The Bombing of Brittany: Solving the Wrong Problem

A Monograph

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AY 2010

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
12-05-2010	SAMS Monograph	July 2009 – May 2010

4. TITLE AND SUBTITLE
Bombing Brittany: Solving the Wrong Problem

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Major Jeremiah S. Heathman (U.S. Air Force)

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
School of Advanced Military Studies (SAMS)
250 Gibbon Avenue
Fort Leavenworth, KS 66027-2134

8. PERFORMING ORG REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army School of Advanced Military Studies
Fort Leavenworth, KS 66027

10. SPONSOR/MONITOR'S ACRONYM(S)
CGSC

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution is Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

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15. SUBJECT TERMS
Second World War, Allied Bombing, Design, Submarine Pens, Bomber Operations, Brittany, Occupied France, British Royal Air Force, US Army Air Corps, Organization Todt

16. SECURITY CLASSIFICATION OF: (U)			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					Stefan J. Banach COL, U.S. Army
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. PHONE NUMBER** *(include area code)*
(U)	(U)	(U)	(U)	62	913-758-3302

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major Jeremiah S Heathman

Title of Monograph: The Bombing of Brittany: Failing to Solve the Problem

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Abstract

THE BOMBING OF BRITTANY: SOLVING THE WRONG PROBLEM by Major Jeremiah S Heathman, USAF, 62 pages.

As a result of the Allied bombing campaign against Nazi submarine bases during the Second World War, the cities of Brest, Lorient, and Saint Nazaire were nearly completely destroyed. Despite thousands of bombing missions, all three submarine bunkers still stand today. This monograph examines the effectiveness of the Allied bombing campaign against German submarine bases in Brittany by analyzing the campaign through the use of a design methodology. Research is broken down into three frames: the operational approach, the operational environment and the problem frame. The first frame provides an account of the bombing missions and effects. Next, an overview of the operational environment is conducted by exploring the historical context of Brittany, German construction efforts and Allied institutional barriers. The study concludes by examining the problem frame, which entails how the Allies perceived their operational problem and developed an approach based on their understanding. Ultimately, the Allies failed to accurately identify their problem and developed an ineffective approach towards defeating the threat. Had the Allies incorporated design thinking into their planning and execution, they may have developed an effective campaign towards defeating the Nazi U-boat threat rather than solving the wrong problem.

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Introduction

When tourists visit the French Brittany Coast they find cities that are fairly new and modern compared to the historically rich cities found elsewhere in France. Few tourists understand this since the French restored many of the historical sites. The alert observer asks what happened to the original structures. Three major coastal Brittany cities, Brest, Lorient, and Saint Nazaire were nearly completely destroyed by Allied bombing during the Second World War. Why were these three cities targets for British and American bombers? Soon after the occupation of France, the German military constructed massive, concrete submarine bunkers and port facilities to expand their naval operations closer to Allied forces in the North Atlantic. Following the war, all three cities experienced significant effects such as economic, political, and social disruptions due to long-term reconstruction efforts.[1] It is important to understand how Brittany suffered during this time period since most people, outside of France, do not realize the level of destruction and long-term consequences caused by British and American bombing throughout the war.

Within these three Brittany communities, located within 300 kilometers of each other on the northern coast of the Bay of Biscay, Allied bombers caused an unprecedented amount of collateral damage during their efforts to destroy the Nazi submarine bunkers. In Brest, the Allies conducted over eighty large-scale raids between 1941 and 1945.[2] Of these eighty raids, eleven were the so-called 'hundred-bomber raids'.[3] Throughout the course of the war, Brest endured

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[1] Maria Gravari-Barbas, "Tourism Policies in French Post-2nd-World-War-Reconstructed Cities: Saint-Nazaire, Le Havre & Lorient," *City Tourism 2002: Proceedings of European Cities Tourism's International Conference in Vienna*, ed. K.W. Wöber (Vienna, Austria: Springer Verlag, 2002), 251.

[2] Richard G. Davis, *Bombing the European Axis Powers* (Maxwell Air Force Base: Air University Press, 2006); Gordon Williamson, *U-Boat Bases and Bunker 1941-45*, ed. Marcus Cowper and Nikolai Bogdanovic (Oxford: Osprey Publishing Ltd., 2003), 41.

