were common to the range of British and American

intelligence organizations during the war, and by the middle of 1943 they had provided a

basis for practical action in terms of the initial bombing of Peenemünde. However, what

the British political and military decision makers saw as adequate to the tactical decision

to bomb was seen by intelligence producers such as R. V. Jones as only partial

knowledge, inadequate to support strategic decisions for civil defense or to inform

decisions on resources to combat the secret weapons once they became operational. This

raises the question about how the participants judged the output of intelligence as well-

working or non.working.

The concept of interpretative flexibility is useful in clarifying this dilemma. This

concept holds that groups with particular frames of reference can judge an artifact as

essentially different technologies based on the degree to which it meets that group's goals

and resolves its key problems. Thus it is quite possible for a political or operational

military decision maker to see a particular intelligence finding as adequate while an

intelligence producer will be dissatisfied with a lack detail or context. It is also possible

for the political or military decision maker to find an intelligence appreciation or estimate

to be unconvincing for addressing a practical problem, while an intelligence producer is

satisfied that it has provided accurate detail and adequate context.

236

This study proposes that in a formal hierarchy such as a government or military service, it is the political policy maker or military commander whose judgment prevails. However, it also suggests that lingering disagreements between policy makers or military operators may create a situation in which a stabilized judgment about working or non-working performance of a component such as an intelligence division is impossible to reach under normal circumstances. It is also possible that a crisis may produce a situation where a definition of effective performance is temporarily stabilized, only to return to a traditional view of effective performance once the political force of the crisis is removed.

From the middle of 1944—the opening of combat on the western European Channel Coast—through the end of the war three basic questions related to the interpretive flexibility of performance of Allied intelligence against the secret weapon threat took on the greatest importance:

- Were the secret weapons capable of delivering chemical, biological, or nuclear payloads?
- When and where would the secret weapon be used?
- What countermeasures would be most effective against the secret weapons?

Chapters 8 and 9 will discuss how these problems were addressed and how the different interpretations of the major political, military, and intelligence groups affected the judgment of effectiveness. This chapter focuses on the British and American experience, while the next chapter describes how the relationships and operations were impacted by the inclusion of the Soviet Union in the secret weapon investigation.

The utility of information produced by Allied intelligence technology began to be felt when the details enabled civilian and military planning and operations against enemy military forces, including the secret weapons. In the aggregate, the combined efforts of American and British political, military, and intelligence decision making were becoming more formal. By late 1944 and early 1945, such information was routinely passed to operational commanders and planners both in Europe and in Washington. But it was also a source of disagreement, for example, within the nations' Air Forces about the opportunity cost of using expensive heavy bombing against the secret weapon sites rather that other strategic targets such as oil production or heavy industry—differences in the operational frames of independent Air Force commands.

While much of the published literature on American intelligence concerned with the German secret weapons emphasizes Army and Army Air Force activities, the U.S. Navy was also working on rocket development projects of its own. Most of these were smaller systems most useful for aiding short distance take off of aircraft, or rockets to be fired against ground targets. Thomas F. Dixon, later Deputy Associate Administrator of America's National Aeronautics and Space Administration, described his participation in the Navy's World War II rocket program in a 1963 article in *The Airpower Historian* which outlines the state of American naval rocket research and awareness of the German program in the second quarter of 1944. These intelligence reports were largely derived from photography and agents and forwarded to the Navy Department. Given Dixon's wartime position, his observations must have reflected the knowledge held in Admiral Julius Furer's office as the Navy's Coordinator of Research and Development. They also

give an indication of the state of American interest in liquid-fuel rocket development as a

key problem:

> During the spring of 1944, I was working in the Navy Department in Washington. We were in the home stretch of our preparations for the invasion of Normandy which was scheduled for early that summer. American military interest in the operational use of rockets had been very slow in developing. In fact, the only applications of rocket technology that were actually in production were rather small, tactical battlefield weapons, such as aircraft rockets and the bazooka. My job was to expedite the production of the Navy's 5-inch HVAR aircraft rocket, later known as "Holy Moses," to be fired from under the wings of fighter aircraft at targets such as trucks and tanks. During the spring we were still firing only about two dozen rockets a day, but we were organizing our plants and shipment facilities for a planned production increase to about 40,000 of these rockets per day.

> One thing that kept us from being complacent about our rocket progress was the stream of Naval Intelligence reports coming in from London. They contained many piecemeal indications of how large and active the German rocket program was. As these indications mounted and as German political leaders began to talk more and more about "secret weapons," the Allies devoted more and more of their intelligence effort to the problem of identifying German rocket installations and attempting to piece together the status of the rocket program and its capabilities. We had bombed Peenemunde in August 1943, knowing that some kind of major rocket development was going on there. That was about all we knew at the time. We did not even know whether the mystery vehicles were a winged type or a ballistic type.

> In the Navy Department we had a series of conferences on the probable capabilities of the Germans in this type of new weapon. We eagerly studied photographic and ground intelligence reports for new clues. But the picture was hard to bring into focus. Reports on the launching sites being built in the Pas de Calais area offered little common ground with reports on the facilities at Peenemunde. So we played it safe by bombing anything that could be identified as a rocket installation. From Poland intelligence reports began to trickle in telling of frequent sightings of large rockets rising in the sky with a long red flame spewing from the rear. This was intriguing, but it didn't help us much..[340]

Formalizing and Assigning Allied Intelligence Requirements

In principle, the Western Allies' requirements for gathering and analyzing

information on especially important topics such as the flying bomb and liquid-propelled

rocket were the province of the American-British Combined Intelligence Committee in

Washington, through its subsidiary, the Combined Intelligence Objectives Subcommittee

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[340] Thomas F. Dixon. "Solving the V-2 Mystery in 1944." *The Airpower Historian*, Volume 10, No. 2, April 1963, Pp. 46-49.

(CIOS) in London. CIOS was formally established under the authority of the Combined

Chiefs of Staff on July 28, 1944, and supplanted the short-lived Combined Intelligence

Priorities Committee (CIPC).[341] It was to manage six functions within the SHAEF area

of operations:

- Receive, approve, and coordinate British and American requests for

  intelligence of military or political significance, exclusive of combat

  intelligence,

- Assign priorities,

- Arrange for folders of instruction and personnel for technical

  investigations,

- Submit the target folders to SHAEF for implementation,

- Disseminate results of investigations to British and American departments,

  and

- Refer to the Combined Intelligence Committee issues that cannot be

  resolved within CIOS.

The CIOS chairman was British Maj. Gen. Kenneth Strong's Deputy SHAEF G-

2, American Brig. Gen. Thomas Betts. American CIOS representation in London

included members from the State Department, the three military service's intelligence

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[341] This description of CIOS is based on "Note by the Secretary" of the American Joint Intelligence
Committee's Joint Intelligence Staff. See Joint Intelligence Staff document J.I.S. 107 (Rev), dated 9
January 1945, subject:"Combined Intelligence Objectives Subcommittee (A Summary)." Records of the
Joint Chiefs of Staff. Record Group 218, 190/2/22/5, Box 55, Entry 343/1. National Archives at College
Park, MD.

staffs, the Federal Economic Administration, the OSS, and the Office of Scientific

Research and Development. Equivalent representation from Britain included the Foreign

Office, the three service intelligence organizations, the Ministry of Supply, and the

Ministry of Aircraft Production. The U.S. and the U.K. would have parallel staff

secretariats to coordinate the activities of these members and would be "capable of

independent joint as well as combined operations."

CIOS was to handle formal requirements concerning the highest priority

intelligence issues to be addressed within Allied intelligence's technological framework.

It established a subsidiary group, the Technical Industrial Intelligence Committee (TIIC),

from November 1, 1944, under the Chairmanship of Howland H. Sargeant of the U.S.

Federal Economic Administration. Its purpose was to act as a filter to coordinate

requests for technical industrial intelligence from American Government agencies in a

number of specified technical areas such as materials, machinery and utilities, before they

were formally submitted to CIOS for approval.

CIOS recognized the potential for conflict between varying collection interests.

Three in particular are mentioned in the JIS Summary: the ALSOS Mission, the United

States Strategic Bombing Survey, and the British Bombing Research Mission. CIOS

management desired close coordination and even "close liaison" between themselves and

such other activities, and they assumed that when in the field, their members should act

under the "control and orders" of "T" Force commanders described below.

CIOS-validated requirements would be forwarded to the Supreme Headquarters,

Allied Expeditionary Force, where their execution would be managed operationally by

the SHAEF G-2 through the staffs of the three Army Groups and their subordinate numbered field armies. However, the complexity of this organizational arrangement and the number of specialist investigating elements led to tension between agencies in Washington and London, which were demanding special information, and the operational commands in the European Theater charged with coordination, control, safety and support of the special investigating units while they were operating within the European Theater.

Such tensions were one component of a post-war report prepared under the authority of a General Board of the United States Forces, European Theater. This report summarized overall Allied organization, strategy, tactics, and administration in a series of 131 individual studies. One of these, Study 14,[342] deals specifically with the question of structure and function of intelligence services available to the Supreme Allied Commander, and it comments on the evolution of the relationship between British and American intelligence organizations with the invasion of the continent:

> 22. The integration of British and American personnel in the Intelligence Branch, Chief of Staff, Supreme Allied Command, was a predominant factor in the development of this branch and in the later organization of the G-2 Division, Supreme Headquarters, Allied Expeditionary Force…. Although all three services of Great Britain and the United States were represented in the Intelligence Branch, Chief of Staff, Supreme Allied Command, the meager facilities provided by American intelligence agencies initially dictated almost complete dependence on the more British intelligence staffs. This dependence on British intelligence agencies for information and intelligence was particularly necessary during the planning stage for the operations involving the invasion of France.... After the invasion of France, however, the main sources of information were

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[342] Report of The General Board. United States Forces, European Threater. Study 14, "Organization and Operation of the Theater Intelligence Services In The European Theater of Operations," paragraphs 22 (P. 12) and 29 (P. 16) The General Board was established by orders in June, August, and November 1945 to "prepare a factual analysis of the strategy, tactics, and administration employed by the United States Forces in the European Theater." This reference draws from commercially available reproductions available on discs produced by MilSpecManuals.com, CD # 008084, and an identical version is included in the complete set of General Board studies published by Genea Archives, BACM Research , *World War II Historical Document Archive*, DVD-ROM Disc 2 of 4.

from forces in the field. From that point on, the Americans capably furnished their rightful share of intelligence.

General Board Study 14 also addresses the rapid increase in importance of technical intelligence on German weapons and their tactics for employing them—and reflected American's preference for data on enemy capabilities rather than on their intentions. This addition of a technical focus led to a significant set of organizational innovations for gathering and initially evaluating this new source of information, and it directly set the stage for increasing the detail, context and perspective of knowledge about the German secret weapon program:

> 29. <u>The reorganization necessary to co-ordinate and control the various operational agencies</u> which came under control of G-2 Division, Supreme Headquarters, Allied Expeditionary Force, brought several changes to the organization of the G-2 Division…. These changes occurred primarily in the field of technical intelligence.. Initially, the activities involving technical intelligence played a minor role in intelligence operations, but the experiences of Allied forces in Italy brought to light the need for agencies to examine and exploit the vast amount of enemy equipment and material, as well as enemy technical personnel, captured during combat operations in that country. Consequently, in the European Theater, The British and United States air, ground, and naval forces dispatched field investigative teams to examine and exploit these intelligence targets. In addition, the United States and Great Britain governmental departments or ministries dispatched investigative teams to cover intelligence targets of interest to their respective departments or ministries.

Coordination of the expanding set of theater and departmental/ministerial sponsored teams of technology specialists within the European Theater became a significant resource and control problem for SHAEF G-2. In response, SHAEF created a system of staff agencies to oversee and enable the activities of these teams. In July 1944, SHEAF Headquarters added a "T" subdivision (the "T" stood for "target") to its G-2 organization to be responsible for investigating and exploiting intelligence objectives and targets. This "T" subdivision was merged in February 1945 into a Special Sections Sub-

Division that combined the intelligence target coordination functions with coordination of matters related to Allied occupational commitments.

General Eisenhower's combined staff was anticipating this new source of information when on May 19 the Allied Expeditionary Force G-2 published its Intelligence Directive 9, providing guidance for acquisition of technical intelligence.[343] The directive was focused on ground forces and left to European Theater Naval and Air Force commanders the preparation of corresponding guidance in their areas of responsibility. However, it did include instructions to these services in defining areas of shared responsibility.

The intended functions of Technical Intelligence as described in SHAEF Intelligence Directive Number 9 were twofold:

- "To provide all Services and formations concerned with the capabilities, characteristics and methods of operation and neutralization of enemy equipment in use, or likely to be brought into use in the Theater of Operations.

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[343] SHAEF Intelligence Directive Number 9, Technical Intelligence. (SHAEF/2UX/INT), dated 19 May 1944. Records of the Supreme Headquarters Allied Expeditionary Force. Record Group 331, Entry 18a, Box 163. National Archives at College Park. The directive was signed by General Kenneth Strong's immediate predecessor, Major-General J.F.M. Whitely and authorized by Lieutenant General W.B. Smith, General Eisenhower's American AEF Chief of Staff. In the post war era, Smith was to become the fourth American Director of Central Intelligence, serving from October 1950 until he was replaced in February 1953 by Allen Dulles.

- "To provide higher authority with detailed technical reports and suitable specimens of enemy "new equipment" in order that the maximum exploitation of this type of intelligence may be achieved."[344]

These general functions were to be performed by Technical Intelligence Teams or sections within each of the three Army Groups in Europe, Montgomery's 21st, Bradley's 12th, and Devers' 6th. The teams and sections were to be attached to, or included in, the staffs of field headquarters and were to operate closely with these headquarters' intelligence staffs. The specialist technical intelligence personnel were to be in the combat zone only with the authority of the service headquarters, and the teams were to operate as self-contained units, with transportation support arranged with the "appropriate authorities."

Notification of captured equipment would flow through intelligence channels to the Teams and Sections. Captured heavy equipment was to be left in place until the Teams and Sections had inspected it, while lighter equipment could be moved to a safe location. In both cases, the capturing units were to protect the equipment and associated documents from tampering—presumably destructive souvenir hunting. SHAEF was to publish lists of equipment in which they were especially interested while other items were to have special handling arranged between the teams and sections and their services. Equipment required for evaluation by the U.K. War Office or the U.S. War Department was authorized for direct shipment, but only after approval by the SHAEF G-2.

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[344] SHAEF Intelligence Directive Number 9: 19 May 1944, as above. Paragraphs II. 5(a) &(b).

SHAEF G-2's Technical Intelligence Sub-section was to manage the specialized requirements imposed by higher headquarters, while the teams and subsections were to ensure that both the British and American armies had access to their data. They were also to maintain liaison with a range of intelligence-related units. In cases where more than one example of a piece of new equipment was available, the first example would go to the British and the second would go to the Americans, whose detailed exploitation capabilities were considerably farther away.

Each of the three Army Groups would be required to notify SHAEF, the Allied Expeditionary Air Force, and the Allied Expeditionary Naval forces of capture of equipment in their areas of technical interest. The SHAEF Intelligence Division (G-2) would receive copies of both reports and photographs. Technical reports required by other authorities were to be forwarded as specified by the concerned headquarters. Distribution of reports to the teams and sections was to be through either intelligence or service channels. SHAEF Technical Intelligence Bulletins intended for use directly by troops in Europe would be sent to Division-level headquarters.

Intelligence Directive Number 9 described the functions to be performed by the teams and sections in some detail but it was not specific about how their effort was to be made into an organizational system that identified requirements for information, assigned the requirements to specific organizations for action, and provided the means for physical and technical access. Such factors were clarified soon after the invasion in a new SHAEF Intelligence Directive Number 17 on 27 July. This combined British and American

guidance established the concept of "T Forces" within each of the three Army Groups

involved in the invasion of Europe from the west.[345]

Many of the specialist teams such as Manhattan Project's ALSOS mission, the

later von Kármán investigation for Army Air Force Chief Arnold, and dedicated CIOS

teams were created outside the European Theater and then assigned temporarily to duty

within the Theater. Organizations permanently assigned in Europe also made

contributions as the war progressed toward Allied victory. In the case of the V-1 and V-2

especially, the Army Ordnance technical services units in Europe were active participants

by early 1945.   The "U.S. Army in World War II" series' volume, *The Ordnance*

Department On Beachhead and Battlefront, describes the activities of Ordnance

Technical Intelligence Teams.[346]

American support and administrative units, while assigned under SHAEF, had an

independent command called the "Communications Zone" (or COMZ) in occupied

France that dealt with Army Service Forces support matters such as administration,

communications, supply, and transportation. The ordnance function was included in

COMZ organization and thus the Ordnance Technical Intelligence Teams were

subordinate to it, while attached to the numbered armies. As part of their function, these

teams were responsible for investigating and reporting on captured enemy equipment

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[345] This description of T Forces is based on a paper prepared for the Advanced Infantry Officers Course, 1948-1949 by Lt. Col. Harold C. Lyon titled "Operations of "T" Force, 12th Army Group, in the Liberation and Intelligence Exploitation of Paris, France, 25 August – 6 September 1944."   Colonel Lyon was the executive officer of the 12th Army Group's T Force in its formation and first operation. The paper records his first-hand experiences and observations and ends with his assessment of lessons learned from his experiences. A copy of this paper was acquired commercially from MilSpecManuals.com, on their CD # 005853.
[346] Lida Mayo. *The Ordnance Department: On Beachhead and Battlefront*. Washington, D.C.: Office of the Chief of Military History, United States Army, 1968. Pp. 348-349.

such as the V-1 and V-2. Conflicting responsibilities sometimes caused tension between

the various command elements and the specialized investigating units.   As Army

historian Lida Mayo describes it:

> When combat troops came across new German weapons, normally they reported them to the army Ordnance officer, who passed the information on to the Ordnance Technical Intelligence Teams. By February 1945 each army had such a team, consisting of four officers and from four to six enlisted men (most on temporary duty from Aberdeen Proving Ground), as well as technicians, a clerk, an interpreter, and a draftsman. Often corps or division commanders called on the teams for information on the characteristics and capabilities of new enemy equipment, and this knowledge was immensely helpful to the commanders in planning tactics and developing countermeasures….

> Behind the army teams were smaller teams attached to ADSEC **[Advance Section (on Continent)]** and CONAD **[Continental Advance Section]** and a 14-man COMZ team (5 officers, 9 enlisted men). All reported to COMZ Ordnance Section's Enemy Equipment Intelligence Branch, headed by Col. Holger N. Toftoy, which consisted of 12 officers, 17 enlisted men, and a civilian technician, and was organized into seven units: Special Advisors, Field Coordinators, Shipping and Requirements, Drafting, Library, Reports, and a staff unit composed of specialists on ammunition, small arms, and automotive, artillery, fire control, and underwater mine materiel….