[3] Williamson, 41.

more Allied bombardments than any other submarine base in France.[4] Lorient suffered from relatively few bombardments but was the city was nearly destroyed in the process.[5] In Saint Nazaire, the incendiary bombings of 1942 and 1943, destroyed eighty percent of the entire city.[6] As a result of Allied air campaign against the Nazi submarine bases, all three cities and their citizens suffered from not only the immediate effects of bomb damage, but also from the long-term effects of reconstruction.[7] Even today, French citizens are reminded of the attacks by the lack of historical architecture and the visible scars throughout their coastal communities. Perhaps the greatest reminder of them all is the fact all three concrete bunkers still stand today.

There are literally hundreds of books dedicated to fact-finding, analysis and historical understanding of the European Allied bombing campaigns during the Second World War. Some of the best are Max Hastings' *Bomber Command,* Gerhard Weinberg's *A World at War* and Forrest Pogue's *Supreme Command*. But, if the entire body of literature is taken into account, an overwhelming number of authors tend to formulate their findings and research into one common narrative with regard to Allied bombing. Books such as William Hitchcock's *The Bitter Road to Freedom,* Jurgen Brauer and Hubert Van Tuyll's *Castles, Battles, & Bombs,* and Robin Neillands' *The Bomber War: The Allied Air Offensive Against Nazi Germany* are primarily focused on the bombing of Germany. Writers such as these tend to defend their findings based on aircrew casualties, the destruction of German cities, civilian casualties and the long-term effects associated with the bombing. Unfortunately, this narrative has permeated historical

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[4] Ibid.

[5] Davis. Excel spreadsheets of bombing data from 1940-1945.

[6] Gravari-Barbas, 252.

[7] Hugh Clout, "Place Annihilation and Urban Reconstruction: The Experience of Four Towns in Brittany, 1940 to 1960," *Geografiska Annaler Series B, Human Geography* 82, no. 3 (2000); Gravari-Barbas, 252-255; Kenneth Hewitt, "Place Annihilation: Area Bombing and the Fate of Urban Places," *Annals of the Association of American Geographers* 73, no. (2 June 1983).

research for too many years. It is time to ask *why* this narrative has stood for so long and to start developing a larger body of knowledge in order to inform, educate and understand the scope and scale of bombing campaigns over Western Europe.

Within the past few years, a few historians have focused their research on the effects of war within occupied countries such as France. In their attempt to expand upon the breadth of knowledge regarding the effects of Allied bombing, they are essentially providing the missing pieces of historical record to form an expansive narrative of the Second World War. Authors Lindsey Dodd and Andrew Knapp at the University of Reading in Great Britain explored the effects of the British Bombing Policy on French civilian casualties. Their efforts, along with others involved in a project titled, *"Bombing, States and People in Western Europe,"* are determined to shed light on the bombing campaigns directed at occupied countries.[8] Their studies explore the changing policies and directives throughout the course of the war, the various operations executed against targets in France, and the effects of Allied bombing from the French perspective. Their findings and research go far beyond the study of civilian casualties and encourages further questioning of bombing effectiveness. Without efforts such as these the German-focused narrative would continue to dominate understanding of Allied bombing over Western Europe.

The bombing of Brittany is an interesting case study. Literally thousands of British and American bombers flew across the English Channel to obliterate the Nazi submarine bunkers in Brest, Lorient and Saint Nazaire. These bunkers were vital to the enemy in sustaining their *Unterseeboot* (U-Boat) operations in the Atlantic, which constantly threatened Allied shipping throughout the war. The German military went to great lengths to capture these port cities and

[8] Lindsey Dodd and Andrew Knapp, "How Many Frenchmen Did You Kill? British Bombing Policy Towards France (1940 - 1945)," (2008). www.fh.oxfordjournals.org (accessed February 5, 2009), 469.

turn them into fully operational naval bases in very little time. Allied leaders thought they understood the German Naval threat operating out of these submarine bunkers, so they tasked approximately 7,300 bombers and dropped nearly 20,000 tons of bombs in an effort to destroy them.[9] Just how effective was the Allied bombing campaign against these three submarine bases? This question cannot be answered with abstract metrics. It would fall short in explaining the operational environment, understanding the problem, and properly evaluating the overall operational approach. What is needed is a new methodology to apply to historically complex events to gain a deeper understanding of the conflict.