> When the big push into Germany began, the armies advanced so rapidly that the tactical units did not have time to report new items; for this reason a good deal of enemy materiel was discovered by the men of the intelligence teams, who had a 'search list' supplied by EEIB's Shipping and Requirements Section. SHAEF had decreed that the first specimen of each item discovered be shipped to England, because the U.S. Army had no proving ground in Europe. The second specimen would be sent to Aberdeen Proving Ground. The EEIB men resented the arrangement but could do nothing about it, since higher authority refused to sanction the establishment of an American proving ground on the Continent….

> After the Rhine crossing, the teams were swamped. They had to investigate every lead, no matter how unprofitable; they had to explore huge installations, many of which were underground, and sometimes had to seek out the inventor of a new weapon in order to fill in the details; often they had to evacuate important items to safer areas. By mid-April [1945] the pressure on the army teams had become so great that most of the EEIB staff had to be sent forward to help them, and [European Theater of Operations Chief Ordnance Officer, Maj. Gen. Henry B.] Sayler was cabling home for twelve more officers and twenty-two more enlisted men. Items of the greatest importance for future Ordnance research had been discovered—V-1, V-2 and other types of rocket materiel; new artillery, such as the German 128-mm. gun mounted on a Russian carriage; and new ammunition like the 88-mm. incendiary shrapnel antiaircraft shell—and time was short. With inadequate means and manpower, Colonel Toftoy soon felt, as he reported to Paris, like 'mouse trying to chew down a huge oak tree.' His problems were increased rather than lessened with the arrival of the Combined Intelligence Objectives Subcommittee (CIOS) teams sent out by the Combined Chiefs of Staff early in 1945 because he had to furnish assistance to these groups. And the demands of field forces continued up to V-E Day [8 May 45]; for example, commanders were demanding identification photographs of Russian tanks in preparation for the meeting of the American and Soviet forces at the Elbe."

The Americans had partially prepared themselves to exploit what they believed to be the types of information that would become available to them when they directly faced the German forces. They created a set of organizational innovations in a complex structure that was intended to link Allied intelligence with European Theater military operators and U.S. and U.K. senior political decision makers. However, the innovations left open avenues of conflict that had continuing potential for blocking or distorting the production, distribution, and use of detailed knowledge of Germany's secret weapon capabilities and applications.

But this organizational innovation was not yet effective at quieting American broader speculation about the purpose of the secret weapon program being linked to delivery of weapons of mass destruction. As Goudsmit wrote:

> Hitler had boasted about secret weapons. What else could he have in mind but an atom bomb? We had obtained intelligence data on the V-1 and V-2. What final use could they be to the Germans unless they were meant to carry atomic explosives? Reconnaissance planes brought us pictures of mysterious installations along the coast of France. Might these not be bases for uranium piles to produce bombs or at least huge amounts of radioactive poisons? It was not surprising that our invasion troops were equipped with special detectors for radioactive materials. Fortunately they proved to be unnecessary.[347]

Shortly before the Invasion, photographic reconnaissance had identified 68 of the simplified "modified sites" for launching the flying bomb, most aimed at London. The photo interpreters found it confusing that the basic launch support structure had been created in France, but no operational activity could be seen. However, additional photography revealed that much of the needed material had been prefabricated and would be put in place only a short time before a flying bomb was to be launched. This

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[347] Goudsmit, 1947. Pp. 12-13.

information was given to the CROSSBOW Committee the day before D-Day. But, by this late date, immediate operational deployment concerns outweighed CROSSBOW collection requirements. It was not until June 11, 1944 that the CROSSBOW sorties were resumed—when new images showed nine operationally-ready sites that had not been previously seen. Babbington Smith says that the photo interpreters sent a "DIVER" alert signal at once. The flying bomb campaign began the following day.[348]

Evolving Improvements in Tactical Information and Strategic Countermeasures

As the Luftwaffe was making final preparations to launch its flying bomb campaign, there was still resistance in the British military to the possibility that attack on the English homeland was imminent. Air Commodore Pelly had been replaced as the U.K. Air Staff Director of Operations (Special Operations) and chairman of the JIC Crossbow subcommittee. According to Jones, his replacement, Air Commodore Grierson, was ready to accept the possibility that a handful of the original ski sites might still be operational. But his staff would not yet accept the possibility of a meaningful state of readiness of the more recently discovered modified sites. Jones attributes this to "watcher" fatigue from overwork. However, a Belgian agent report of June 10 described a wagon train passing through Ghent toward France with loads of "rockets." In addition, the poor flying weather that had nearly stopped the June 6 invasion continued up to June 11, when the RAF finally discovered considerable activity at several modified sites. The agent report and the new photography provided the basis for a last minute warning—the

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[348] Babbington-Smith, 1957. Pp. 232-233. "DIVER" was a code word used for messages concerning V-1 attacks. The corresponding code word to be used for V-2 activity was "BIG BEN."

"DIVER" message from the Photo Interpretation Unit. However, Lord Cherwell was hesitant to notify Churchill so that he could issue a civil defense warning. The first launchings were on the night of 12-13 June, the campaign increased tempo on June 15, and the civilian population of London assumed that the military had been surprised.[349]

As the first flying bombs landed on English soil a week after the invasion, bits and pieces of wreckage came into the Allies hands from the wreckage of exploded missiles. A more useful source turned out to be the A-4 test vehicle for an antiaircraft guidance system that went off-course and landed in Swedish territory on the night of 12-13 June mentioned by Huzel, above. The British Air Attaché in Stockholm sent a report and Swedish military photographs to London.

Jones sent two Air Technical Intelligence Officers to Sweden with a request that they be given access to the wreckage—as the U.K had received in the case of the earlier flying bomb landing on Bornholm Island on August 22, 1943. Access was approved and the officers' report again contained speculation that the amount of electronic control equipment on the rocket would only "be justified if the warhead were to weigh at least ten thousand pounds."   This speculation was circulated to a large audience and tended to reinforce the opinion of those experts whose interpretations of the available evidence would allow use of a large nuclear payload or some other weapon of mass destruction.

Jones convinced Air Staff head Portal to negotiate a trade with the Swedes for access to U.K. evaluation of the wreckage, along with selected military hardware. The

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[349] Jones: 1978, Pp. 417-418.

Swedes accepted the offer and the material arrived in late July for evaluation at Royal

Aircraft Establishment Farnborough.[350]

Jones' description of this operation suggests it was exclusively a British affair.

Thomas Dixon shows that the Americans were aware of it almost from the beginning:

> The break came a week after the invasion, although I did not hear about it until the latter part of June. It was then that I saw an intelligence report stating that on June 13, 1944, a large rocket had crashed near Kalmar in southeastern Sweden; that the rocket must have been German; that the Swedes were furious but had agreed to let a team from the British War Office come to Sweden, collect the fragments, and bring them back to England. This team, headed by Sir Alwyn Crow, had flown to Sweden in an American Air Force C-47 Dakota and was busy collecting the fragments—no small job, since they were scattered over some 60 miles….[351]

As important as this information would prove to be, Allied intelligence quickly

began to reap a harvest of information from other newly available sources such as

increased prisoner-of-war interrogation, captured documents, and physical access to

former military positions and facilities. Much of this information was related to the

flying bomb sites and the never-operational "V-3" long range cannon emplacement at

Mimoyecques. The invasion force had forced the Germans to move the A-4 launching

area north. While the V-2 had never been deployed to France, the newer information

sources provided useful information to understanding how the Germans had intended to

employ this weapon when it finally became operational. For example, a German POW

with direct access to the information told the British about criteria for site selection and

construction. The British then were able to find an example of the planned but never

used V-2 launching positions in an area the Allies controlled near Bayeux, half way

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[350] Jones, 1978. Pp. 431-432, 443.

[351] Dixon, 1963. P. 47.

between Caen and the base of the Cherbourg Peninsula. Jones recognized the layout from earlier photography of Peenemünde.[352]

While the intelligence picture was improving by the middle of June, a number of difficulties in acquiring useful information remained to be resolved. Jones cites an example of hesitant operational acceptance of good information. American Air Force Intelligence reported another example involving questionable information being provided from diplomatic communication intercept. A third example shows the blocking of information by unnecessarily restrictive security procedures.

In the first case, Dr. Jones' staff had revised an earlier estimate of flying bomb operational altitude and forwarded this through normal military channels. It never reached the Commander-in-Chief. In practice, the flying bomb's operational altitude was too high to be reached by light antiaircraft artillery and too low to be tracked by the heavier mobile guns. Jones suspects that the revision never reached the Commander-in-Chief because it entered the bureaucratic chain at too low a level to stimulate emergency modification of existing defense plans.[353]

In the second case, an Army Air Force after-action evaluation of ULTRA Sigint describes the confusion that could arise from a communication to Tokyo by the Japanese consul general in Vienna that was inaccurate because of the limited understanding of the sender. In making the judgment of inaccurate information in the intercepted consul general's report, its authors say that it:

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[352] Jones: 1978, Pp. 432-433.
[353] Jones: 1978, Pp. 418-419.

> ...is illustrative of intelligence from diplomatic sources. There is part truth in all of it and exact truth in none. The Japanese were often confused by the number and variety of German secret weapons, as, to be fair, was Allied Intelligence. It will be recollected that the Germans had begun the V-1 flying bomb attacks against England on the 12th with a tentative few and were to initiate intensive and continuous operations with this weapon on the 16th. The A-4 rocket, on the contrary, was not identified with certainty in use against England until September.[354]

It is important, however, to recognize that problems with intercepted communications such as that mentioned by the USSTAF depended on such factors as who was originating the message and what other information was available to provide detail, context, and perspective. In a similar case, the British official history describes an intercepted cable of August 14 from the Japanese Ambassador in Venice in which he accurately reported to Tokyo that German Foreign Minister Ribbentrop "told the Italian Vice-Minister of Foreign Affairs on 20 July that the V2 would shortly be brought into use on the western front." This, combined with operational information obtained from a German General POW, was briefed to the CROSSBOW Committee on August 25 and it gave credible warning that the rocket campaign would start in mid-September.[355]

Internal secrecy rules could hinder the passage of information, as demonstrated in a third example taken from the memoirs of General Eisenhower's SHAEF G-2, General Strong. He says that, at least initially, he was isolated by security restrictions from information on the V- weapons, despite his senior position in the Combined Intelligence structure:

> ...I knew nothing more about them...because of a stupid rule which confined the knowledge of the weapons to a small and restricted circle. It was not until later that I was

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[354] U.S. Army Air Force. *ULTRA and the History of the United States Strategic Air Force in Europe vs. the German Air Force*. Frederick, Maryland: University Publications of America, 1980. P. 114. This is a commercial reproduction of an official Air Force report published on 24 September 1945.
[355] Hinsley, et. al.: 1988, Volume 3, Part 2, P. 559-560.

given enough information to enable me to reach an independent judgment on certain aspects of their dangers and potentialities. Meanwhile, as a result of my ignorance, I was led on more than one occasion into giving inadequate advice to my colleagues. I find it difficult to excuse such a maladroit application of security rules.[356]

Despite such problems, information on the German operational use of the flying bomb was now beginning to flow more freely within Allied intelligence channels. On June 19, OSS Director Donovan sent a memorandum to President Roosevelt addressing a number of questions about the recent V-1 campaign. This information was in response to a request sent to OSS London. London's report contained information gathered in the first week after the V-1 bombardment began, and it contains more detail and a broader perspective than demonstrated in OSS R&A's report just six months earlier. It also demonstrates the perceived importance placed on any indications found that could associate the flying bomb or long-range rocket with nuclear payloads. In this case, none were revealed:

> With regard to timing or good military judgment of launching PAC it must be taken into consideration that our previous bombing necessitated entire change of method in launching these craft.
>
> No evidence yet of special explosive. Warhead is thin cased HE 1000 KG bomb. Time interval depends on facilities at each site. Therefore cannot state as yet any definite time intervals. No evidence of any sort of contagion near place where PAC hit.
>
> PAC are robot compass controlled, compass set prior to launching. No change in flight possible. PAC show up on radar.
>
> From 1130 17 June to 0540 18 June 138 PAC launched. 94 made landfall, 52 landed greater London area, 30 landed outside, rest undiscovered up to present time, 5 destroyed by fighters. No report as yet of results obtained past night by A.A. Between 0540 and 0900 18 June 15 more launched. Photo reconnaissance shows two new sites ready between Somme and Seine, three new sites in Pas de Calais area. Germans working feverishly to get old sites in commission.[357]

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[356] Major-General Sir Kenneth Strong. *Intelligence at the Top: The Recollections of an Intelligence Officer.* Garden City, New York: Doubleday & Company, Inc., 1969. Pp. 176-177.

[357] Memorandum for the President from William J. Donovan, no subject, 19 June 1944. Records of the Office of Strategic Services 1940-1946. Record Group 226, OSS Microfilm Collection, Reel 23, Frames 925-926. The abbreviation "PAC" stands for pilotless aircraft, while "HE" stands for high explosive.

One approach to resolving such issues within the U.K. structure was the establishment on June 19 of another British CROSSBOW Committee, this one directly answering to the War Cabinet. It paralleled the existing JIC subcommittee of the same name, but operated at a higher level of authority. Jones says this committee was to report on both the secret weapons and proposed countermeasures to them. Churchill made Duncan Sandys the committee's chairman, with members that included Jones as well as "the Commanders-in-Chief of the appropriate Commands and various senior serving officers and scientists…."[358]

Apart from the increased bombing of flying bomb launch sites, another countermeasure quickly applied to the V-1 problem was a product of British counterintelligence double agents and Sir John Masterman's Double Cross (XX) deception committee. As Masterman describes the complexity of this type of operation, it was intended to fool the German flying bomb commanders into believing that many of their weapons that were hitting where they were supposed to were flying beyond their targets. It was calculated by the British that the Germans would reduce the range settings, thereby causing the weapon to fall short of their intended targets. Presumably this would move them from the densely populated area around London to less populated areas of the southeastern countryside:

> Early in June the first flying bombs (V-1) arrived and the agents were soon asked to
> report upon them in detail. Here at once an opportunity for deception presented itself.
> However the flying bombs were worked, it was clear that the Germans could only correct
> their aim and secure results by adjustments based on experiment, and that their data must
> rest in the main upon reports from this country. The agents could not fail to report on

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[358] Jones, 1978. P. 425.

incidents which occurred under their noses, and which were common knowledge in England. If, for example, St. Paul's was hit, it was useless and harmful to report that the bomb had descended upon a cinema in Islington, since news of the truth would inevitably get through to Germany in a short space of time. (fn: At a later stage great danger was caused to our deception by the publication in the evening papers of maps showing the fall of bombs in various London boroughs.) In other words, it was necessary to decide what measure of useful deception was possible without blowing the agents.

It was soon realized that widely scattered though they were, the majority of the bombs were falling two or three miles short of Trafalgar Square, and the general plan of deception soon took shape. It was, in brief, to attempt to induce the Germans still further to shorten their range by exaggerating the number of those bombs which fell to the north and west of London and keeping silent, when possible, about those in the south and east. The general effect would be that the Germans would suppose that they tended to overshoot and would therefore shorten their range, whereas in fact they already tended to undershoot. The danger was that we could not be sure that the Germans had not a method of themselves accurately locating the fall of bombs, and this compelled caution on our side.

The Chiefs of Staff approved the proposed deception policy but some civilian departments raised objections and a considerable controversy arose which hampered our plans. Briefly, the Chiefs of Staff took the hard-headed view that, since the bombs must fall somewhere if not shot down *en route*, it was best to divert them as much as possible from the most thickly populated area; unfortunately the Cabinet took the view that 'it would be a serious matter to assume any direct degree of responsibility for action which would affect the areas against which flying bombs were aimed,' and consequently rejected the plan. The Chiefs of Staff, however, resubmitted the proposal and eventually in mid-August we secured, though in somewhat grudging terms, the directive which we required. We were to 'continue to convey to the enemy information which will confirm his belief that he has no need to lengthen his range…and within limits to take such steps as [we might] judge to intensify this belief.'

Another factor arrested our operations. We received a steady stream of information passed to the enemy by uncontrolled sources, mainly OSTRO. Although the information was almost entirely false, it was believed by the Germans, and we therefore plotted all this material graphically in order to arrive at a mean point of impact (M.P.I.). We then passed across such information as was necessary to correct the inferences from OSTRO's material and bring the overall M.P.I. to the desired point.[359]

R.V. Jones places himself near the center of planning for this deception effort and says that he worked directly with the deception planner "George" who had earlier (1943) assisted Commander Ewen Montagu in overseeing OPERATION MINCEMEAT:

It immediately occurred to me that photographic reconnaissance could only reveal the points of impact, and not the times. Moreover, I knew from previous experience that while agents could usually define the place of an incident fairly well, they were likely to be wrong in other details, even the time.

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[359] Masterman, 1972. Pp. 179-180.

I had noticed that in the Peenemünde trials the bombs for the first 24 hours…that the operational bombs were also tending to fall short, the centre of gravity being in south-east London, near Dulwich. In a flash I saw that we might be able to keep the bombs falling short, which would mean fewer casualties in London as a whole, and at the same time avoid arousing any suspicions regarding the genuineness of the agents.

We could give correct points of impact for bombs that tended to have longer range than usual, but couple these with times of bombs which in fact had fallen short. Thus, if the Germans attempted any correlation, they might be led to think that even the bombs which they had reason to believe might have fallen short were instead tending to fall in north-west London. Therefore, if they made any correction at all, it would be to reduce the average range….

As I recommended this course of action to 'George,' I realized well that what I was doing was trying to keep the mean point of impact in the Dulwich area, where my own parents lived and where, of course, my old school was. But I knew that neither my parents nor the school would have had it otherwise. 'George' said that he would adopt the plan, and we waited to see what would happen. Somehow, though, the dilemma got out, and it was discussed at the political level, with Duncan Sandys now back in the picture. Both he and Lindemann supported the policy which we had already put into effect, but it was opposed by Herbert Morrison, whose constituency was a nearby one, Lambeth, and who seemed to think that the attempt to keep the aiming point short was an effort by Government officials and others in Westminister, Belgravia, and Mayfair, to keep the bombs off themselves at the expense of the proletariat in south London.[360]

At the time in late June and early July that Hitler was curtailing other weapon production in favor of the V-1 and Dornberger was fighting his bureaucratic battles with the Army Weapons Department and General Kammler for control of the A-4 program, the Soviet Army was advancing west. This opened up another possible Allied intelligence source: direct exploitation of the southeast Poland Heidelager testing area at Blizna, once it was captured. Photographic reconnaissance of Blizna continued to reveal detail, but it was sometimes still subject to speculative error by photo analysts who had pictorial evidence but not the depth of knowledge or context held by senior advisers and decision makers. Polish underground workers had stepped up their wrecked A-4 salvaging efforts, but did not all have the knowledge to determine what was important

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[360] Jones, 1978. Pp. 420-421. For the deception operator's perspective, see also: Ewen Montagu. *Beyond Top Secret Ultra.* New York: Coward, McCann & Geoghegan, Inc., 1977 (First American edition 1978), Pp. 157-161.

and what was not. However, some members of the Polish underground were technically trained. They were identifying rocket chemical components such as concentrated hydrogen peroxide, as well as being able to make a preliminary estimate of the size of the rocket as about 40 feet long by 6 feet in diameter and to confirm the size of the main jet as coinciding with what was being reported by cable about the Swedish vehicle wreckage. The Poles offered to send the original material supporting these conclusions through their liaison in London.[361]

Nonetheless, the aerial photography and the Polish underground operations were extremely valuable to the western Allies. But because of the sensitivity and complexity of a third source, the direct inspection of Blizna by representatives of the western Allies, it will be treated separately below as an example of the occasionally difficult relationship between goals and political problems of the leadership of the western Allies and the Soviet Union, who sometimes acted more as a difficult associate than a friendly ally. The series of incidents at Blizna in July through September, for example, presages the type of tensions that would later develop into the Cold War and are discussed in the next chapter.

Changes continued to be made in Britain's intelligence and secret weapons countermeasures structure. In early July, the senior British Air Staff intelligence officer, Frank Inglis, decided to replace the second Air Staff Director of Operations (Special Operations) Air Commodore Grierson. As Jones describes it, Grierson had no experience and would be moved to a position more suited to his experience. Jones was assigned to take over the Air Staff intelligence responsibilities concerning Germany's secret weapon retaliation campaign, effective July 6. According to Jones he moved to include American

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[361] Jones: 1978, P. 432.

air officers more fully by hiring former OSRD representative and SHAEF Scientific

Adviser Dr. Robinson as his deputy. He also hired Matthew Pryor from the BritishWar

Office to ensure that Jones' part of the U.K. Air Intelligence structure was paying

adequate attention to the rocket threat, given pressure to focus on the flying bomb. Jones

says Pryor was given "particular responsibility for studying the military organization

associated with the rocket while I took responsibility for the technical details."[362]

As Jones was establishing his Air Staff team, the British Chiefs of Staff

Committee was wrestling with the question of another possible countermeasure: bombing

reprisals for the V-1 attacks on England's civilian population. At the direction of the

Chiefs of Staff, a meeting was held at the air ministry on July 5 to examine options for

reprisal bombing of German cities. A minute of the meeting prepared by a Foreign Office

representative notes that the consensus was not to provoke escalation by directing

reprisals that would be of uncertain effectiveness in deterring further German action. The

Foreign Office concurred in the draft report and its recommendation to the Chiefs of Staff

Committee. However, the draft proposal went as far as compiling a list of German towns

of approximately the equivalent size and importance as those English towns struck by V-

1s. The draft's conclusion drew attention to the uncertain effect of bombing raids on

civilians, the diversion from military missions of bombing resources that would result,

and to the possible political difficulties of pursuing such an option. Based on these

considerations, the Air Staff recommended to the Chiefs of Staff Committee that a policy

of reprisals not be adopted.[363]

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[362] Jones, 1978. Pp. 425-426.
[363] UK National Archives On Line Service, Catalogue Reference:FO/954/32C, Image Reference:54.

New information continued to come in about the V-weapons from American sources, as well. For example, OSS Director Donovan sent a memoranda to President Roosevelt and General Arnold that informed them of information provided by Dulles' well-placed agent in the German Foreign Ministry, Fritz Kolb. In Dulles' cable to Donovan on July 6, he says "George Wood" identified V-1 component manufacturers, possible V-1 arrangement for radio control in some V-1s, German interest in first-hand observations of the damage resulting from V-1 attacks, and some preliminary information on the V-2.[364] This material formed the basis of Donovan's July 10 report to Roosevelt and Arnold.[365]

However, the value of such information to either ally depended critically on who was interpreting it. By mid-July Jones was complaining about the reappearance of Sandys' experts from the old BODYLINE investigation to support the new War Cabinet CROSSBOW Committee. Jones considered these experts to be well intentioned but ill informed.

Nonetheless, Inglis directed Jones to write a summary of knowledge of the V-2 for the CROSSBOW Committee. This was delivered on July 16, with the protest that the uncertainty of much of the information made firm conclusions premature. Two days later, the British officers, Burder and Wilkinson, had returned from their trip to Sweden, and with their information Jones and his staff were able to infer that one of the A-4 propulsion fuels was likely liquid oxygen rather than hydrogen peroxide. This supported

[364] Petersen, Editor, 1996, P. 321
[365] Memorandum for the President from William J. Donovan, no subject, 10 July 1944. Records of the Office of Strategic Services 1940 1946. Record Group 226, OSS microfilm collection at Roll 24, frames 83-84. National Archives at College Park, MD. The nearly identical version sent to General Arnold is in the NARA OSS microfilm collection at roll 20, frames 652-653.

an estimate of a lighter V-2 warhead than that included, prematurely, in his Inglis-directed July 16 report.[366]

While R.V. Jones had no hard evidence of A-4/V-2 activity at Heidelager, by mid-June, he was receiving puzzling Sigint intercepts talking about material being returned from Poland to Peenemünde. There was no specific information in the intercepted messages identifying what returned items were. Jones speculated that the message references could be to rockets, but he had no new aerial photography to work with. He infered that the Germans had built Heidelager sufficiently large to support testing of both the flying bomb and the long-range rocket, even though he had only seen evidence of the former. He then went back to photography from May 5 and did a thorough re-search. He says that in this process he recognized a pattern that he had seen before in photos from Peenemünde. On two separate photos he could identify a faint image of an A-4.

He notified his staff and Lord Cherwell, but he could not identify any of the gun-type launchers anticipated by Sandys' experts They had assumed that the launch support tower at Peenemünde—a primitive version of what would become a commonly recognized structure at Cape Canaveral—was such a device. There was no such tower at Heidelager. In Jones' telling of the story, this was a major breakthrough because it called into question the experts' assessment that a launch ramp of some sort was required. On taking yet another look at the earlier pictures, he found a flat pad from which a rocket could be launched vertically. The elaborate launcher expected wasn't necessary. This interpretation was consistent with earlier piecemeal Sigint indications of stabilizing

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[366] Jones, 1978. Pp. 434-435.

gyroscopes and deflectable jet rudders. Based on this interpretation, Jones compared the intercepted serial numbers from the items returned to Peenemünde and calculated that at least a thousand rockets had already been produced.[367]

On July 18, Jones was called to present a summary of the current intelligence at a meeting of the Cabinet-level CROSSBOW Committee in the Prime Minister's office. According to Jones, Churchill was in a combative mood and questioned all the evidence that Jones presented about the flying bomb and the V-2. On this occasion, Jones was speaking as a representative of the Air Staff. His two former bosses, Pelly and Grierson attended, Pelly as the Chief Intelligence Officer of the Allied Expeditionary Air Force, and Grierson in his role of overseeing countermeasures.

A main point of contention was the conclusion Jones had just drawn about the probable existence of 1000 operational long-range rockets. Churchill attacked with the possibility that intelligence had been caught napping. Jones parried with the observation that it was the Prime Minister who had ordered before D-Day that all requirements conflicts between intelligence to support offensive or defensive actions should be made in favor of the offensive. This had been done, but not at the expense of searching for answers to the V-2 question. And the important information about V-2 vertical launch position and the likelihood of 1000 operational rockets had just been derived from review of earlier imagery of Blizna. Chief of the Air Staff Portal supported Jones, and the Prime Minister moved on to other questions.

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[367] Jones: 1978, Pp. 435-437.

One aftereffect of this meeting was an increase in tension between Douglas Kendall, a Chief Photo Interpreter at Medmenham, and Jones. Kendall wrote a letter to Air Staff intelligence chief Inglis in which he called Jones an "amateur interpreter." He said Jones should have coordinated his conclusions with the professional interpreters before talking about them with the Prime Minister and the CROSSBOW Committee. Jones, as the senior Air Staff analyst on the secret weapon subject felt within his purview in taking the actions he did. He proposed to Inglis to simply acknowledge receipt of Kendall's letter, but that "in the interest of good relations" Jones would not respond directly to Kendall.[368] Here was another budding knowledge transfer difficulty. Increasing the complexity of the information provided by new technical collection systems was simultaneously building boundaries between parts of the intelligence bureaucracy, with each portion believing that it had proprietary interest in controlling distribution of the knowledge product.

Intelligence Sharing between the Western Allies

Organization of appropriate secret weapon intelligence distribution was becoming an increasingly important issue between the Americans and the British by mid-July. In his discussion of U.S. Air Force intelligence in WW II Europe, Robert C. Ehrhart describes American modifications to the CROSSBOW committee system proposed by the U.S Strategic Air Force. As mentioned above, in a January interview in Secretary Stimson's office Dr. E. L. Bowles had pointedly criticized Lord Cherwell's negative

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[368] Jones: 1978, Pp. 437-439, 450-451.

effect on the British approach to secret weapon countermeasures. By mid-July, American

air intelligence officers in Europe were just as dissatisfied with the "impractical

applications of security" described by SHEAF G-2 Strong, and with the perceived failure

of the British to keep their American Allies informed. The American position was

summarized in a July 16 letter to British Assistant Chief of the Air Staff (Intelligence),

Inglis from General George C. McDonald, Director of Intelligence for U.S. Strategic Air

Forces in Europe, which said, in part: "Frankly, I do not believe that anything less than a

joint and balanced Anglo-American CROSSBOW Committee, formed exclusively from

representatives of the Air Staff and USSTAF…will answer the requirement."[369]

This recommendation was accepted. But, from the American perspective it added

another dissemination problem: understanding who in the British and Allied staffs should

be receiving American produced CROSSBOW intelligence. There was a confusing array

of offices that wanted such information, including several with the word "CROSSBOW"

in their titles.

An example from OSS records in the National Archives provides a summary of

the complexity of that problem. On August 11, Philip Horton, the chief of OSS London's

Reports Division wrote an unofficial memorandum to Colonel John Haskell, chief of

OSS London's Secret Intelligence (SI) Branch on determining a best channel for

providing OSS-produced CROSSBOW reports to American and Allied organizations.

This memorandum was intended to "be used for information purposes only" as its

contents were supplied by Colonel Stuart McClintic (misspelled "McClintock" in some

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[369] Robert C. Ehrhart. "The European Theater of Operations" in John F. Kreis, General Editor, *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*. Washington, D.C.: Government Printing Office for the Air Force History and Museums Program, Bolling Air Force Base, 1996. P. 222.

British documents), an American liaison officer, who was the Executive Officer to an intelligence section chief in the U.K's Air Ministry. Colonel McClintic was the designated point of contact for CROSSBOW in the Air Ministry, and he "maintained close contact with Colonel O'Meara at USSTAF who has been designated specialist in CROSSBOW material" at US Strategic Air Force Headquarters. (Colonel O'Meara was also an American participant in the August-September Allied mission to inspect the captured Heidelager facility at Blizna.)

Colonel McClintic's conclusion was that the most efficient way for OSS to get American intelligence to the CROSSBOW decision makers would be to pass it through Colonel. O'Meara at USSTAF to Colonel.McClintic's office in Air Ministry Intelligence,and thus to the Joint Crossbow Committee. This, he says, is the most important of the several related committees.

The attachment to Philip Horton's memorandum lists nine committees and agencies that were receiving CROSSBOW material. It has interesting notes that it might not be a good idea to send material directly to Duncan Sandys Cabinet level organization, the Joint CROSSBOW Committee represented Allied strategic bombing units but not the tactical units, and the CROSSBOW working committee had joint U.K. and U.S. direction from Drs. Jones and Robertson:

> A.D.G.B – This group deals with the defense of the Island but all data concerning new developments are passed on to this body by Crossbow Committee.
>
> Cabinet Crossbow Committee – Duncan Sandys.   Probably best not to send OSS material direct to this body.
>
> Joint Crossbow Committee – Made up of Air Ministry, USSTAF and Operations personnel of Bomber Command and Eighth Air Force. (Not included are AEAF, the Ninth Air Force and 2nd TAF.) [NOTE: Emphasized by a pencil double slash in the margin of the original.]

266

Crossbow Working Committee – Dr. Robertson (American), Dr. Jones (British). Composed of all divisions of Air Ministry and certain USSTAF with Rostow as Secretary. All OSS material come to Broadway, then distributed to the Air Ministry.

Widewing USSTAF – OSS material direct to A-2 Section. Used with dispatch but no operations are directly affected by it.

Technical Staff (Air Technical Research – This staff is used to examine captured sites. Your material may be of advantage as it contains background material, however of no operational importance.

G-2 ETOUSA – My guess is they read and file and occasionally pass on to Air Ministry likely items.

Civilian Specialist Committee – This Committee has been established at the request of the Prime Minister. It deals with technical developments and counter measures.

A.I.2(g) and USSTAF Technical Groups – Both these bodies from ground information, fragments of flying bombs, etc. endeavor to put together pieces to see how and why new weapons work.[370]

The first meeting of a combined Anglo-American CROSSBOW Committee—as proposed by the Americans—was held on July 21, a day after the German attempt to assassinate Hitler. Historian Earhart's description of this meeting includes the observation that the American Strategic Air Force prepared a paper dated July 16 that admitted "they were as yet unable to fully evaluate the impact of air strikes against handling and storage areas, but it suggested that 'strategic attacks on the basic industries producing components' appeared more effective than attacks on the launch sites. By the end of July, this committee was recommending that target priorities for CROSSBOW V-1 targets be changed from launchers in the region of the Channel Coast to supply depots, special fuel dumps, and estimated factories in France, Belgium, and Germany. To some

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[370] Memorandum, Philip Horton to Colonel John Haskell, Subject: Committees and Agencies Receiving Crossbow Material, dated 11 August 1944. Records of the Office of Strategic Services 1940-1946. Record Group 226, 190/8/24/3. National Archives at College Park, MD. The abbreviation A.D.G.B. was a military command, titled Air Defence of Great Britain, which directed the operations of bombers, fighters, guns, and searchlights.)

extent, this effort to change the committee focus and priorities was made moot by the movement of Allied ground forces into northern France and the Netherlands in August. The U.S. Eighth Air Force flew its last CROSSBOW-related mission on August 30, 1944.[371]

Increasing Detail on A-4 Characteristics

Attention was not just given to the V-1, although this was its main focus while the flying bombs were being launched against England. On July 25, there was a cabinet-level CROSSBOW meeting at which a primary agenda item was the conflicting estimates of rocket weight. Sandys' experts asserted that the recent intelligence was confirming their previous relatively high figures of about 32 tons . Jones disagreed and said his calculations suggested that a more accurate figure would be less than 20 tons. One possible source of a more accurate figure might come from inspection of Blizna, which Jones had proposed shortly before through Air Staff channels. At this point, Churchill acknowledged his correspondence with Stalin on the subject (discussed below.) He said that he had received "a very civil reply from Mr. Stalin" that implied the possibility of cooperative eastern and western Allies' exploitation of the former German test and training area.[372] Up to this point, the Soviet Union had not played a part in the western Allies' secret weapons investigation.

As July came to a close, the Soviet Army was closing in on eastern Poland and the German rocket troops made their westward withdrawal from Heidelager to the

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[371] Ehrhart, in Kreis:1996. Pp. 222-223.
[372] Jones: 1978, Pp. 440-442.

Heidekraut location between Danzig and the German border.[373] The British War Cabinet

at that time was becoming more concerned about the threat of a rocket attack in addition

to the German's V-1 campaign.

According to Babbington-Smith, this concern reinvigorated the photographic

analysis unit's interest in the V-2, especially related to the method of rocket launching.

One line of effort was to re-look at the old photography of Peenemünde. On the

northeast corner of the island, near Test Stand VII, the interpreters realized that the

German man-made projection into the Baltic ("Test Stand X") had been covered with

asphalt and that what they had earlier identified as 40 foot columns were in reality

rockets in position for vertical launch. The earlier assumptions that a large rocket would

need either a rail-served launching ramp or would be projected from some sort of large

gun were in error. Any hard flat surface might be adequate. [374]

By this time, Jones says he was tiring of Duncan Sandys' experts complaining to

the Air Staff and he was considering resigning. Chief of U.K. Air Staff Intelligence

Inglis, instead, decided to remove Jones from the responsibility for V-1 and V-2

intelligence on July 27 and transfer that responsibility to one of his Directors of

Intelligence. Jones did not resign, but continued his work at the Secret Intelligence

Service headquarters.[375]

During this last week in July, the V-2 wreckage from Sweden and the components

captured by the Polish underground arrived in England nearly simultaneously. American

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[373] Dornberger: 1952, 1954, P. 227.
[374] Babbington-Smith, 1957. Pp. 234-236.

[375] Jones: 1978,   Pp. 442-443.

naval rocket expert Thomas Dixon says that the material "assumed a new order of importance in our eyes." [376] Dixon was sent on temporary duty to England in August and September to be a part of the material exploitation team that he calls Project Big Ben. (BIG BEN was the code name for the V-2 that corresponded to DIVER for the V-1) Dixon's observations provide a sense of the complexities of reconstructing a weapon for wrecked parts:

> I arrived in England in the latter part of August and was sent on to Farnborough, the British aircraft flight-test establishment. Then began a most interesting assignment. Inside the buildings at Farnborough were the hundreds of V-2 fragments collected in Sweden. They were strewn all over the floor—pumps, thrust chambers, nozzles, valves, controls, sections of the missile. Like other members of Project Big Ben, I was amazed at the complexity of such a missile. At that time the largest missile under development in the United States was the Corporal, a rather short-range battlefield missile with about 20,000 pounds of thrust. The Project Big Ben team consisted of members from the U.S. Army Air Force and from the British Ministry of Supply. Most of the people had had experience in rockets, but not ones of this size.

> Still, we felt, a man who had designed fighter planes could at least understand the design of a bomber, even if he had never built one. So, using wires and supports, we began putting together our reconstruction of this mystery bird that had flown into Sweden. Day and night we pieced together the parts. Some of the systems were so different to our experience or so complex in design that at times we felt like we were putting together a huge, three-dimensional jigsaw puzzle, with only faint clues and hunches as to which pieces fitted where.

> In a day or two, though, some signs of order began to appear in the chaos of fragments, and some hard facts began to emerge. One important fact came to us quite early—and through our noses. When we gathered together the fragments of the tanks, I was assailed by an old odor with which I was very familiar—the odor of alcohol. We immediately agreed that alcohol must be the fuel.

> By spreading out the assembled fragments on our wires and supports, we finally began to see the length of the missile and the configuration. The rocket scaled out about 46 feet long and appeared to weigh something less than14 tons when fueled. Measuring the size of the warhead compartment, we calculated for a standard explosive and estimated that the warhead could go up to two tons.

> By the end of the first week in September 1944, working at it night and day, we had come up with most of our important technical conclusions about the V-2. Through the size of the pumps and pipelines, we calculated the engine thrust and the chamber pressure. The design of the valves and pipes told us that liquid oxygen must be the oxidizer used with the alcohol propellant.