An effective way to examine historical campaigns is through the idea of framing the conflict. According to Bryan Lawson, an expert on the design thinking, framing can be seen as a window for looking at problems and situations.[10] Lawson believes by looking at problems from some angles a situation looks difficult to solve, but from other viewpoints they seem less difficult.[11] In this study, it is important to view the bombing campaign from multiple frames in order to gain a panoramic and microscopic understanding of what really happened and why. Moreover, breaking down historical events in this fashion leads to a greater contextual understanding of the situation, better identification of problems, and the ability to comprehend how solutions were developed to solve the problem.

John Lewis Gaddis best spoke of the need for an alternative research method when he wrote, “Our responsibility as historians is as much to show that there were paths not taken as it is

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[9] Davis. Excel spreadsheets of bombing data from 1940-1945.

[10] Bryan Lawson, *How Designer's Think: The Design Process Demystified*, 4th ed. (Burlington, MA: Architectural Press, 2006), 276.

[11] Ibid.

to explain the ones that were."[12] Even during the late nineteenth century, Field Marshal Helmuth von Molke, the famous Prussian officer, understood this need as an important aspect to his learning. He advanced a methodology that began by understanding a given problem, examined alternative solutions, and thought through possible courses of action.[13] This methodology of critical and creative thinking is essential to understanding complex adaptive environments.

One tool that could provide deeper analysis and understanding of historically, complex campaigns is through the use of a design methodology. Design is not a new term, but is certainly one that is somewhat difficult to put into words. Lawson had difficulty defining the term in his book, *How Designers Think,* but comes up with an appropriate way to confront the problem of finding a good definition. Lawson notes, "'Design' is both a noun and a verb and can refer to the end product or to the process."[14] From a military doctrine perspective, the United States Army defines 'design' as a methodology for applying critical and creative thinking to understand, visualize, and describe complex, ill-structured problems and develop approaches to solve them.[15]

This paper focuses on the methodology of design thinking to balance understanding of precise and vague ideas, systematic and chaotic thinking and the need for imaginative thought and mechanical calculation[16] There is a strong need for this kind of methodology since many problems in the real-world do not present themselves as simple and well-formed structures.[17] So

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[12] John Lewis Gaddis, *The Landscape of History: How Historians Map the Past* (Oxford: Oxford University Press, 2002), 141.

[13] Michael D. Krause, "Moltke and the Origins of the Operational Level of War," in *Historical Perspectives of the Operational Art,* ed. Michael Krause and R. Cody Phillips (Washington DC: Center of Military History, 2005), 117.

[14] Lawson, 3.

[15] United States Department of the Army, *The Operations Process: Field Manual 5-0 (Final Authorized Draft)* (Washington DC: Defense Printing Office, 2010), 3-1.

[16] Lawson, 4.

[17] Donald A. Schon, *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions* (San Francisco: Jossey-Bass, 1987), 4.

how does this benefit someone critically studying military history?

A design approach allows for greater analysis when dealing with complex problems and promotes critical thinking, innovation, and creativity instead of limiting understanding.[18] It allows practitioners of design to cover key elements of design such as: receipt of a situation, developing an environmental frame, problem frame, and operational approach.[19] Donald Schön, a theorist and practitioner of professional reflective thinking, believes competent designers must not only know how to solve technical problems, but have the ability to manage uncertainty and uniqueness in order to construct a coherent problem worth solving.[20] Design enables commanders to view a situation from multiple perspectives, draw on varied sources of situational knowledge, and leverage subject matter experts while formulating their own understanding.[21] By applying an iterative, "comprehensive approach to complex problem solving,"[22] This methodology can provide a greater understanding of historical campaigns to aid leaders, planners, and strategists in conducting future operational planning. The Allies could have benefitted from the concepts of design in order to develop an effective operational approach, enhance their understanding of the operational environment, and help them to identify the correct problem associated with defeating the naval threat coming out of Brittany.

This monograph seeks an answer to the overall effectiveness of the Allied bombing campaign of Nazi submarine bases in Brittany. It will answer this question by analyzing the bombing campaign using three design frames: the operational approach, the operational

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[18] Stefan Banach and Alex Ryan, "The Art of Design: A Design Methodology," *Military Review* (March-April 2009), 105.; US Department of the Army, *The Operations Process*, Chapter 3: Design.

[19] Stefan Banach, "Educating by Design," *Military Review* March-April, no. (2009): 99.

[20] Schon, 6.

[21] US Department of the Army, *The Operations Process*, 3-9.