> With this in mind, we laid out the missile. We sized the thrust and the specific impulse from the data acquired in the early days of Goddard's work and that of the Jet Propulsion

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[376] Dixon, 1963. P. 48.

Lab and Cal Tech. After we had pieced the tanks together as best we could, we estimated their size. This fuel capacity we then converted into an estimate of the duration of the rocket, using the necessary standard equations that we thought proper for the design. Figuring the weight of the rocket from our previous work on the various components, we calculated the V-2's range with a warhead. This was most important for us, for this would tell us at least the circular areas in which the launching sites would have to be located. We calculated the range of the V-2 to be 175-200 miles.

Immediately Project Big Ben notified the Eighth Air Force and the RAF of the findings on the range of the V-2. The rather random search that had been underway for the launching sites was quickly narrowed down to eastern France, eastern Belgium, and Holland.[377]

The BIG BEN weight and range calculations from the Swedish and Polish material were not available to British and American intelligence until early September 1944. In July and August, a great deal of haggling continued within Whitehall over the figures and the assumptions that went into them. According to Jones, U.K. Home Secretary Herbert Morrison "was near panic" and on July 27 was pushing the cabinet for a plan to evacuate London in the face of the perceived threat. In Jones' opinion, however, estimates of warhead weight were becoming realistic—he says he had convinced Lord Cherwell that the accurate figure was closer to one ton. He observes that the scientific experts who argued for a heavier estimate of five to seven tons that were driving Home Office concern had no practical rocket building experience. Jones also reports having found a full-scale wooden training dummy at a storage site captured near Caen to fit with a number of ground support vehicles, and thus provided a clear description of missile size.[378]

In early August, as the new civilian Siemens general manager of the development plant at Peenemünde took over his duties, and as General Kammler was given

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[377] Dixon, 1963. Pp. 48-49.
[378] Jones: 1978. Pp. 445-447.

supervision authority of the overall A-4 program, Jones was reviewing all available evidence about V-2 weight. He says that he developed a most likely figure based primarily on agent reporting and prisoner-of-war interrogation. Based on Peenemünde/Blizna ULTRA SIGINT reporting, he resolved other conflicting figures by using only reports that mentioned liquid air or liquid oxygen as a fuel component. This reduced the large number of reports to five. From these and SIGINT mention of a one-ton component referred to as an "elephant," Jones arrived at a rocket weight of 12 tons and a one ton warhead. Assuming the other fuel component was something such as alcohol, he estimated total fuel weight as around 8 tons. He reported these figures at a Prime Minister's CROSSBOW Committee meeting on August 10. Preliminary reports by the Farnborough team looking at the Swedish wreckage confirmed Jones' warhead weight estimate. His results were reviewed at the request of the Air Ministry Science Adviser Sir George Thomas by Walt Rostow, American economic historian and wartime OSS officer in London. Rostow concurred with Jones' calculations.[379]

While the American 8th Air Force bombed Peenemünde until August 25, it continued its conventional attacks on flying bomb sites along the French coast. New techniques of bombing were being developed. One that was especially created to destroy the "large site" bunkers had a short, unsuccessful, and even notorious career. Project APHRODITE and its naval parallel, Project ANVIL, used worn out Air Force B-17 and specially designated new Navy PB4Y (the Navy's version of the Air Force's B-24) aircraft loaded with high explosives as non-piloted cruise missiles. In the case of both types of aircraft, a pilot and a flight engineer would fly the aircraft during takeoff, arm

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[379] Jones: 1978, Pp. 447-450.

the explosive charge, and bail out before crossing the Channel. A "mother ship" flying a

parallel course would then take control of the attack aircraft with a radio link to its

autopilot. Using a television camera in the bomb aircraft nose, a controller was to fly it

directly into the target and detonate the explosive. B-17 attacks were made on the "large

sites" at Mimoyecques, Siracourt, Watten and Wizernes on August 4 and 6 with little

damage to the intended targets, many aircraft guidance system malfunctions, and a high

rate of crew fatalities.

The most notorious incident in APHRODITE's short history was an attempted

Navy PB4Y attack August 12 on the long-range guns being built at Mimoyecques, in

which Navy Lieutenant Joe Kennedy (older brother of the future president) and his flight

engineer were killed. This apparently happened because of a malfunction when they tried

to arm the explosive and it blew up. This incident was doubly tragic as the guns at

Mimoyecques had never been completed and the Germans had spoofed Allied

photographic reconnaissance at the other sites by creating the appearance of repairing

earlier bomb damage. They had, in fact, abandoned most of the facilities—a

vulnerability of photography as a source of credible information. After that incident, the

remaining few drone aircraft were used to attack submarine pens, an oil refinery, a rail

marshaling yard, and a power station—most attacks plagued by malfunctions and enemy

antiaircraft fire. APHRODITE was terminated by General Spaatz on January 27, 1945.[380]

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[380] A brief summary of APHRODITE operations is at http://en.wikipedia.org/wiki/Operation_Aphrodite.
This entry was accessed on April 18, 2012. Of the several books that mention this project, one written for a
general audience was recommended by Roy W. Forrest, the wartime commanding officer of Project
APHRODITE, for telling the story "exactly as it happened." See Jack Olsen, *Aphrodite: Desperate
Mission*, New York: G.P. Putnam's Sons, 1970. Administrative detail on the APHRODITE missions is in
Roger A. Freeman, *Mighty Eighth War Diary*, London, New York, and Sydney: Janes, 1981, Pp. 313, 316,
323, 324, 338, 344, 347, 365, 373, 391, and 412.

In late August, as the Allies once again bombed Peenemünde, Speer became increasingly uncertain about the ability of the V-2 to become an effective weapon, and Kammler and Dornberger sparred over control of the rocket program. Sigint was reflecting German withdrawal from the area of Falaise and an order from highest military authorities to ensure "that all V-weapon installations were so thoroughly destroyed that the victors could draw no conclusions about the method of operation."[381]

This was also the time at which the Luftwaffe tried an alternative launching technique for the up to 600 flying bombs per month that were being produced at the Mittlewerk: launching them from He-111 bombers. This was a less-than-successful experiment, due at least in part to American heavy bombing of their operational airfield.[382]

On August 26, Jones completed his final report reviewing all the evidence. It included his evaluation of the value of outside experts:

> The positive contribution of technical experts to Intelligence problems can be great, and there are many cases where Intelligence would be remiss in not asking their advice; but from an Intelligence point of view, it must always be borne in mind that the advice comes from a British, and not a German, expert. If this difference in background is not continually appreciated, serious misjudgements can be made. In the tactical field, Napoleon knew this danger well: he called it, 'making pictures of the enemy'. In the technical field, the same danger exists: the present investigation is sufficient example.[383]

Thus, in Jones' opinion, assessments of technical experts such as those participating in the Sandys investigations may be of specialized value within the experts specialized fields of interest. But for intelligence and policy purposes, they must be viewed with skepticism because technical experts frequently do not possess sufficient

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[381] Bennett: 1980, P. 124.
[382] *ULTRA*: 1980, Pp. 130-131.
[383] Jones: 1978, Pp. 427-428

knowledge of the most recent applications of technology or the political and military

contexts defining their use.

Jones says he distributed 40 copies of the report, all of which were withdrawn by

the Air Staff head of intelligence based on objections from Duncan Sandys, presumably

due to this epilogue,[384] This demonstrated the power that a representative of the civilian

political leadership frame of reference could exercise over the product of a subordinate

intelligence producer.

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[384] Jones: 1978. Jones provides an extended section on his August 26, 1944 assessment on Pp. 452-459.

CHAPTER 9

SOVIET PARTICIPATION AND SHIFTING ALLIED INTELLIGENCE

PROBLEMS

As the Soviet Army approached Poland from the east in July 1944, the Germans were moving their Polish Heidelager rocket training and test facility at Blizna, near Debice, to the Heidekraut site in northwestern Poland near the German border. While Dornberger was fighting his bureaucratic battles over control of the A-4, the Americans, British, and SHAEF were negotiating appropriate management and distribution of CROSSBOW data. R.V. Jones was clarifying and solidifying knowledge of V-2 structure and capabilities. And a senior-level "MOST SECRET" (the British equivalent of America's TOP SECRET) negotiation was taking place affecting a new intelligence relationship that would bring the Soviet Union into the discussion of the long-range ballistic missile.

The initiative for these negotiations was British, while the Americans were instrumental in its execution. The results were a portent of the strained relationships between the eastern and western Allies that would evolve into the Cold War and demonstrated the impact that an additional set of conflicting Soviet political, military, and intelligence goals could have on activities within the western Allies' intelligence technological frame by altering information sharing practices and problem solving strategies.

The Blizna Episode

R.V. Jones says that he had started the proposal as a source of information that might provide more conclusive answers to the thorny issue of V-2 rocket weight. He suggested this option in mid-July to Air Staff Chief Marshal of the RAF Portal, with the observation that it would be "most desirable that some Air Intelligence officers with a full knowledge of our background should immediately inspect the camp in the event of its capture. You may consider, as I do, that this matter is of sufficient importance to justify a personal approach to Stalin by the Prime Minister." Portal made the approach to Churchill, who agreed with the course of action.[385]

Churchill sent his initial message to Stalin on July 13:

There is firm evidence that the Germans have been conducting the trials of flying rockets from an experimental station at Debice in Poland for a considerable time. According to our information this missile has an explosive charge of about twelve thousand pounds and the effectiveness of our counter-measures largely depends on how much we can find out about this weapon before it is launched against this country. Debice is in the path of your victorious armies and it may well be that you will overrun this place in the next few weeks.

2. Although the Germans will almost certainly destroy or remove as much of the equipment at Debice as they can, it is probable that a considerable amount of information will become available when the Area is in Russian hands. In particular we hope to learn how the rocket is discharged as this will enable us to locate the launching sites.

3. I should be grateful, therefore, Marshal Stalin, if you could give appropriate instructions for the preservation of such apparatus and installations at Debice as your armies are able to ensure after the area has been overrun, and that thereafter you would afford us facilities for the examination of this experimental station by our experts.[386]

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[385] Jones, 1978. Pp. 440-441.

[386] A copy of the original text from the UK Foreign Office to its embassy in Moscow is available online under Crown Copyright from the UK's National Archives, catalogue reference FO/954/20B, image reference 3. It varies slightly in wording from the Soviet Ministry of Foreign Affairs version in document No. 295, on P. 237, in *Correspondence Between Stalin, Churchill & Attlee During World War II*, reproduced in Honolulu: University Press of the Pacific, 2003, but is substantially the same. A looser translation appears in Boris Chertok, *Rockets and People, Volume 1*, English translation published:

Stalin replied two days later that "We should like to comply with your request stated in your message of July 13, concerning the experimental station at Debice in the event of it falling into our hands. Please specify which Debice you mean, for I understand there are several places with that name in Poland…."[387]

Churchill responded to Stalin on July 19, 1944[388] with aset of geographic coordinates of the German facility. He told Stalin of the possibility that the German rocket could carry a five-ton warhead and that they might already have built a thousand operational rockets—an apparent reference to Jones' estimate presented at the Cabinet-level CROSSBOW Committee meeting the day before. He mentioned the pressure he was under from Parliament to assure the British population that everything was being done to counter the rocket threat. He included what must have been very preliminary information on the wreckage from Sweden. Given that the rocket components did not arrive in England until the end of July, Churchill's revelation may also have been drawn from the earlier on-site reports of the Bruder/Wilkinson inspection team that Jones had dispatched in June. Churchill ended his message with the request that Stalin direct his responsible officers to work in Moscow with the chiefs of the British and American

Military Liaison Missions, Generals Burrows and Deane, in Moscow to set up access to the captured site.[389]

Stalin responded on July 22 that he had instructed a Soviet General Staff representative, General Slavin, to arrange matters with Generals Burrows and Deane and that he promised "to take personal care of the matter so as to do all that can be done according to your wishes…."[390] Churchill, in return, sent Stalin a cable thanking him for his message of the 22nd and stating that he was "very glad you will give the matter your personal attention…."[391] These five messages are the basis for Churchill's comment at the July 25 Cabinet-level CROSSBOW meeting that he had "a very civil reply from Mr. Stalin. From this point on, however, the road became rougher.

According to Boris Chertok, during the war a Soviet missile specialist at Scientific Research Institute-1 (NII-1), he and his colleagues knew nothing about Heidelager and very little about the A-4/V-2. He says that after the initial exchange of telegrams Stalin gave instructions to allow the British to inspect the test range, though not as quickly as Churchill would have liked. His instructions were given to the General Staff, and the Army intelligence services were ordered to be "particularly vigilant in gathering intelligence on the Debica area, which in August 1944 was still 50 kilometers

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[389] Both General Deane and Ambassador to Moscow W. Averell Harriman published memoirs after the war. However, neither makes any reference to the Blizna affair. Deane was not an intelligence officer, although his Military Liaison Mission took the place of the traditional attachés until the end of the war. However, Deane had served in high office as the secretary of the American Joint Chief of Staff and as the American secretary to the Combined Chiefs of Staff in Washington. He was familiar with intelligence issues from performing those roles, but states that General Marshall had directed him to downplay intelligence in his MLM role. See John R. Deane, *The Strange Alliance: The Story of our Efforts at Wartime Co-Operation with Russia*, New York: The Viking Press, 1946, 1947, P. 202. See also W. Averell Harriman and Elie Abel, *Special Envoy to Churchill and Stalin 1941-1946*, New York: Random House, 1975, for his broad view of wartime American – Russian diplomatic relations in Moscow.
[390] MFA, Document 300. P. 241.
[391] MFA, Document 302. Pp. 242-243.

from the front line." Stalin also ordered Peoples Commissar of the Aircraft Industry

Shakurin "to prepare a group of Soviet specialists who could study everything that could

be found on that test range before the British specialists showed up there."[392]

Jones criticized the selection of the British party chosen to inspect Heidelager as

having been taken over by Duncan Sandys' "experts," at the expense better qualified

individuals.   But, he did not mention American participation in the person of Colonel

O'Meara from USSTAF, named in the August 11 Horton-to-Haskell OSS London

correspondence as having "recently left London on a short mission to Russian occupied

Poland where the Russians have captured an important experimental station for secret

weapons." Nor did Jones mention Churchill's inclusion of American Military Liaison

Mission chief, General Deane, in his July 19th message to Stalin.

However, Jones' discussion suggests that he was satisfied with the selection of

Wilkinson (who had served on the initial Swedish wreckage investigation) and Eric

Ackerman, who he thought would be the best qualified of the whole party to look at radio

control equipment. He was less happy with the team's first radio report on July 31 from

the Headquarters of British Forces in the Middle East—their departure point—that

suggested over-optimism about the team and its likely success. In Jones' opinion, "This

naïveté did not augur well for matching the wiles of the Russians…."[393]

On August 3, the team was in Tehran but was being held up by ostensible visa

irregularities. That same day Churchill sent Stalin a message asking him to intercede to

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[392] Chertok: 2005. Pp. 258-259.
[393] Jones: 1978. Pp. 440-442.

resolve the issue so that the experts could proceed immediately.[394] Stalin replied to

Churchill on the 4th that the Soviet Ambassador in Tehran had been instructed to issue the

necessary visas right away.[395]   The group was still in Tehran on August 7, according to

Jones, with "most of them down with dysentery…." Ackerman sent Jones a separate

cable saying "that the Mission was quite hopeless because of its incompetence, and

requesting my permission to return. Since there was plenty of work for him to do on the

Western Front, I readily agreed."[396] R.V. Jones completed his final report on V-2

characteristics and capabilities on August 26, without any data from the repeatedly

delayed Blizna inspection team.

According to Jones, the team finally reached Moscow on September 1 and

reported that it was leaving for Blizna the next day. They sent a cable on September 18

that the mission was a success and had surprised the Russians, who had not conceived of

such a large rocket. On September 28, the team was headed back to Tehran, enroute to

England, although they reported that "(t)he Russians have temporarily lost main part of

our R specimens in transit between Blizna and Moscow but they have promised to do all

in their power to see that they follow us without undue delay."[397]

Soviet Engineer Chertok described what actually happened to the rocket

wreckage:

> The first expedition, comprised of military intelligence under General I. A. Serov, was
> sent to the liberated area of the alleged test range hot on the heels of battle. Included in
> this group from our institute were Yu. A. Pobedonostev, M. K. Tikhonravov, and several
> of their immediate technical assistants. They dug around Poland for a rather long time
> under heavy guard. After our group had been working in Poland for about a week, the

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[394] MFA, Document 309. P. 247.
[395] MFA. Document 310. P. 248.
[396] Jones, 1978. P. 441.
[397] Jones: 1978, Pp. 441-442.

British specialists arrived, including a representative of British intelligence who had a detailed map of the area showing the coordinates of the launch site and numerous sites where the missiles had fallen. Upon his return, Tikhonravov told us that our military intelligence officers had driven all over the test range and had confirmed that the British map was right on the money. Their intelligence service had provided accurate information

In many respects for our future activities, Churchill's appeals to Stalin were truly decisive. If not for his letters, our victorious army would have moved right past these Polish marshlands and forests without investigating what the Germans had been doing there. With the help of the Brits, we were able to recover A-4 missile parts for the first time. (We of course did not know the designation "A-4" at that time.)

Within days after the captured missiles were delivered from Poland to NII-1 in Moscow, some wise person commanded that they be kept secret from Soviet rocket specialists. It was sometimes impossible to understand the logic of our intelligence services.

All the missile parts were placed in a large assembly hall at the institute. Only the chief of the institute (General Fedorov), his science unit deputy (our "patron" General Bolkhovitinov), and an information security officer were granted access. Even Pobedonostev and Tikhonravov, who had seen everything in Poland, loaded everything into the airplane, and brought it with them, were initially barred from entering. But gradually common sense began to prevail. Isayev, and then I, Pilyugin, Mishin, and several other specialists were allowed to inspect the German secret weapon. Entering the hall, I immediately saw a dirty, black, funnel-shaped opening from which Isayev's lower torso protruded. He had crawled head first through the nozzle into the combustion chamber and, with the aid of a flashlight, was examining the details. A gloomy Bolkhovitinov sat nearby.

I asked, 'What is this, Viktor Fedorovich?'

"This is something that can't exist!" he answered.

We had simply never imagined a liquid-propellant rocket engine of such proportions at that time!

According to Tikhonravov, who had delivered this engine from the Polish swamp, its location had also been indicated on the British intelligence map. The Brit who brought them to the swamp said that a local resident had passed along the site coordinates. He, in turn, had received the coordinates from Polish partisans. Not far away they had found blown up aluminum tanks, pieces of the exterior steel casing, and white shreds of prickly fiberglass. They didn't manage to get everything out of the swamp. The explosion of the propellant components had scattered missile parts all over the area.