[22] Banach, "Educating by Design," 99.

environment and the problem frame. The first frame provides an account of the ad hoc operational approach undertaken by the Allies during the bombing of Brest, Lorient and Saint Nazaire. Simply, this section highlights what happened. The second section, the operational environment, explains the historical context of Brittany, German construction and development of the submarine bases, and Allied institutional barriers that hindered execution. Finally, this monograph concludes with a look at the problem frame, which entails understanding how the Allies perceived their problem and developed solutions based on their understanding of the environment. In the end, had the Allies utilized a design methodology towards planning and execution, they may have developed a more effective campaign towards defeating the Nazi U-boat threat rather than solving the wrong problem.

This narrative does not follow the chronological sequence of the Second World War. It is purposely done in this manner in order to gain a greater understanding of this complex campaign through the use of framing.[23] In the end, this study's aim is not to place blame but to highlight the need for a better approach towards conducting complex planning at the operational level of war. Perhaps, through the use of a design approach that incorporated proper framing of the environment, understanding the problem, and developing the operational approach, Brittany would not have suffered as much near and long-term damage as it did.

[23] Banach and Ryan, "The Art of Design," 105.; US Department of the Army, *The Operations Process*, Chapter 3: Design.

Operational Approach

According to the author Randolph Bradham, throughout the course of the Second World War, "There was no other area in Europe that suffered as long and as continuously as the area in Brittany."[24] The cities of Brest, Lorient and Saint Nazaire were nearly erased from the region, along with much of their cultural and historical identity. The long-term effects of bombing the submarine bases and destroying the surrounding cities are still being felt today through urban development struggles, reduced tourism and population, lack of community identity and cultural heritage.[25] This section will highlight what actually happened to these cities and how were they destroyed.

While the Allied bombing campaign over Brittany did not dramatically alter the course of the war, the Allies did spend considerable amounts of national treasure and lost many lives in their attempts to turn the Nazi bunkers into rubble. In the end, it was the French citizens that truly suffered from the lack of a well-developed, operational approach aimed at defeating the local U-boat menace. The United States Army Field Manual 5-0 defines operational approach as a broad conceptualization of the general actions that will produce the conditions that define the desired end state.[26] In simple terms, this is how leaders visualize and develop a solution towards solving problems. The Allies were in need of a better solution that limited collateral damage and achieved the desired ends. Instead, bombing operations in Brittany were plagued by unsynchronized operations, changing political conditions, and operational priorities. This section will examine how the Allies executed their bombing campaign and conclude with an analysis of their operational approach.

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[24] Randolph Bradham, *Hitler's U-Boat Fortresses* (Westport: Praeger Press, 2003), xiv.

[25] Clout, 170-178.

[26] US Department of the Army, *The Operations Process*, 3-11.

Attacks on Brest

Bomber Command, guided by a Trenchardian philosophy that nighttime bombing was the way to conduct operations, was designed to pursue strategic offensive theories at this time.[27] Unfortunately, at the beginning of the war, the British Royal Air Force (RAF) was not in a position to fulfill its offensive-minded doctrine without long-range pursuit aircraft and outnumbered by the German Air Force in total bomber aircraft by a four-to-one ratio.[28] The British strategic air force, named Bomber Command, was organized into fifty-five squadrons controlled by five operational groups with the availability of 500 aircraft per day.[29] Each group was responsible for designated sections throughout England and Scotland. They flew a wide range of bombers from the heavy *Halifax* and *Stirling* bombers to the lighter *Whitley* and *Blenheim* bombers. Although trained for nighttime, saturation raids, they found itself with a new mission and a new kind of target with the Nazi naval threat terrorizing the Atlantic shipping routes. As a result, the War Cabinet reassigned a large number of Bomber Command assets to Coastal Command and tasked them to support the Battle of the Atlantic by attacking the submarine pens at Brest.[30]

These first attacks took place on March 30, 1941, when 109 British aircraft, mostly *Wellingtons*, bombed the German capital ships, *Scharnhorst* and *Gneisenau* in drydock.[31]

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[27] Max Hastings, *Bomber Command* (New York: Simon & Schuster Inc., 1979), 45-52. Hugh Montague Trenchard was a British officer who was instrumental in establishing the Royal Air Force. He has been described as the *Father of the Royal Air Force.* Trenchard is recognized today as one of the early advocates of strategic bombing.