The Brits were very interested in the remains of radio equipment and control system instruments that had remained intact. They had gathered several large cases of all sorts of parts to be sent immediately to Britain via Moscow. Upon the arrival of the British cases in Moscow, we were given the opportunity to inspect the contents the night before they were transferred to the British Mission. Pilyugin, two other engineers, and I did just that at the Khoroshevskiy barracks.

A group headed by Bolkhovitinov—consisting of Isayev, Mishin, Pilyugin, Voskresenskiy, and I—received the assignment to reconstruct the general form of the missile, its methods of control, and primary specifications based on the fragments that had been recovered. A year later, already working in Germany, I determined that for the

most part, we had correctly reconstructed the missile, and this greatly facilitated our subsequent activity.[398]

Jones says that the Russians intentionally delayed the team while they conducted their own search. They impeded team activities and identified Polish nationals who gave information to the team. He concludes that "the Mission probably did positive harm and achieved no good whatsoever." Just as importantly, when the crates of material that were forward to Tehran were opend in England, they were found to be not the items which had been packed at Blizna but parts of old airplane engines which the Russians had substituted instead.[399]

Chertok does not specifically address the issue of diverting the investigation team's material. However, in the last two paragraphs in the section of his memoirs just quoted, he describes a situation that is consistent with such an interpretation. After noting that the material was placed in a large hall and only very senior authorities were allowed access, he says that he was part of a group of four engineers that were given access the night before the material was to be released to the British mission. In the final paragraph he talks of a slightly larger group that was given "the assignment to reconstruct the general form of the missile, its methods of control, and primary specifications based on the fragments that had been recovered." This analytical reconstruction process appears very similar to that described by Dixon in the case of analysis and exploitation of the material provided from Sweden in which some preliminary results were briefed to a CROSSBOW meeting on August 10, but the BIG BEN team at Farnborough then worked with the fragments day and night until the end of the first week in September to provide

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[398] Chertok, 2005. Pp. 259-261.
[399] Jones, 1958. Pp 441-442.

their version of the type of reconstruction that Chertok describes. It doesn't seem possible that Chertok and his small group of engineers would have been able to have completed in one evening the accurate reconstruction he said resulted from their efforts. The conclusion would seem to be that the Russian engineers had the fragments the Allied Blizna team collected for an extended period of time. And, while the sending of crates of old and easily identifiable wrecked aircraft parts would seem to be a futile attempt at deception, at a minimum it bought the Russians some time in which to build their own reconstruction of the A-4/V-2.

Nonetheless, Churchill sent a message to Stalin on October 16 thanking him for granting access to Blizna, mentioning that the team of experts had brought back valuable information (but with no reference to the issue of the missing components or the substituted wrecked aircraft parts), and thanking him for the help of Soviet authorities.[400] Churchill's message was sent a week after the Allies' Fourth Moscow conference attended by himself and Stalin, along with Foreign Affairs chiefs Eden and Molotov. It also preceded the Malta Conference in January/February 1945, and the Yalta Summit in February 1945, which resulted in the Soviet Union's agreement to enter the war in the Pacific. Another factor that may have influenced Churchill's careful wording of his October 16 message was the Russian demand in October that head of the British MLM, General Burrows, be removed from office for being "arrogant and difficult to deal with."[401]

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[400] MFA, Document 334. P. 262.
[401] See Deane: 1946, 1947, P. 154, and Harriman: 1975. P. 352. The closeness of the two conferences and the demand for removal of the British MLM chief illustrate how diplomatic relations can have an impact on military and intelligence activities and vice-versa. However, both Deane and Harriman suggest that the real

Perhaps in this context, the Blizna episode can be seen as a political and technical victory for the Soviets, while being of more strategic political value than for the technical knowledge produced for the western Allies. However, it presaged a pattern of east-west tensions and provocations that would increase after the end of World War II, changing the ultimate focus of western intelligence activities through the end of the twentieth century.

It is interesting that at this same time the question of sharing technical intelligence with the Soviet Union was being discussed in the Chiefs of Staff Committee and the Combined Intelligence Committee, but not mentioned in either the Churchill-Stalin correspondence or Jones' memoirs. At a minimum, the senior officers of the British and American Moscow Military Liaison Missions, Generals Burrows and Deane, who Stalin said would be contacted at Churchill's request, must have been aware of the discussions before the Allied investigators were allowed into the Blizna facility on September 18.

On August 26, 1944, the U.K. Chiefs of Staff committee sent a cable (WARX 86963) to its Moscow Mission, saying in part:

> Because it is vitally necessary to exchange information between the Russians, British and Americans on German developments in weapons and methods of war it is essential that the Russians forestall destruction by Germans of Intelligence objectives and allow them to be inspected by United States and British Officers. Representations to the Soviet General Staff should therefore be made immediately to the above effect and offering lists of objectives in the Soviet sphere in which we are interested and reciprocal treatment for Soviet Officers in British and American spheres . . . This proposal concerns only the period preceding tripartite control of Germany but for your information only, we are suggesting that the European Advisory Commission negotiate extension of this agreement into the period of tripartite control of Germany.

reason for his removal was that the Soviet intelligence Service had placed listening devices in General Burrows' office and overheard his uncomplimentary comments on relations with the Russians.

This was followed a week later by a cable (September 2) from the Combined Intelligence Committee to CIOC Chairman Betts in London, the Mediterranean forces Joint Intelligence Committee in Agiers, and the heads of the American and British military missions in the USSR, to clarify the CIOS' sphere of responsibility:

> Because of integrated character of German activities throughout enemy occupied areas CIOS will be responsible coordinating exploitation throughout German-occupied Europe of German intelligence objectives of interest to US and British governmental departments. CIOS should therefore conduct continuing study of such objectives, including those in SACMED and Soviet areas. Close liaison should be maintained between CIOS and Intelligence Objectives Subcommittee (Algiers), including transmittal of CIOS data on SACMED targets. If arrangement with Soviets proposed in WARX 86963 is negotiated, CIOS data on targets in Soviet area should be transmitted to SHAEF for forwarding to Moscow Missions. (underscoring supplied)[402]

Allied Intelligence Sees The First V-2s in Combat, while Some Allied Decision Makers Start to Look to the Future

During the period in September when the Allied team was inspecting Blizna, the first V-2s were fired in combat, not from France as the Germans had planned, but initially from Belgium and then rapidly moved to the area of the Hague in the Netherlands. Dornberger says that a total of 350 rockets were delivered to the front during September 1944[403] and Speer writes that the first 25 rockets were fired at England over a period of ten days, "not the 500 rocket barrage Hitler had imagined."[404] Those rockets reaching the

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[402] J.I.S. 107, dated 9 January 1945, Pp. 9-10.
[403] Dornberger: 1952, 1954, P. 225.
[404] Speer: 1970, P.369.

front were shipped by express carrier from the Mittlewerk assembly area in an attempt to minimize degradation of sensitive components.[405]

The published English translation of Dieter Hölsken's doctoral dissertation, *V-Missiles of the Third Reich: The V-1 and V-2*, describes the first attempted combat launches as being on September 6—aimed at Paris from a launch site in the Belgian Ardennes. Neither missile launch was successful and the missiles had to be defueled for maintenance. Two days later, on September 8, two missiles were successfully fired at Paris from a position about 20 km north of Bastogne, shortly after which Himmler ordered that no more rockets would be launched against France.[406] Höelskin also says a motorized unit fired rockets at London on September 6 from a site near Wassenaar, just north of the Hague. However, the British official history reports that the first missiles landed in the London area the evening of September 8. These were the first of 35 launched from the area of the Hague before the Germans temporarily ceased rocket operations on the 18th because of the British move through Belgium and into the Netherlands. Montgomery was attempting to capture the Rhine bridge at Arnhem, the ill-fated "Bridge Too Far."[407]

American First Army ordnance officer Colonel John G. Medaris—after the war, the American Army's missile development equivalent of the Air Force's General Bernard Schriever—writes in his memoir *Countdown for Decision* (1960) of his first-hand experience with the first V-2 impact, apparently one of the two rockets fired at Paris on September 8. He was near his Ordnance Headquarters in France, but does not specify the

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[405] Dornberger: 1952, 1954, 225-226.
[406] Dieter Hölskin, *V-Missiles of the Third Reich: The V-1 and V-2*, Sturbridge, Massachussets: Monogram Aviation Publications, 1994, Pp. 220-221.
[407] Hinsley, et al: Volume 3, Part 2, P. 564.

date. As he was reading over routine paperwork, he was startled by "a heavy blast *followed* by a deep rumble that sounded like thunder. Not too close, but close enough to rattle the fragments of broken windowpane and shake down some dust. My first thought was that perhaps an ammunition dump had exploded."   Medaris investigated the impact site and concluded from the rumble after the impact that it must have been a supersonic missile and the V-2 was the only such device the Germans had. The wreckage that he could identify included "bits of thin metal, a small valve or two, a piece of twisted pipe, a heavy fragment showing a few gear teeth…." Medaris directed his technical intelligence officer to:

> …alert all technical intelligence teams working in the forward area. Be sure they know what they are looking for. Give them all the information we have, including our best guesses. Get out a special bulletin to the combat divisions and give them the same information. Tell them that any V-2 hardware they find is to be put under strong guard at once, and this headquarters Notified.

With these instructions, he was carrying out the requirements of the SHAEF Intelligence Directives mentioned earlier.[408]

Soon after the first operational rockets landed in England, the British XX Committee modified its V-1 targeting deception for use against the V-2. Masterman says the principle was the same in both cases, but the details for the V-2 were a little more complex because the Germans could be expected to know with some precision when each of their rockets had impacted. However, the Germans still had no good source of information about the exact location of impact since the Allies were able to restrict enemy photo reconnaissance over the English mainland. Both the V-1 and V-2

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[408] MAJ GEN J. B. Medaris, U.S. Army, Retired, with Arthur Gordon. *Countdown for Decision*. New York: G. P. Putnam's Sons, 1960, Pp. 49-50. Army Historian Lida Mayo, apparently drawing from Medaris' memoir, places this incident at Charleroi in Belgium. She cites the date as September 3, apparently in error. See Mayo: 1968, Pp. 274-275.

deceptions depended on British counterintelligence being able to control the location feedback that their captured double agents sent back to the Germans. In the case of the V-2, the British-contrived feedback gave the real time of an impact, but associated it with the location of a real impact from another rocket that had landed several miles short of the center of London. This technique successfully shifted the weekly mean point of impact to the east, outside the London area, while allowing the Germans to think that their mean impacts for the same period were in the vicinity of Charing Cross in the city center. Masterman says that the XX Committee and the MI-5 double agents were the means of transmitting the deceptive information. But that it was the Home Defense Executive that developed the concept, performed the planning, and had to argue the ethical and political issues for the approval of the countermeasure that resulted in the saving of "many thousands of lives."[409]

Policy Changes Allow Wider Distribution of V-2 Information

During September, while Huzel was dealing with the effect of Allied action on the production of liquid oxygen (only enough for about 25 rocket launches a day)[410] and Dornberger was expanding his authority as Kammler's tactical staff officer,[411] Colonel McClintic asked Jones to write an article for the Eighth Air Force internal magazine. This article was a first in the sense that it showed a willingness to deal more publically with a subject that up to that point was given only very restricted dissemination. Jones'

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[409] Masterman, 1972. Pp. 180-182.
[410] Huzel: 1962, P. 121.
[411] Dornberger: 1952, 1954: Pp. 224-225.

conclusion showed prescience about the post-war issues that would be faced by rocket

developers:

> … At the moment such a rocket could not be intercepted, but by the time it becomes a serious possibility it may itself be a target for smaller defence rockets fitted with predictors and homing devices: but these would depend upon adequate warning, and the defences might also be saturated by a salvo of long range rockets.
>
> The protagonists for the development of very long range rockets would probably have, in Britain at any rate, to meet the criticism that it would not be worth the effort expended. The A4 has already shown us that our enemies are not restrained by such considerations, and have thereby made themselves leaders in a technique which sooner or later will be regarded as one of the masterpieces of human endeavour when it comes to be applied to the exploration of Space. As it is mainly with our enemies that Intelligence is concerned, rather than with our own views on military economics, it suffices that the long range rocket can be developed much further. In light of this fact, we must watch.[412]

This move toward openness was followed by an article the November issue of

IMPACT, the American Air Force's CONFIDENTIAL general distribution news

magazine for its airmen. The article accurately discusses some of the processes in V-2

development at Peenemünde and other places, but misidentifies the purposes of several

specific buildings. However, IMPACT was designed as a general orientation journal for

a broad military readership, not a detailed planning document for technical specialists or

war planners.[413]

While the Air Force was talking more openly to its members about the secret

weapon threat, information was also being released to the American press on the subject.

Beginning in August, the New York Times published an article by Hanson Baldwin on

"The V-2 Rocket Bomb" that discussed such topics as launching sites, the "giant" size of

the missile, and the estimate that it could carry a payload believed to be "a minimum of

12,000 pounds of explosive in its warhead." Baldwin's article was followed by a series

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[412] Jones: 1978, Pp. 459-461.
[413] *IMPACT*, Volume 2, No. II, November, 1944. Pp. 4-5. Reproduced in *IMPACT*, Book 5, 1980.

of other articles from October through December that discussed various aspects of the

weapons and had clearly relied on official release of information.[414]

Also in September 1944, American Air Force General Hap Arnold asked

California Institute of Technology professor Theodore von Kármán to create a blueprint

for future American air force research and development. Arnold believed that the war

against Germany was essentially won and it was time to start thinking about the military

implications of the weapon technology that had been developed for aerial warfare. On

November 7, General Arnold sent a memorandum to Dr. von Kármán establishing the

Army Air Forces long range development program, asking that he report on a specific set

of questions.[415] On November 11 the Army Air Forces officially recognized von

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[414] The following series of articles published between August 1944 and May 1945 traces New York Times coverage of the V-2 to the end of the war. It was retrieved from the New York Times on-line archive in August 2012:

    "The V-2 Rocket Bomb" by Hanson W. Baldwin, published: August 21, 1944.

    "Germans Are Still Striving To Perfect New V Weapons" by Harry Vosser, published: October 22, 1944.

    "V-2's Hit London, Say Nazis, Claiming Big Rocket Damage" by Sydney Gruson, published November 9, 1944.

    "Churchill on V-2 Rocket" unattributed, published: November 11, 1944.

    "Churchill Bares V-2 Toll; Says Damage Is Not Great," bu Sydney Gruson, published November 11, 1944.

    "V-2 Pril Doubted By Iron Age Editor," unattributed, published: November 11, 1944

    "V-2 Is Aimed at Allied Armies; Speed is '3,500 Miles an Hour,'" by The Associated Press, published: November 12, 1944.

    "Germans' V-2 Rocket Not Yet Very Deadly," by Harry Vosser, published: November 12, 1944.

    "Moves on West Front," by Hanson W. Baldwin, published: November 13, 1944.

    "V-1 and V-2," unattributed, published November 19, 1944.

    "Germans Developed V-2 Rocket to Overcome Factors Weakening V-1's Effectiveness," by Waldemar Kaempffert, published: November 19, 1944.

    "V-2 Use Growing, Foe Says," unattributed, published: November 28, 1944.

    "Millions Are Spent for Rockets, Now Important U.S. War Weapon," unattributed, published: December 6, 1944. "British Minimize Accuracy of V-2," by Clifton Daniel, published: December 9, 1944.

    "Rockets Cut Down By Allied Tactics," by Harry Vosser, published: December 10, 1944.

    "V-2 London Attack Mounts, Foe Says," unattributed, published: January 6, 1945.

    "New Nazi Rockets Fly Over Sweden," by George Axelsson, published: January 20, 1945.

    "Trainload of V-2 Rockets Captured by First Army," by United Press, published: April 7, 1945.

    "ATC Exploit Gave British V-2 Secret," unattributed, published: May 1, 1945.

[415] Michael H. Gorn, editor. *Prophecy Fulfilled: "Toward New Horizons" and Its Legacy*. Air Force History and Museums Program, 1994, Pp.. 85-87.

Kármán's office as part of its long-range development program.[416] In December 1944 von Kármán moved to Washington to assemble the resources he would need to answer General Arnold's request.[417]

Despite Arnold's optimistic vision, the war had not yet been won. The situation in Europe had developed sufficiently, however, that changes were occurring in the relative value of the different enabling intelligence technologies on knowledge of the rocket weapon. Imagery, for example became less valuable because of the difficult-to-detect method which the Germans employed to launch their rockets. Photo interpreter Babbington-Smith says that between September and December many photo reconnaissance flights took thousands of photographs of reported launch sites. Each had to be looked at, but only two showed any suspicious activity. As Babbington-Smith says it: "Such impotence, such lagging far behind reports from other sources, was something quite new for photographic intelligence. The ground reports were very emphatic at this time, as one might expect. To the residents of The Hague, the thunderous roar of rockets made it only too clear that the Haagsche Bosch was the main launching area."[418]

HUMINT and SIGINT, however, increased in value. HUMINT, for example included an October 11, a memorandum from OSS Director Donovan sent President Roosevelt, describing secret weapon information provided by Dulles' HUMINT agent Kolbe/"Wood" that gave accurate locations of V-2 production facilities and rocket characteristics. Donovan sent essentially the same memorandum to Assistant Secretary

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[416] Gorn, editor, 1994, P. 5.
[417] Theodore von Kármán with Lee Edson. *The Wind and Beyond: Theodore von Kármán, Pioneer in Aviation and Pathfinder in Space*. Boston and Toronto: Little, Brown and Company, 1967, Pp.267-268. See also Gorn, editor: 1994, Pp. 4-5.
[418] Babbington-Smith, 1957. Pp. 236-237.

of War McCloy and the Secretary of State. "[419] On November 20, Dulles in Bern also

forwarded to OSS information from the same German Foreign Office source that

described Japanese concern over the Allies possible use of V-1 technology—a legitimate

concern given the U.S. program to clone the V-1 as the American's JB-2 "Loon."[420]

Finally, by November, CIOS teams in France were beginning to report details of

V-1 related facilities—some of these reports were prepared by members of the ALSOS

Mission, even though they did not deal specifically with nuclear weapons. Whether these

were the result of Goudsmit's interest in a broad range of science and technology or

Pash's concern with cover activities for the very sensitive atom bomb mission is

problematic.[421] Humboldt State University History Emeritus Professor John Gimbel

describes the rapidly expanding activities of CIOS teams throughout Europe in his 1990

study of exploitation of captured German science and technology:

> CIOS mushroomed in size and function late in 1944 and early 1945, charged as it was
> with compiling black lists of targets from which information was urgently needed by the
> military, arranging for those targets to be visited by appropriate specialists, and
> distributing the reports of investigating teams to American and British agencies…. It had
> a field team in Paris on 28 August 1944, four days after the first French troops entered the
> city, and—in collaboration with T-Force units—sent teams of specialists into other cities,
> such as Nancy, Luxembourg, Brussels, Aachen, Strasbourg, Heidelberg, and
> Ludwigshafen, as Allied troops moved across France and the Low Countries into
> Germany. By the end of 1944, CIOS reported that it had sent 197 investigators,
> representing 14 American and British agencies, to visit 115 targets…. Meanwhile, using
> information gathered by teams in the field, CIOS drew up additional black lists of targets
> and eventually responded to a variety of suggestions and pressures to include targets of
> industrial and scientific interest irrespective of their immediate military value.[422]

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[419] The version of this memorandum sent to the President is in Records of the Office of Strategic Services
1940-1946, Record Group 226, OSS microfilm collection, reel 24, frames 451-452. National Archives at
College Park, MD.0 The version sent to Assistant Secretary of War McCloy is at reel 20, frame 276. The
version sent to the Secretary of State via James Dunn is at reel 20, frames 132-133.
[420] Petersen, editor, 1996, P. 399. The only significant difference between the German and American
versions was that the copy would have substituted a launch sled powered by JATO-style rockets rather than
the more complex steam catapult normally used by the Germans.
[421] The referenced summary of reports is in the NARA OSS Microfilm Collection, Roll 9, Frames 1-17.
[422] John Gimbel. *Science, Technology, and Reparations: Exploitation and Plunder in Postwar Germany.*
Stanford, California: Stanford University Press, 1990, P. 4.