[28] Ibid., 49-50. The Royal Air Force (RAF) is the United Kingdom's air force, the oldest independent air force in the world. It was formed on 1 April 1918.

[29] Ken Delve, *RAF Bomber Command 1936-1968: An Opertional and Historical Record* (South Yorkshire: Pen & Sword Books Ltd, 2005), 7.

[30] Hastings, 126; Dudley Saward, *Bomber Harris: The Story of Sir Arthur Harris, Marshal of the Royal Air Force* (Garden City: Doubleday & Company, Inc., 1985), 96.

[31] Jonathan Falconer, *The Bomber Command Handbook 1939-1945* (Thrupp: Sutton Publishing, 2003), 232.; Delve, 16-17.

Despite the size of the attacking force, good weather, and very little cloud cover, the British bombers did very little damage to the ships. In April, Coastal Command inflicted quite a bit of damage to the *Gneisenau*, keeping her in drydock for an extensive period of time. Looking to seize the opportunity to put this ship out of commission, the British attacked on four separate nights. Although the bombs available for use at the time were incapable of destroying these armored vessels, they still caused extensive damage to the *Gneisenau,* which remained in drydock through the remainder of year.[32]

From June 1941 through February 1942, roughly 1,800 aircraft consisting of light, medium and heavy British bombers, dropped nearly 3,000 tons of bombs on Brest in an effort to destroy the prized German fleet docked at Brest.[33] The city suffered from extensive collateral damage as a result of these attacks, which also failed to destroy the *Scharnhorst*, *Gneisenau* and *Prinz Eugen*.[34] Finally, on February 12, 1942, these three capital ships steamed from Brest to Germany in what would come to be known by the British as the 'Channel Dash,' as 242 British bombers pursued them with a vengeance.[35] Unfortunately, all the vessels made it back to Germany safely. In the wake of this missed opportunity, the British made drastic changes to Bomber Command's leadership, naming Arthur Harris the new, Commander-in-Chief on February 22, 1942.[36]

In November 1942, America's 'Mighty Eighth' Air Force entered operations against the Brest bunker and dropped its first bombs. But, they only flew one raid against the U-boat base,

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[32] Delve, 122-123.; Google Earth-Hacks, "Googleearthhacks.Com - German Battlecruisers Gneisenau and Scharnhorst in Brest," http://www.gearthhacks.com/dlfile30379/German-Battlecruisers-Gneisenau-and-Scharnhorst-in-Brest.htm (accessed 19 November 2009).

[33] Davis. Excel spreadsheets of bombing data from 1940-1945.

[34] Clout: 168; Falconer, 233.

[35] Falconer, 233.

[36] Ibid.

dropping a total of eighty tons of bombs.[37] Eighth Air Force activities over this city were short lived since numerous bomber assets were diverted, based on decisions made by President Franklin Roosevelt and Prime Minister Winston Churchill, to the Mediterranean theater in preparation for Operation TORCH. The purpose for this decision was to "affect a lodgment in French North Africa and to open the Mediterranean to Allied shipping."[38] Additionally, it was designed to ease pressure on the Soviet armies and check the threatened advance of German power into the Middle East.[39] President Roosevelt and Prime Minister Churchill agreed politically and militarily, this operation was extremely important to victory in Europe. Throughout the remainder of 1942 and 1943, the Eighth Air Force flew four more bombing missions over Brest as Churchill's concerns over the effectiveness of American daylight bombing began to grow.[40]

Eighth Air Force was structured similarly to Bomber Command but differed in some critical areas of operations. They both possessed bomber and fighter subordinate units with similar numbers of aircraft per element, but the American's differed in their structure of the bombardment wings, which were later restructured into air divisions versus Bomber Command's group and squadron structure.[41] Another major difference was in its approach to bombing. American bomber doctrine of the time, having its roots in the development of daylight, precision

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[37] Roger A. Freeman, *Mighty Eighth War Diary* (New York: Jane's, 1981), 22.

[38] Leo J. Mayer, "The Decision to Invade North Africa (Torch)," in *Command Decisions, Publication 70-7*, ed. Kent Roberts Greenfield (Washington DC: Center of Military History, 2000), 174.

[39] Ibid.

[40] Davis, 97. Excel spreadsheets of bombing data from 1940-1945.

[41] Robin Neillands, *The Bomber War: The Allied Air Offensive against Nazi Germany* (Woodstock: The Overlook Press, 2001), 173; Falconer, 27.

bombing, guided all training and execution of the bomber force.[42] This doctrine was also influential in the development of heavy bombers such as the B-17 *Flying Fortress* and the B-24 *Liberator*.[43] Major General Carl 'Tooey' Spaatz was the overall Commander with Brigadier General Ira Eaker commanding VIII Bomber Command.

Throughout the first half of 1944, the Allied bombing campaign focused on softening up targets within the Normandy region in order to support the eventual ground effort following a breakout into France. However, in the months following the invasion, one last round of bombings forever changed the landscape of Brest. From August through September 1944, the submarine base and city was attacked eighteen times with a bomber force of nearly 2,000 bombers, dropping more than 7,300 tons of high explosive, fragmentation and incendiary bombs.[44] A combined offensive, consisting of American and British bombers, attacked a variety of military and supporting effort targets such as: troop concentrations, rail targets, constructing and marshalling yards, fuel dumps, artillery batteries and coastal fortifications. This bombing was part of a larger effort to cut-off enemy supply lines that ran into this region of France. They essentially created a pocket of resistance out of the remaining German forces within the city.

Finally, On September 21, 1944, Organization Todt, the German military construction agency, surrendered the port city to American forces after four weeks of intense fighting.[45] During the final battle, the United States Army suffered more than 10,000 casualties and was unable to prevent the Germans from destroying nearly all the remaining port facilities in order to deny their use to the Allies immediate use. After five years of concentrated Allied bombing the

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[42] United States Air Force Air University Public Portal, "Case Study for Joint Doctrine Air Campaign Course," (1996). http://www.au.af.mil/au/awc/awcgate/readings/awpd-1-jfacc/awpdproc.htm (accessed 23 January 2010); Neillands, 178.

[43] Ibid.

[44] Davis. Excel spreadsheets of bombing data from 1940-1945.

[45] Jak P. Mallmann Showell, *Hitler's U-Boat Bases* (Chalford: Sutton Publishing, 2007), 93.

city lay in ruins but the concrete submarine pens remained intact.[46] Brest struggled during the aftermath to regain its identity as reconstruction carried on for several years following the war.

Attacks on Lorient

Bomber Command crews flew their first bombing missions against Lorient on September 2, 1941.[47] The commands planners targeted ships from the German surface fleet that had moved to Brittany in an obvious move to participate in the Battle for the Atlantic between.[48] From March to May 1941, the city was targeted two more times, again striking the German fleet and conducting mining operations within the vicinity of the port city.[49] Just like Brest, Lorient experienced an operational pause in bombing while Bomber Command changed leadership and planning efforts. By April 1942, the submarine base was back on the target list. This time, fourteen British bombers damaged the port areas with a combination of high explosive and incendiary bombs.[50] On October 21, 1942, the Eighth Air Force conducted its first raids on the Nazi U-boat base with a combination of sixty-six B-17s and twenty-four B-24s with only fifteen hitting their target due to clouds obscuring the area.[51] Monthly summaries during this timeframe indicated: two submarines believed to be sunk or damaged, the destruction of mechanics' workshops, direct hits to the U-boat bunkers and docks.[52]

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[46] Williamson, 41.

[47] Falconer, 231.

[48] Davis. Excel spreadsheets of bombing data from 1940-1945.

[49] Ibid.

[50] Ibid.

[51] Ibid., 77.

[52] United States Army Air Force, *Monthly Summary* (New York: Army Air Force Antisubmarine Command, December 1942), 21.

Lorient enticed Allied planners largely based on the fact it was the largest construction project outside of Germany.[53] One reason for the increased level of construction activities was that the city was became the new location for Admiral Donitz' U-boat Command Headquarters.[54] Based on the importance of this move, the War Cabinet approved a policy of area bombing against U-boat bases on the west coast of France in January 1943.[55] A few days later, the War Cabinet issued a directive to Air Marshal Harris stating American and British strategic air forces were to level Lorient first.[56] Beginning on night of January 14, 1943, the RAF dropped approximately 600 tons of high explosive and incendiary bombs on the city over the course of two days.[57] These successive bombings nearly destroyed the entire city-center. Due to increasing bombardments, roughly 40,000 out of approximately 50,000 *Lorientais* left town.[58] Between January and February over 2,000 sorties were flown against the city.[59] According to Josef Konvitz, "Most of Lorient was destroyed in the process, not as an accidental consequence of operations with other objectives, but as a deliberate attempt to diminish U-boat activity."[60] For the first time during the war the Allies successfully reduced the efficiency of a U-boat base, but they did not render it useless.[61]

From 1941 until the end of the war, Lorient was attacked on twenty-eight separate days, which included all types of bombardments: precision bombing, area bombing, and leaflet drops

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[53] Gravari-Barbas, 252.