ULTRA SIGINT provided intercepted messages on October 19th expressing the Japanese Naval Attaché's pessimistic view of Germany's rocket attacks in England,[423] and on October 19 a cable from Luftwaffe Command West that indicated the extreme importance of shortages in methyl alcohol, with liquid oxygen, the fuel for the V-2.[424] SIGINT later in October and November also suggested possible techniques the Germans might use to block or harass Allied shipping at the port of Antwerp—one of the purposes for the October flying bomb attacks before Field Marshal von Rundstedt moved to divert them to Allied supply bases in advance of the Battle of the Bulge.[425] However, an intercepted message dated November 18 reflected the general strain the Germans were experiencing due to fuel shortages. In this case, they restricted the use of specially-equipped He-111 bomber aircraft for airborne launching of V-1s, a measure adopted to offset the loss of ground-based catapult launchers in territory captured by the Allies..[426]

The ALSOS Mission made a potentially vital discovery in late November 1944, after the Free French Army opened Strasbourg to the Allied investigating teams on November 27. With its new access, ALSOS experts were able to inspect the offices and laboratories of German scientists Dr. von Weizsacker, Dr. von Haagen, and Dr. Fleichmann for evidence of nuclear or biological research. In some cases they were also able to interview the scientists and their assistants. Some of the captured documents made reference to the locations of other research facilities, including Stadilm in Thuringia and Haigerloch, Hechingen, Bisingen, and Teilfingen in the vicinity of

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[423] *ULTRA*, 1980. Pp. 148-149.
[424] ULTRA, 1980. P. 149.
[425] Bennett, 1980. Pp. 167, 169.
[426] *ULTRA*, 1980. P. 160.

Stuttgart. From study of these documents, Dr. Goudsmit was able to conclude that the Germans were not yet able to construct an atom bomb. According to Military team chief Pash, "The fact that a German atom bomb was not an immediate threat was probably the most significant single piece of military intelligence developed throughout the war. Alone, that information was enough to fully justify Alsos." In Manhattan Project chief General Groves' words, "This is the most complete, dependable and factual information we have received bearing upon the nature and extent of the German atomic effort….' "[427]

However, Dr. Goudsmit's memoirs suggest that as important as this information may have been, a cautionary note was in order. He says that both his civilian and military colleagues were initially skeptical of the conclusion, thinking that the captured papers could be a deception to mislead the investigators—somewhat similar to Lord Cherwell's concerns in the flying bomb/liquid fueled rocket debate. However, aerial photography of the not-yet-occupied parts of Germany confirmed that the facility designated as the main atomic laboratory—one wing of a small textile factory—was incapable of carrying out the necessary advanced research.[428] While neither Pash's nor Goudsmit's statements specifically associate their finding with the V-2, one implication was that Allied concern over the capabilities of the rocket no longer presented the immediate threat of ability to deliver an atom bomb.

Britain's intelligence analysis of Germany's new weapons continued into December. However, much of its emphasis was shifting away from defining the basic capabilities of new enemy systems a toward a parallel set of tactical combat support and

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[427] Pash, 1969. Pp. 155 – 158.
[428] Goudsmit: 1947, Pp. 75-76.

strategic planning perspectives. Jones writes that just before Christmas he was asked to

prepare a broad analysis of all the new weapons. Churchill based a presentation to

Parliament on Jones' analysis, and Jones' conclusion was that at this stage of the war,

Germany's difficulties would be more in the area of production than new system

development:

> The Germans have been consistently fertile in producing new weapons , and in several
> directions temporarily outshine us. The most notable examples are the new submarines
> and fuels, rockets, and jet propulsion generally. Few weapons starkly novel to
> Intelligence have been discovered during the past two or three months, but several of
> those previously discovered are only just coming into operation; if available in sufficient
> quantity, they would have a pronounced influence on operations. It is therefore
> production rather than invention, particularly of synthetic fuels, that is going to be
> Germany's main difficulty.[429]

An example of the American's shift toward strategic thinking is von Kármán's

project for guiding America's future air power research. He says that General Arnold

was looking for both a continuing American lead in the current war and a way in which

to ensure post-war national preparedness. Von Kármán was given a leave of absence

from Cal Tech by Robert Millikan, and he assigned Frank Malina to manage the Jet

Propulsion Laboratory while he was chairing General Arnold's Scientific Advisory

Group (SAG) and preparing for SAG on-site investigations in Europe.[430]

Initially, Vannevar Bush objected to von Kármán creating a roadmap for the Air

Force because of his belief that the creation of new military weapons should be run by a

civilian agency rather than a military service—generally the position he took in 1945 in

Science-the Endless Frontier. Von Kármán says that General Lauris Norstad, one of

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[429] Jones, 1978. P. 464.
[430] Von Kármán, 1967, Pp. 268-272. Also see Gorn, editor, 1994, P. 6.

Arnold's Deputy Chiefs of Staff, had a discussion with Bush, who then wrote a letter

"revoking his position, saying he was misunderstood." [431]

By the fall of 1944, limited information on the V-2 was being made more widely

available to a broad spectrum of the U.S. and U.K. militaries through general-distribution

publicatinos such as IMPACT.[432] And, by the end of the year, much of this information

was also released to the American public in an article in the December 25th 1944 edition

of *Life* Magazine in article on pages 46-48 entitled "V-2 Nazi Rocket Details are Finally

Revealed." Both the military and civilian sources of information describe a weapon

using a high explosive charge weighing about one ton. However, comparing the

description of the rocket in the September 1944 issue *Impact* and the December 1944

issue of *Life* provides an illustration of the sorts of problems that limited the effectiveness

of Allied knowledge of the missile during the war. The official USAAF publication

estimated a rocket weight of 24 tons. The commercial publication, only three months

later, described the rockets weight as about half as much, or 12 tons—much closer to the

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[431] Vannevar Bush. *Science-The Endless Frontier*. Reprinted, Washington, D.C.: National Science
Foundation, July 1960. On page 18, Bush includes the statement that:

> "…The Army and Navy should continue to carry on research and development for the
> improvement of current weapons…. There should now be permanent civilian activity to
> supplement the research work of the Services in other scientific fields so as to carry on in time of
> peace some part of the activities of the emergency wartime Office of Scientific Research and
> Development.
> *Military preparedness requires a permanent independent civilian-controlled organization, having
> close liaison with the Army and Navy, but with funds directly from Congress and with the clear
> power to initiate military research which will supplement and strengthen that carried on directly
> under the control of the Army and Navy."*

[432] *Impact*, was a classified monthly publication by the U.S. Assistant Chief of Air Staff for intelligence,
United States Army Air Force (USAAF) that was distributed to all squadrons. These issues were
consolidated and published commercially in eight volumes under the title *Impact: The Army Air Forces'
"Confidential" Picture History of World War II*. New York: by James Parton and Company, Inc., 1980.
Book 8 includes *Impact* Volume 2, No. 9, published in September 1944 that contains an article on pages
40-45 entitled "Hun Hard at Work on V-2 Rocket." This article provides a general description of the rocket
and several photographs of bombed "large site" facilities thought to be associated with fixed-position
launchers for the V-2 on the Channel Coast of France that were oriented toward London.

actual value of the operational system when fueled and ready for launch. This

discrepancy reflects the common wartime problem of having insufficient accurate

information with which to inform policy, plan operations, or inform the general public. In

this case, an error of this magnitude in earlier calculations of V-2 performance—

therefore, the threat—would suggests that a rocket conforming to the earlier USAAF

figure would be able to either to carry a heavier load than the later civilian figure would

suggest, or that it could carry the same load a significantly greater distance.[433]

By November and December, the Germans were producing between 600 and 900

V-2 rockets a month.[434] Even though the Allies were well aware of the German forces'

retreat into the Netherlands, little photography was obtained that would reveal the

locations of repositioned rocket launchers. While some thought this was because of

German camouflage, it is just as likely the result of the "express delivery" process from

Mittlewerk described by Dornberger. Nevertheless, on December 29, air reconnaissance

finally found thirteen V-2 rockets hidden under trees in the Hague's large park. Photo

interpreter Babbington-Smith said that the large number implied a storage area as well as

a launch site." The same day Churchill was presenting Jones' conclusions to

Parliament[435]

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[433] A more accurate estimate of V-2 range of of a maximum 230 nautical miles was reported in the
December 1944 issue of *Impact* in an article titled "V-2" on pages 24-27. By this time, the Germans had
been launching V-2s against London for nearly three months, so U.S. and U.K. intelligence organizations
had access to physical evidence from missile wreckage in the London area. Nonetheless, their performance
estimates were still too great. Michael Neufeld lists the operational A-4 (the German military designation
for the V-2) range at 156 miles and says that only special test models flew as far as 239 miles. (See
Neufeld, Michael J., *The Rocket and the Reich: Peenemünde and the Coming of the Ballistic Missile Era*.
New York: The Free Press, 1995, Pp. 281-282.)
[434] Dornberger: 1952, 1954, P. 225.
[435] Babbington-Smith, 1957. P. 237.

This Allied experience with imagery illustrates two problems with reliance on single sources of information. First, a source of information that is critical in one situation may be of little value in another. Aerial photography was essential to determining the characteristics of the flying bomb and long-range rocket at Peenemünde, but of less value in finding operational missile launchers when the Germans were forced into more mobile and low-profile tactics by Allied military action. Second, it can be just as useful to understand what isn't present, such as expected mass storage facilities for V-2s, as it is to understand what is actually seen and recorded.

1945: The Western and Eastern European Allies Compete for Possession of Germany's Technical Accomplishments

Allied information on the secret weapons continued to be released to broader audiences, increasing the inclusion of the public within the intelligence technological frame. The January 1945 issue of *IMPACT* once again contained a secret weapon-related article, this time on the V-1 and American development of its JB-2 clone at Wright Field in Ohio. It explains some elementary detail about the difference between the German steam catapult launcher and compares this with the American's JATO unit technique, concluding that "This has important advantages, now secret."[436] (*IMPACT* was published at the lower CONFIDENTIAL level of classification.)

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[436] *IMPACT*, January 1945, Volume 3, Number 1, Pp. 5-7. Reproduced in *IMPACT*, Book 6, 1980.

From the Russian perspective according to Chertok, in the early part of 1945, Soviet rocket researchers were in the process of trying to make sense of the material they had obtained from Blizna. However, they did not yet understand issues the Germans faced with rocket production or the accuracy of operational systems. Chertok says that the Soviet Air Force and his NII were especially interested in missile reliability. This question was not resolved until after the war. However, Chertok based on a captured report from Kammler suggests just 64% of Germany's wartime launches were reaching their targets.[437]

In late January and early February 1945, as the Battle of the Bulge in the Ardennes was coming to a close, ALSOS investigated reports of a V-2 impact with far greater than normal destruction. The Germans had recently started launching V-2s not just at England, but at the port of Antwerp. As this port had become a major transfer point for Allied war materiel, there was continued concern within the Allied military authorities that a V-2 with an atomic bomb could cause vital damage to logistic support for the planned push to cross the Rhine River into Germany. As the Battle of the Bulge was ending, one V-2 impact was reported to have produced significantly greater damage than normal. ALSOS quickly sent a team to the impact area and were able to determine, Pash wrote, that "a somewhat greater area than usual had been severely affected—but only because of a freak explosion of a V-2."[438]

General Arnold's AAF Scientific Advisory Group teams in Europe were producing useful information by February 1945. For example, Hugh Dryden, a

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[437] Chertok: 2005, Pp. 261-262.
[438] Pash, 1969. P. 164.

consultant on guided missiles for the SAG published a report on the "Status of Development of Special Missiles in Germany as of February 6, 1945."[439] Dryden's report was based on papers found in the office of Professor Osenberg, Chief of the Planning Office of the Reich Research Council. It summarized various classes of missiles under development, including the long-range rocket and the flying bomb, and it commented on those programs that were complete and in production, those that have priority in development and pilot production, those that were to be terminated at the end of their development period, and those that were to be terminated immediately. The V-1 and V-2 were considered to be in the "completed and in production" category. Dryden also gave summaries of the characteristics of four of the other missiles, *Schmetterling* and *Wasserfall* that were on the "closed out at the end of development" list and *Enzian* and *Rheintochter* that were on the "close out immediately list. While Dryden intended this list for an Air Force audience, he commented that it would also be of interest to ALSOS, various Navy offices NACA, NDRC, OSRD, Dr. Tuve of the Johns Hopkins Applied Physics Laboratory, and other Service and JCS offices.

As the Soviet Army was moving across Poland, Montgomery's Twenty-First Army Group was moving through Belgium and into the Netherlands. One result was a temporary suspension of V-2 launches from The Hague. However, on February 26, the photo interpreters at Medmenham once again revealed the presence of rockets, this time

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[439] Paper byHugh Dryden, "Status of Development of Special Missiles in Germany as of February 6, 1945." undated, AAF Scientific Advisory Group. Records of the Army Air Forces. Record Group 18, 190/62/10/4, GD. Miss 1726. National Archives at College Park, MD. While the paper uses the date of February 6, it is possible that the files from Osenberg's office were not recoverd until May, when the SAG team moved to Europe. Dryden, along with Drs. Tsien, Schairer, and Wattendorf were members of the group that deployed at that time. It seems more likely that the documents were initially obtained when the ALSOS team was searching Professor Osenberg's office in early April and then provided to the SAG team at a later date.

at the Duindigt race track northeast of The Hague. Reinforcing her earlier description

and the situational importance of collector access, Babbington-Smith assessed that:

> If Hitler's ideas of sticking to massive concrete 'launching shelters' had prevailed, the tail would
> have been very different. There would have been something to bite on. But the plain fact of the
> matter is that General Dornberger's almost ridiculously simple conception of how the V-2 should
> be launched defeated Allied photographic reconnaissance.[440]

The western Allies were also moving toward Germany. On March 7-8, they were

finally able to cross the Rhine River for the first time at the Ludendorf Bridge at

Remagen, giving them a foot-hold in Germany itself.

On March 16, Dulles in Bern made a telephone call to Washington (presumably to

Donovan) in which he commented on the possibility of a German "national redoubt" in

the Tyrolian Alps and his views on possible resistance to Allied victory:

> … They now feel themselves as beyond the law and outside the old world, relying solely
> on their own resources in the fight for their bare existence in a hopeless struggle. We
> know that no fighters are more dangerous than those who fight with the energy of
> despair. They shrink from nothing and no one, for they have nothing more to lose. There
> is much thought in this connection of new miracle weapons, especially in the use of gas,
> to which they might resort at the moment of complete despair. For our part, we do not
> believe that any such miracle weapon exists, for if they existed they would have been
> used before now.[441]

On the last day of March and the first day of April, ULTRA SIGINT intercepted

orders that the German Army protect specified facilities in the Hartz Mountain and

Thuringian Forest areas of central Germany. These included "certain industrial

installations at Nordhausen," most likely a reference to the Mittlewerk/DORA production

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[440] Babbington-Smith, 1957. Pp. 237-238.
[441] Petersen, editor, 1996, PP. 477-477.

and concentration camp facilities. [442] At this same time, Dulles was informing London of ongoing "secret surrender" negotiations with SS General Wolff. In these conversations Reich Security Chief (RSHA) Kaltenbrunner was said to have called the situation desperate—no one dared tell Hitler the truth of the situation and some of his advisers had taken to calling the Vergeltunswaffe ("vengeance" weapon) V-2 the Versweiflunge, or "desperation" weapon.[443]

During the second week of April, at the time President Roosevelt died, the ALSOS Mission was inspecting Dr. Walter Gerlach's laboratory in Stadtilm, about 25 km south of the industrial city of Erfurt. While ALSOS was looking for scientific and technical information, this visit provided an example of information that was only sporadically available before the Allies entered Germany.   The team uncovered a GESTAPO secret police report that described the bureaucratic infighting that was going on in January 1943 at Peenemünde.. It isn't clear that such information would have changed British or American perception of the secret weapon program significantly, but it could have given civilian and military decision makers some context on the occasional references from agent reports and SIGINT about missile reliability problems. In his memoir, Goudsmit's conclusion about the efficacy of the V-2 after the Gerlach laboratory visit paralleled Vannevar Bush's skepticism about the rocket's cost effectiveness. In Goudsmit's words:

> The Peenemünde Project did succeed; at least, the V-2's were used against London late in 1944. From a technical and scientific point of view these Buck Rogers inventions were really a marvel, but it is questionable if they could have altered the outcome of the war, even if they had been used earlier. The amount of explosive each V-2 carried was comparatively small; all the V-2's together would not have been equivalent to one major Allied air raid. Moreover, the V-2 was effective only against a target like London. It was the first step in a development which later may become of major importance in warfare, but the Germans used it prematurely. The only real advantage they had was that they

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[442] Bennett: 1980. Pp. 251, 253.
[443] Petersen, editor: 1996, Pp. 486-488, Dulled to London telegram 9119,   .

could not be shot down like planes and did not involve the loss of highly trained personnel, like bomber crews.[444]

Similarly, ALSOS captured the office of Professor Osenberg in Hanover in early April. In this instance, they found a file from of the SS Ahnenerbe Foundation that described the use of a mathematical section of concentration camp inmates to do computing work related to V-1 and V-2 development. Goudsmit reports that "They were reported to have done very good work."[445] But the ALSOS primary mission was determination of Germany's atomic weapon capability. From documents captured by ALSOS in its earlier French and western Germany investigations Pash and Goudsmit were sure that German research was located in the Black Forest region of Württemberg, south of Stuttgart. In an operation codenamed HARBORAGE, Directed by General Marshall and coordinated by MANHATTAN Project Commander Groves, ALSOS formed a 6th Army Group T-Force under Pash's command to move into the anticipated area as combat conditions permitted. April 22 began its movement into the villages of Haigerloch, Hechingen, Bissingen, and Tailfingen. This investigation finally led to senior decision maker acceptance of the limited nature of the German atomic program.[446]

On May 2, the same day that von Braun arranged the surrender of the Peenemünde team, SHAEF G-2 issued an order establishing procedures for "Evacuation of Technical Intelligence Material by Air." The order prescribed weight limits, flights

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[444] Goudsmit: 1947, Pp. 145-147.
[445] Goudsmit: 1947, Pp. 197, 207. The Ahnenerbe Foundation was an SS organization specializing in racial history and anthropology.
[446] Vincent C. Jones. *MANHATTAN: The Army and the Atomic Bomb*. Washington, D.C.: Government Printing Office, for the Center of Military History, United States Army, 1985. Pp. 289-290.

available, and times of departure for flights from Paris by the 302nd Transport Wing, to begin immediately.[447]

     .The Army Air Forces SAG team arrived on the Continent on April 28 under the code name OPERATION LUSTY, an operation that blurred the distinction between intelligence and scientific investigation. Sherman Kent shortly after the end of the war pointed out some procedural differences with intelligence and scientific research frames of reference—mainly the specificity of information required and the short deadlines often required for information to be of intelligence value (see pages 62 and 63, above.) The distinction being made in the present study is one of the effects of institutional subordination in a complex and hierarchical organization: duplication of effort and conflicts of interest that arise when two parts of a complex organization are performing similar activities.