[54] Ibid.

[55] Davis, 94.

[56] Ibid.

[57] Ibid.; Josef W. Konvitz, "Bombs, Cities, and Submarines: Allied Bombing of French Ports, 1942-1943," *The International History Review* XIV, (1992), 33.

[58] Clout, 167.

[59] Arthur T. Harris, *Bomber Offensive* (London: Collins, 1947), 137.

[60] Konvitz, 23.

[61] Davis, 94.

designed specifically to warn French citizens of impending attacks in hopes of reducing civilian casualties.[62] The effects from bombing and collateral damage sustained were astounding. Approximately 3,500 out of 5,000 buildings were completely destroyed and critical infrastructure was equally damaged.[63] All major utility systems remained out of service for sometime after the war. The death toll would have been more significant as a result of these deadly bombings, but persistent evacuations of the city saved many French civilian lives.[64]

Attacks on St. Nazaire

In the early days of the Battle of the Atlantic, Saint Nazaire possessed one of the only dry docks on the west coast of France large enough to hold the German battleships *Bismarck* and *Tirpitz*.[65] The docks and lock system presented a tremendous target of opportunity for the British to effectively reduce Nazi naval activity in the near future. RAF bombers attacked the docks and the large lock system twice during the early months of 1941, but caused more damage to the city than on the actual designated targets. This was mostly due to poor weather conditions this time of year and the aircrews inability to acquire the targets.[66] Unsatisfied with their efforts, Bomber Command decided to execute a daring alternative plan to destroy the locks.

One of the most famous of raids on Saint Nazaire, codenamed Operation CHARIOT, took place on March 27, 1942. This was a combined British operation consisting of bombers and a commando raiding party designed to put the large lock system out of commission.[67] Sixty bombers were tasked to provide air support for this mission. The bombers attacked during

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[62] Ibid.

[63] Konvitz, 35.

[64] Ibid.

[65] Showell, 109.

[66] Bradham, 25; Davis. Collected from bombing mission data files from 1940-1945.

[67] Showell, 153-155.

nighttime on the 27th and 28th of March as a diversionary tactic to allow the seaborne attacking force to come ashore aboard the HMS *Cambletown.*[68] British commandos rigged the *Cambletown* with delayed explosives, rammed the lock during the early morning hours and detonated the charges, destroying the lock by noon.[69] The raid was deemed a success, but many British commandos lost their lives. Unfortunately, the British were unable to capitalize on the moment. They ceased bomber operations against U-boat bases for a majority of 1942 as Harris began re-focused his efforts on transforming Bomber Command into an effective fighting force and planning the first 1,000-plane raid over Germany.[70] He was determined to show, in his own way, how the bomber could bring an end to the war in Europe.

In November 1942, Bomber Command and the Eighth Air Force began a flurry of attacks on the submarine bunkers and supporting facilities. According to Maria Gravari-Barbas, "The goal was not only to destroy the base but also to devastate an important part of the city in order to avoid urban resistance."[71] The Allies destroyed much of the city with the bunkers left, more or less, unscathed. Despite the obvious destruction caused by Operation CHARIOT and the additional bombing raids throughout the year, there is no evidence to suggest that any of these missions hindered Nazi U-boat operations.[72]

Saint Nazaire was repeatedly attacked from January to June 1943, as a result of directive and policy changes established by the Casablanca Conference.[73] Because of the conference and a focus on U-boat bases, it would sustain its heaviest amount of bombing throughout the entire

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[68] Bradham, 33.

[69] Ibid., 33-44.

[70] Neillands, 104-132. This section focuses on Harris' determination to make Bomber Command relevant. Describes advances in new technology such as the Pathfinders and the one thousand-plane raid over Cologne.

[71] Gravari-Barbas, 252.

[72] Bradham, 45-46.