     Von Kármán's technical frame of reference was guided by his position as Chief of General Arnold's Scientific Advisory Group. His key problem was to obtain information to inform General Arnold's post-war Air Force strategic research and development effort based on his team's independent observation and assessment of German rocket-related technology. On the other hand, the military intelligence teams were focused more on the physical capture and detailed examination of operational-tactical equipment and personnel.

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[447] Memorandum, G. H. Schwedersky to "Distribution," File designation SHAEF G-2 GBI/TECH/319(EE)-3U-1. Subject Evacuation of Technical Intelligence by Air, dated 2 May 1945. Records of the Supreme Headquarters Allied Expeditionary Force. Record Group 331, SHAEF G-2, Box 142, Intel Target "T" Subdivision. National Archives at College Park, MD.

Both the military intelligence and SAG investigative efforts were in search of information on the V-2. Von Kármán, however, was a user of intelligence but not a producer of it. But, in the view of intelligence management, his team was forcing deployed military collectors to pay an opportunity cost by competing for scarce support resources therefore unavailable to the more routine operational-tactical military intelligence mission.

With von Kármán in the lead as a nominal major general, the SAG group moved to the Headquarters of the United States Strategic Air Forces in Europe on May 4. The Air Force representatives then proceeded to a series of activities which included visiting German research facilities, interviewing German scientists and gathering together a major trove of documents and microfilm copies. Von Kármán's associates Wattendorf and Dryden traveled to Munich and interviewed both Wernher von Braun and General Dornberger.[448]

According to American army officer Slusser, SIGINT activities at Bletchley Park's Hut 3 continued through VE-Day on May 8. But the pace of activity slowed down considerably and interest turned to writing the history of SIGINT in the war.[449]

Professor Clarence Lasby comments on the impact on Europe-based intelligence of disbanding SHAEF on 24 July 1945—creating organizational blocks to the development of knowledge through removing the theater-based intelligence support structure that advocated importing German scientific and technical experts to the United States:

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[448] Gorn, editor, 1994, Pp. 6-7. See also von Kármán's memoirs: 1967, Pp. 272-283
[449] Slusser, 1993. P. 76.

The changeover from war to occupation in the theater had a crippling effect on Project Overcast in that it destroyed much of the organizational machinery which had kept the program going. SHAEF disbanded on July 24, and with it the two Allied intelligence agencies, CIOS and TIIC. The military's autonomous agencies—the Naval Technical mission, Special Mission V-2, and Project Lusty—all of which had been so ardent in pursuit of their quarry, disappeared soon after the end of hostilities, and most of their staff went on to new assignments or back to civilian life. When the prime movers of importation left, no group with equivalent dedication arrived to take their place.[450]

By August 1945, at the time the American atomic bombs were dropped on Japan, the Soviet Union was beginning to reorganize those former members of the Peenemünde team who had decided to work with the Russians into a new rocket establishment in Soviet-occupied East Germany.[451] This group, under the name Institute Rabe, was led by Helmut Grottrup, who had been in the Measurement House at Peeneünde and was one of those arrested by the SS along with von Braun on suspicion of treason. The interest of the western Allies in the V-2 turned to upper atmosphere research to support their own indigenous rocket development programs. The Soviets, on the other hand, built their own clone of the V-2 which they called the R-1. It became one of the first intelligence targets of the post-war American and British intelligence communities.

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[450] Lasby, 1971, P. 106. With the end of the war in Europe, CROSSBOW became OVERCAST.
[451] Lasby, 1971, Pp. 139-141.

Chapter 10

CONCLUSION: INTELLIGENCE AND THE V-2 AFTER THE WAR

The most obvious change in American intelligence during World War II was its growth from a relatively simple—but poorly staffed and funded group of independent organizations within the power structures of parent armed services and military departments—to a large and highly complex system of civilian and military knowledge production capabilities enabled by material technologies in areas such as signals intercept, airborne photography, and information handling. This system was capable of providing both strategic information for planning and operational information for soldiers, sailors and airmen in combat.

However, the perceived level of effectiveness depended on the judgments of the policy makers, planners, operators, and intelligence personnel involved. No universal acceptance of the structure, functions and output of the variety of wartime intelligence organizations was ever achieved. The STS analysis of the history of Allied efforts to build knowledge of the German secret weapon program helps to understand why this was so.

Chapter 2 traces the development of American intelligence from its early adaptation of British Colonial practices through the beginning of World War II. In its earliest iteration, the number of intelligence-relevant social groups was small, basically limited to the Second Continental Congress and its Committee of Secret Correspondence. The intelligence problems these groups faced were also few: inadequate knowledge of

British military operations in the former colonies, inadequate knowledge of British political intentions in London, and a shortage of weapons with which to combat British incursions.

As shown in figure 7, the problem of creating military knowledge for the Continental Army was addressed by General Washington with artifact organizations for capturing enemy communications, employing military scouts and dragoons to track British movements, and operating spies and couriers—very much in the British tradition. The problems for the Committee of Secret Correspondence were defined at the time more as diplomacy than as any sort of organized intelligence or covert action activity. They were addressed through the placing of American ministers, essentially ambassadors, in London and Paris where Benjamin Franklin and others gathered information and made arrangements for secret purchase of arms from France.

Figure 7

INTELLIGENCE SOCIO-TECHNICAL ENSEMBLE DURING THE AMERICAN REVOLUTION
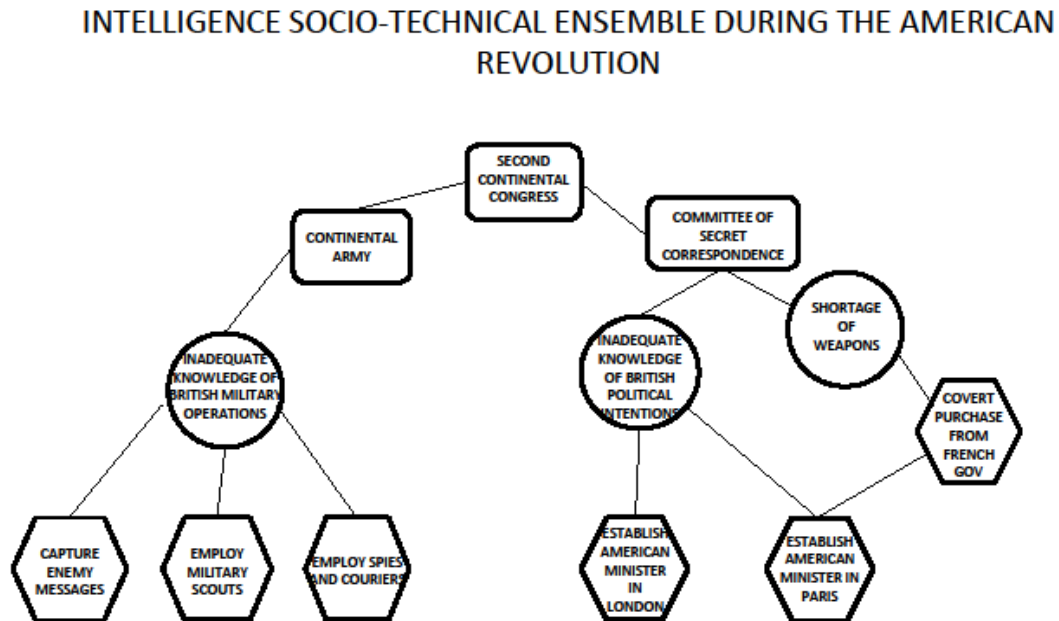
The technical frame established for Revolutionary War intelligence contained a number of characteristics that continued well into the mid-nineteenth century and in some cases well beyond. Intelligence was seen as a military activity, organizationally separate from its diplomatic counterpart. Organizations dedicated to intelligence were as temporary as the military commanders they served. When the armies were drawn down after the War of 1812, the Mexican-American War, and the Civil War, so were their intelligence functions. There was no standing corps of professional intelligence officers

until the 1880s, when the Navy and the Army established Intelligence Divisions in the Navy and War Departments.

Information that was collected on foreign military and naval services and procedures was the product of senior officer observers, not intelligence staffs. Intelligence in the Army, while occasionally recognizing the potential value of newly developed enabling technologies of aviation, photography, and communications intercept, remained focused on patrols and scouts not very different from the Continental Army in 1780. America's problems were seen largely as domestic issues. With the exception of the Mexican-American War, little interest was shown in foreign entanglements until the onsets of the Spanish-American War and World War I. Perhaps most importantly, the public perception of espionage and other covert activities was tainted in the minds of much of the American public with an appearance of unethical sneakiness that did not fit with America's self-mage of openness and straightforward behavior.

World War 1 was a watershed event for American intelligence. Expanding American interest in international trade and political relationships, combined with rapidly advancing heavier-than-air transportation capable of crossing oceans and new developments in radio communications, brought involvement of America into the twentieth century and embroiled it in foreign affairs, requiring greater access to information on activities that affected American interests. The rapid build-up of America's armed forces in 1917 and 1918 gave a boost to new technical means of collecting information and to increasing specialization in America's military intelligence activities. This reliance on adapting emerging technologies to the data gathering and

311

information processing needs of professional intelligence specialists continues to the present. It also resulted in a vastly increased complexity of the social arrangements required to organize and manage permanent staffs of professional intelligence specialists.

However, during the Great Depression in the 1930s, the military and its intelligence components were once again cut dramatically. At the same time, the post-World War I atmosphere also gave rise to increased uncertainty about the ethics of use of new spying on the activities of other nations—a change in the wartime intelligence frame's problem solving strategy. The best known example was Secretary of State Stimson's withdrawal of support for peacetime State Department use of interception and decryption of foreign diplomatic communications.

The tensions in Europe in the last half of the 1930s provided motivation for American Executive and Military interest in what were thought to have been possible revolutionary enemy weapons technologies. Learning of these became a key problem for the America's political and military frames. In turn, this became a goal for its intelligence frame. In addressing the problem-solving strategies that intelligence managers would need to undertake to satisfy the needs, a large number of specialized technical activities were created to collect, process, analyze, and distribute information to policy makers, strategic and tactical planners, operators, and eventually the general public. Figure 8 is a representation of the structure developed.

Figure 8
SECRET WEAPON-RELATED INTELLIGENCE SOCIO-TECHNICAL ENSEMBLE/SYSTEM – EUROPE 1945
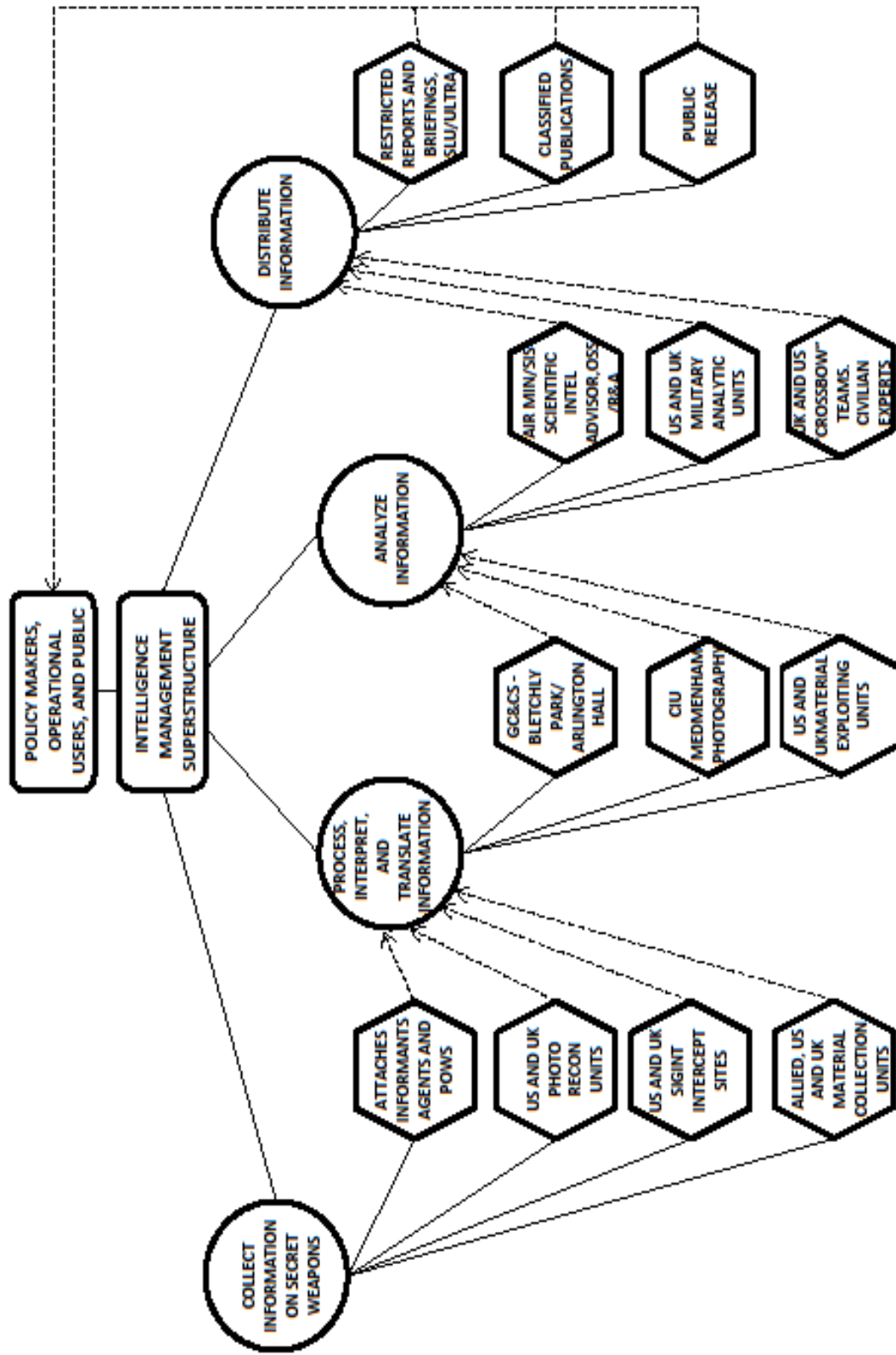
Figure 8 is a combination of the type of SCOT diagram proposed by Bijker and the technological system proposed by Hughes. The primary relevant groups portrayed are the users of intelligence on secret weapons and the intelligence management structures subordinate to them within a hierarchical government. The critical problems for intelligence were acquiring information, processing that information into forms that can be passed to specialist analysts, and finally distributed to users. The various organizations and functions discussed in Chapters 4 through 9 are the specific solutions that were created to enable resolution of the intelligence problems. They are also the instantiation of the three-part functional model presented in Chapter 3. However, the diagram differs from Bijker's model in the use of dashed lines from each "solution" to the next critical problem and then back to the policy makers, operational users and sometimes the public. This closure illustrates how Bijker's socio-technological ensemble becomes a technical system.

The complexity of the relationships portrayed in Figure 8 is evident in the specific organizations that were developed as solutions to the critical problems of data gathering, information processing, analysis and data distribution. Each of these organizations is staffed with specialists and bounded by the activities that are unique to it.

While there were disagreements and differences of opinion within some of these organizations, the bigger difficulties over substitution functions seen in this study were between the actors in different parts of the solution process. For example in Medmenham photo analysts' objecting to R. V. Jones' doing his own imagery analysis, they thought him an amateur and themselves as the professionals. There were also

disagreements at different levels of command, as with SHAEF G-2 General Strong's

anger over not being told early-on about the distributors of intelligence product about the

secret weapons because of what he saw as unnecessarily strict classification.

Nonetheless, the combined American and British intelligence system that emerged

during the war was effective in supporting decisions to bomb Peenemünde and the

Channel Coast V-1 launch sites and to make provision as the Allied Armies overran

German positions for the capture of rocket hardware and internment of German rocket

experts. These would prove of value postwar as America, Britain and Russia created

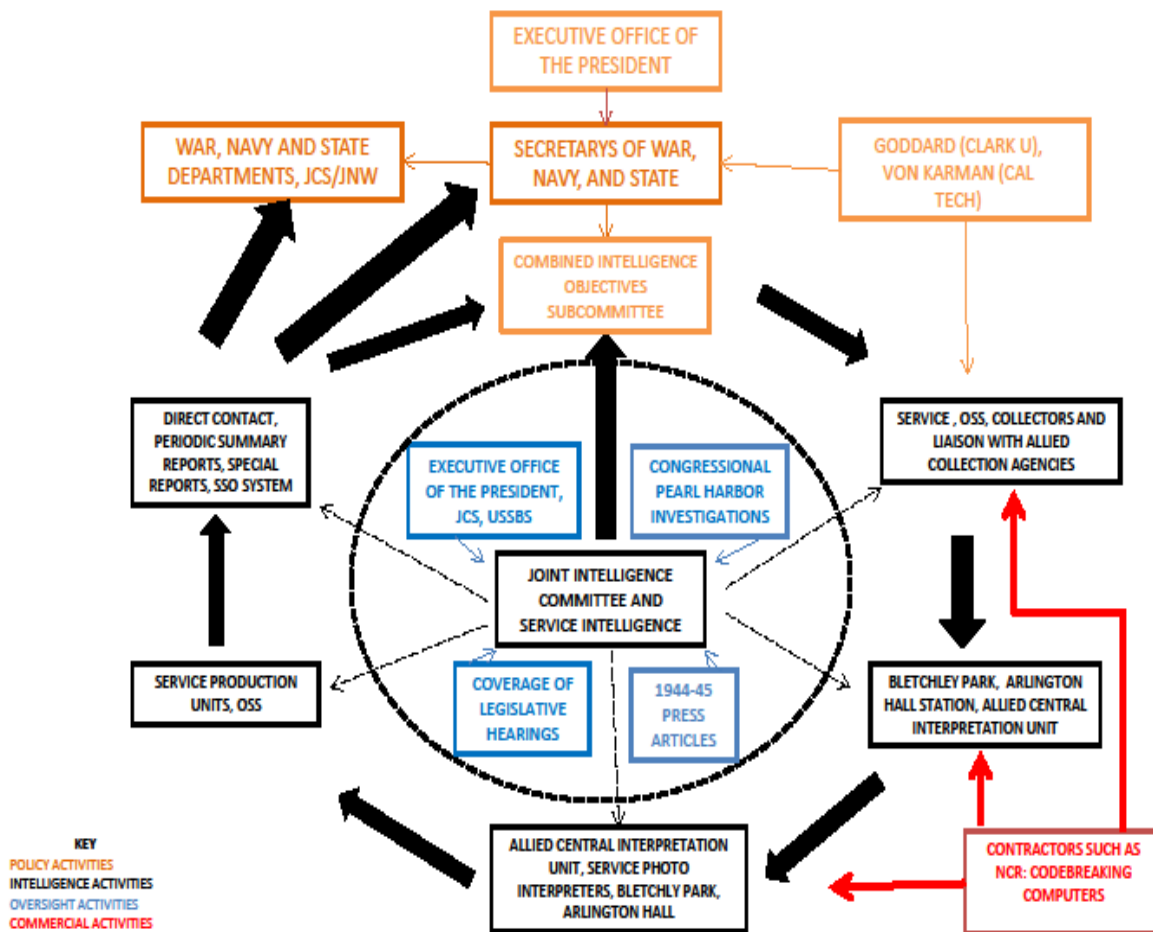both postwar space flight and ballistic missile programs.

Another way of looking at the complexity of the American intelligence technical

system is provided by a review of the model presented in Figure 5 in Chapter 3. Figure 9,

below adapts that model to display many of the postwar characteristics of American

intelligence. It is selective in the organizations and functions portrayed but it does

suggest the large number of actors involved in the intelligence process after 1945.

While it shows the general flow of information, it also provides perspective on

categories of relevant groups, as well as the types of formal and informal interactions

carried on among these groups. The boxes show boundaries, with each bounded area

having different frames of reference depending on seniority or function. The boxes in

light brown are the managers and decision makers who require specific information and

provide political guidance and direction. The boxes in blue are those groups that provide

specific guidance for the form and functioning of intelligence components and provide

official or public oversight functions. The boxes in black are the active intelligence

practitioners who work within senior military or civilian functions but show some independence of frame based on their specialized equipment and procedures. Finally, the red box represents civilian contractors that provide specialized support to the intelligence practitioners. The arrows then show the direction of information flow, while the thickness of the arrows gives a rough estimate of the amount of information provided to the next link in the network.

Figure 9

COMPLEXITY OF AMERICAN SECRET WEAPON INTELLIGENCE AT WAR'S END

EXECUTIVE OFFICE OF THE PRESIDENT

WAR, NAVY AND STATE DEPARTMENTS, JCS/JNW

SECRETARYS OF WAR, NAVY, AND STATE

GODDARD (CLARK U), VON KARMAN (CAL TECH)

COMBINED INTELLIGENCE OBJECTIVES SUBCOMMITTEE

DIRECT CONTACT, PERIODIC SUMMARY REPORTS, SPECIAL REPORTS, SSO SYSTEM

EXECUTIVE OFFICE OF THE PRESIDENT, JCS, USSBS

CONGRESSIONAL PEARL HARBOR INVESTIGATIONS

SERVICE, OSS, COLLECTORS AND LIAISON WITH ALLIED COLLECTION AGENCIES

JOINT INTELLIGENCE COMMITTEE AND SERVICE INTELLIGENCE

SERVICE PRODUCTION UNITS, OSS

COVERAGE OF LEGISLATIVE HEARINGS

1944-45 PRESS ARTICLES

BLETCHLEY PARK, ARLINGTON HALL STATION, ALLIED CENTRAL INTERPRETATION UNIT

KEY
POLICY ACTIVITIES
INTELLIGENCE ACTIVITIES
OVERSIGHT ACTIVITIES
COMMERCIAL ACTIVITIES

ALLIED CENTRAL INTERPRETATION UNIT, SERVICE PHOTO INTERPRETERS, BLETCHLY PARK, ARLINGTON HALL

CONTRACTORS SUCH AS NCR: CODEBREAKING COMPUTERS

Two factors were particularly important in determining whether the social and material technology of intelligence was seen as successful or unsuccessful: boundaries between the actors and competition between their technological frames, their key goals, strategies of application, requirements to be met, and practices to be employed.

However, this complex system also displayed organizational difficulties that are revealed by a Science and Technology Studies analysis based on the social construction of organizations to manage the material technology. Within the various Allied civilian and military power centers, the frames of political and operational reference of leaders sometimes differed from those of their subordinate intelligence organizations. These differences appear to reflect varying levels of inclusion of different organizational components within in a single technological frame. For example:

- the British tension between its Scientific Intelligence advisor and the Sandys cabinet investigations in advance of the August 1943 bombing of Peenemünde,.

- the debates over the load carrying capability of the A-4/V-2 and the overly-simplified assumption that fragmentary evidence about secret weapons described a single type of hardware,

- the British hesitation to give American intelligence access to ULTRA information, and

- differences of opinion on rocket characteristics between the British
  intelligence analysts and their theoretically-focused experts.

The problem of boundaries is less obvious, but it resulted in putting blocks in the way of total cooperation among the Allies as well as the intelligence services of the individual nations. However, its strongest demonstration was in the stonewalling and deception practiced by the Soviet Union in the Blizna affair. Nonetheless, the western and eastern Allies' shared goal of defeating the Nazi Reich resulted in adequate provision of information on the secret weapon threat, if not the cooperation for post-war exploitation of German technology.

The "Combined" institutions formed for the American and British militaries effectively over road the traditional boundaries of military and intelligence organizations within the independent services. As the war ended, these combined organizations were dissolved, and American intelligence reverted to the prewar frame in which the holders of the political and military frames exercised independent control of subordinate organizations and resources. The single organization specifically designed to coordinate intelligence activities and produce integrated knowledge was terminated, its operational resources being transferred to the War Department and its analytical components transferred to the State Department.

The executive holders of the American political frame quickly recognized the loss of integrated strategic information. This, in part, led to the National Security Act of 1947 creating a new Department of Defense to coordinate the activities of the formerly independent services. It created an Air Force independent of the Army and, Navy. And,

most important for the post-war intelligence frame, it established a new Central

Intelligence Agency to coordinate intelligence activities that would directly serve the

goals of the Executive Branch's broad political frame of reference.

The failure to stabilize the authorities and functions of the traditional American

intelligence military intelligence organizations and the new central coordinating body in

the National Security Act of 1947 also reflected boundary problems and shows that a

temporarily stabilized technological structure in a period of crisis could destabilize once

the crisis requiring the integration of efforts had been resolved.

The newly reorganized armed forces fought to maintain their independent

command authority over their integral intelligence organizations, but they found

themselves competing with one another for a share of the increasingly expensive

technical collection systems. Nonetheless, they and their Congressional supporters

sometimes saw the new Central Intelligence Agency that responded directly to the senior

political decision makers as a threat to the services' ability to adequately control their

intelligence efforts. These tensions remain unresolved.

As the war ended, interest in rocketry continued, but more in the frame of

research and development than intelligence targeting. The V-2 remained an object of

intelligence for the western Allies until the mid-1950s. But the key problems of this

particular concern had become what the Soviet Union was doing with its V-2s and what

new technology it was developing in the missile field.

U.S. perspectives on the danger presented by the V-2 during the war had varied

within and across organizations. Some postwar V-2-related literature reflects a

perspective held by a number of military operational managers during the war that the V-

2 was militarily insignificant. This view saw it a questionable use of resources to pay much attention to the German weapon while the war was still going on. However, many other wartime decision makers would not assume that the rocket might turn out to be ineffective.

Some who were less skeptical saw the V-2 through a lens that had overestimated the payload potential of the rocket by a factor of 10 in early 1944 and confounded information about rocket development with that of other weapons. giving a very confused picture of a technology that appeared fully capable of delivering biological, chemical, or radiological mass-destruction devices—and perhaps even a nuclear bomb. Thus, postwar acceptance of the accurate-in-hindsight assessment of limited V-2 effectiveness seems to reflect a form of "presentism" when interpreted exclusively through the eyes of the senior American and British wartime planners skeptical of Germany's missile threat.

America, the United Kingdom, and the Soviet Union pursued advanced rocket designs after the war. The United Kingdom, with American assistance, test launched a small number of V-2s from Cuxhaven to the North Sea under the codename Operation BACKFIRE. The Americans, in Projects OVERCAST, PAPERCLIP, and LUSTY assembled much of the von Braun Peenemünde team and several examples of the V-2 first at Fort Bliss, Texas and White Sands, New Mexico. The resulting American tests were largely for upper atmospheric research—leading ultimately to the establishment of an Army missile agency and then the civilian National Aeronautics and Space Administration facility in Huntsville, Alabama. For their part, the Soviet Union established Institute Rabe near the abandoned Mittlewerk under former Peenemünde officer Helmut Gröttrup. This was soon moved to Moscow and a development facility at

Kapustan Yar.. While much of their early data was derived from a common baseline of

V-2 technology, each of these three nations created parallel indigenous design programs.

Only the Soviet Union deployed their version of the V-2 as the operational military

weapons, the R-1 and R-2.[452] However, postwar perceptions of the value of nuclear-

armed ballistic missiles varied significantly. For example, Winston Churchill's science

advisor, Frederick Lindemann, initially thought the idea of a large, long range, liquid

fueled rocket was unworkable,[453] and U.S. science advisor Vannevar Bush wrote as late

as 1949 that the thought of a large, weapon-carrying rocket was a "fantastic proposal"

that would "never stand the test of cost analysis."[454] On the other hand, the Chief of Staff

of the U.S. Army Air Corps, General Henry H. Arnold, asked Theodore von Kármán,

chairman of his scientific advisory group, as early as November 1944 to provide an

assessment of potential scientific and technical threats, including whether or not "the

present trend toward terror weapons such as buzz bombs, phosphorous and napalm may

further continue toward gas and bacteriological warfare." The attachments to von

Kármán's December 15, 1945 response specifically included a section on guided missiles

and pilotless aircraft.[455]

Postwar intelligence activities had supported the earliest Allied efforts at

capturing and moving V-2-related personnel and hardware to safe areas. But the further

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[452] See James McGovern, *CROSSBOW and OVERCAST*, New York: William Morrow & Co., Inc., Pp. 186-206 for a summary of the transition from war to peacetime operations. Chertok: 2005, Volume 1, Pp. 309-317 and Pp. 345-369 provides his commentary on Institute Rabe and Nordhausen.

[453] Jones, R.V., *The Wizard War: British Scientific Intelligence 1939-1945*, New York: Coward, McCann & Geohegan, Inc., 1978, P. 335.

[454] Bush, Vannevar, *Modern Arms and Free Men: A Discussion of the Role of science in Preserving Democracy*, New York: Simon and Schuster, 1949, P. 86.

[455] Gen Arnold's letter and von Kármán's response are reproduced in Gorn, Michael H., *Prophecy Fulfilled: "Toward New Horizons" and Its Legacy*. Washington, D.C.: Air Force History and Museums Program, 1994, Pp. 85-91.

participation by intelligence officials and organizations rapidly diminished as the rocket development efforts became more clearly aligned with military technology research and development programs within their parent organizations' frames of reference. By the early- to mid-1950s, considerable information on rockets in general and the V-2 in particular was available and served to increase public awareness of the threat that combinations of rockets and nuclear weapon technology presented—both factual and fictional. For example, Ian Fleming's 1955 James Bond novel *Moonraker*[456] pits Bond against an antagonist, Drax, described as a German agent during World War II who built a V-2-like system that would be launched from a domed concrete structure on the English side of the Channel coast. Once again a rocket was to be aimed at London, this time to be launched from within British territory and with a nuclear warhead.

The V-2 as a subject for American intelligence activities was one part of what became a complex combination of independently developed weapon technologies—the merging of the guided missile with the nuclear bomb—that gave credibility in the post-World War II era to Cold War fears of an enormously destructive bomb on a virtually invulnerable delivery vehicle. The United States—and other Allied Powers, particularly the United Kingdom, and the Soviet Union—had considerable information available that could have allowed decision makers to anticipate the threat posed by the revolutionary weapon combination. But neither the U.S. nor the U.K. seemed willing or adequately prepared to capitalize on the knowledge they possessed in the decade after Germany was defeated.

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[456] Fleming, Ian. *Moonraker*. London: Glidrose Productions, 1955. Penguin Books (USA) reprinted this novel in 2003. See especially pages 106 to 111 of the Penguin edition for a description of the launch facility carved out of an old quarry that has features similar to the German's Wizernes site in northwestern France that was bombed by the Allies before it could become operational. (The 1979 movie with the same title has little resemblance to the 1955 novel beyond the names of some of the primary characters.)

It is important to recognize that, despite its wartime tactical ineffectiveness, the V-2's importance transcended the period of the war—making understanding it a problem of forward-looking strategic intelligence. The boundaries of the 1939-1945 war are intellectual constructs defined from a diplomatic and legal perspective. American assessments of the longer-term importance of the liquid-fueled rocket were shaped by the relatively short-sighted focus on what went on only between those dates and by failure to learn during the weapon's development phase what German technology was being created. This was combined with the perceptions of U.S. policy, planning, and operational bureaucracies that did not adequately appreciate what marrying the German-developed rocket to the Allied-developed nuclear warhead might bring.

Comparison of the American approach with that of the Soviet Union is helpful in suggesting alternative approaches to the weapon technology development problem that conditioned post-war innovation in intelligence social and material technologies. Soviet Army Marshal V. D. Sokolovsky, chief of its General Staff from 1953 until 1960, describes in the first edition (1962) of his *Military Strategy*,[457] how the marriage of the two technological artifacts came to be seen in the Soviet Union as a "revolution in military affairs." The nuclear bomb had unprecedented destructive power, and the ballistic missile could deliver that bomb over great distances, at short notice, and with little possibility of interception. Sokolovsky traces development of the missile component of this marriage back to the development and transfer of Germany's World War II liquid-propellant rocket technology. He says that the combination of the rocket and the atomic bomb produced social changes: "fundamental revolution in military

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[457] Sokolovsky, V. D., Marshal, editor. *Military Strategy: Soviet Doctrine and Concepts.* Introduction by Raymond L. Garthoff. New York and London: Frederick A. Praeger, Publisher, 1963, P. 186.

science, a revolution immeasurably greater than that caused by the appearance of gunpowder and firearms." This revolution was reflected in new forms of military organization specifically designed to control and employ the missile-nuclear bomb combination in the Soviet Union and its former U.S. and British allies.

During the European war, each of the three major Allied Powers had development programs for acquiring nuclear weapons and was aware of the value of limited-range solid-propellant tactical battlefield rockets. However, none of the three developed sufficient knowledge of the Germans' war-time, long-range, liquid-propellant ballistic missile to be able to pursue their own innovations of similar technology, to develop countermeasures, or to anticipate the level of threat that the ballistic missile combined with the nuclear bomb would present to the post-war world. It was only after the Germans successfully demonstrated in the fall of 1944 the viability of liquid-fueled rocket technology in the form of the A-4/V-2 rocket[458] that the U. S. and the other Allies began to consider efforts of their own to build similar weapons or unique social systems necessary for creating strategies controlling their employment.

From one perspective, this might be considered an "intelligence failure" in the sense that the U.S. and its Allies had developed intelligence information available from a range of open and clandestine sources that could have enabled them individually and collectively to better understand the implications of Germany's liquid-fuel rocket development. But the information product of their intelligence frame did not prove

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[458] The German Army's designation for their operational liquid-propellant rocket was A-4 (*Aggregat*, "unit" or "set"-*4*.) The Designation V-2, or *Vergeltungswaffe-2* ("revenge weapon-2") was a 1944 designation invented for purposes of political propaganda. See Michael J. Neufeld, *The Rocket and the Reich: Peenemünde and the Coming of the Ballistic Missile Era*, New York, London, Toronto, Sydney, Tokyo, and Singapore: The Free Press, 1995, Pp. 281-284, for a summary of the series of German Army Ordnance Liquid-fueled rockets.

effective in overcoming the decision makers' political frame by convincing decision makers to pursue the implications of the knowledge they had. In other words, the individual Allied nations' decision makers were unable or unwilling to exploit available knowledge of the German technology during the war.

Post-war, only the Soviet Union with its integrated intelligence, military, and political frames transformed the V-2 into an offensive weapon. Its copy was called the R-1 and was made operational in 1950.[459] The U.S. and the U.K. used their wartime intelligence as one basis for carrying out testing on captured V-2s used for research purposes. However, their postwar only-partially-integrated intelligence frames were focused on different issues such as Soviet nuclear weapon development and their ground and naval forces. Both nations developed aeronautical technological frames—relying on scientific research but often independent of intelligence--that supported totally new weapon designs concentrating on airborne delivery vehicles for their operationally deployed nuclear weapon systems. As a consequence of the mismatch between the goal of the dominant decision makers' political frame and the knowledge produced within their intelligence organizations' frames, both nations' political decision makers delayed development of rockets as carriers for nuclear bombs at the same time the Soviet Union was conceptualizing its "Revolution in Military Affairs.". The U.S.-designed THOR Intermediate-Range Ballistic Missile became operational in both U.S. and U.K. Air Forces in the late 1950s, after the Soviet Union's launch of the Sputnik in 1957. The intercontinental ballistic missiles ATLAS, TITAN, and MINUTEMAN did not become

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[459] Godwin, Robert, editor – English edition. *Rocket and Space Corporation Energia: The Legacy of S.P. Korolev*. Ontario: Apogee Books, 1971, P. 123.

operational in the U.S. until September 1959, April 1962, and October 1962,

respectively.[460] Without the convergence of goals, problems, and requirements in the

reference frames of senior political-military policy makers and those of their supporting

intelligence agencies, the knowledge produced by those agencies has limited practical

meaning.

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[460] Berhow, Mark A. *US Strategic and Defensive Missile Systems 1950-2004*. Oxford and New York: Osprey Publishing, 2005, Pp 12-13. These dates are somewhat at variance with the Air Force historian's dates described above. The important point for this discussion is that the operational status of all these systems was not until about 1960, well after American intelligence and engineers acquired detailed information from participants in Germany's V-2 development effort.

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