[73] Clout, 167.

duration of the war.[74] One nighttime raid flown on February 16, 1942, consisted of over 400 British and American bombers.[75] The raids caused many fires and extensive damage to housing, shops and public buildings. About 12,000 people had left the town just a few hours prior to the bombing, but still over 1,000 civilians were killed and another 1,200 injured.[76]

During the first half of 1943, over 1,500 British and American aircraft attacked Saint Nazaire dropping more than 4,200 tons of high explosive and incendiary bombs on the submarine base, port areas and the city.[77] This was by far the worst period of bombing throughout the five-year Battle of the Atlantic, but the Allies were unable to destroy the concrete submarine bunkers. In the remaining years of war, the city was very rarely attacked as Allied planners focused on preparations for the Normandy invasion.

Saint Nazaire was the last region of Brittany to be liberated on May 11, 1945.[78] The bombing directed at the city throughout the war was similar in scope and priority to those focused on Brest and Lorient. However, the city suffered the worst damage, most of which occurred during the early months of 1943. In the end, "only one hundred buildings out of 8,000 remained somewhat intact" with a total of nearly 3,700 completely destroyed.[79] Over eighty-five percent of the city was destroyed. Admiral Donitz is said to have remarked, "not a cat nor dog survived," only the submarine shelter remained standing.[80]

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[74] Ibid.

[75] Arthur T. Harris, *Despatch on War Operations: 23rd February 1942 to 8th May 1945*, ed. Frank Cass, Studies in Air Power (London: Frank Cass and Co Ltd, 1995), 14-15.

[76] Clout, 167.

[77] Davis. Excel spreadsheets of bombing data from 1940-1945.

[78] Williamson, 48.

[79] Clout, 167.

[80] Ibid., 174.

Analyzing the Operational Approach

There were numerous missed opportunities during the Allied bombing campaign of Brittany that contributed to an overall ineffective operational approach. Factors such as: interwar development and training, operational pauses due to competing priorities and objectives, and constantly changing directives and policies all negatively affected the bombing campaign over Brittany. The previous summary presented what the Allies actually did. This section will highlight several instances where they failed to hinder Nazi Naval operations flowing out of Northern France and some reasons for their ineffectiveness. Unfortunately, had some of the failures that occurred during the course of the war been avoided, the outcome of Brittany bombing operations could have been dramatically altered. Perhaps one of the most critical missed opportunities was the possibility to destroy the Nazi submarine bases during their most vulnerable time—during construction.

Most British bombing missions that occurred during the early months of 1941 were in fact during the initial phases of submarine bunker construction at Brest, Lorient, and Saint Nazaire, but the bombings proved to be more of a nuisance than in preventing progress towards completing construction of them. The British were unable to mount a serious offensive during this time period. For months, Organization Todt's work was highly vulnerable to bombing, yet Bomber Command failed to take advantage because they were focused on bombing Germany.[81] Limited resources during the early stages of the war significantly contributed towards this missed opportunity.

The interwar period for the British was filled with turmoil and tension with regard to development of a bomber force capable of defending the homeland and having the ability to go

[81] Bernard Ireland, *Battle of the Atlantic* (Annapolis: Naval Institute Press, 2003), 61.

on the offensive. As of the 1920s, they lacked a true enemy, which prevented a sense of urgency for defense expenditure on future war and focused too much attention on developing a force for defending colonial possessions.[82] Additionally, they lacked adequate funds to build an effective force to carry out such large operations during the early years of the war. The dominant view of bomber operations was largely based on faith that the bomber could exploit societal and economic vulnerabilities by attacking cities and through morale bombing.[83] As a result of this mindset British interwar politics and military development negatively effected Bomber Command's ability to conduct an effective operational approach against Brittany submarine bases during the early years of the war.

Training also played a major role in the ineffectiveness of Allied bombing. One result of this occurred at Lorient during the early months of 1941. Bomber Command aircrews during nighttime raids were far more ineffective than previously thought. During 1918, the British had no choice but to fly most of their missions at night and at low-level over fairly short distances in order to be effective. Based on these previous experiences, very little attention was paid during the interwar years to developing standard navigational techniques and training.[84] This led to an atrophy of basic navigational skills and did not adequately prepare British aircrews for the type of flying they found themselves doing during nighttime bombing raids over France.

> The Butt Report of August 1941, commissioned by Churchill's scientific advisor, Lord Cherwell, revealed that few if any of its bombers had reached what they thought was the target, and fewer still had actually dropped their bombs anywhere near it. Hundreds of brave aircrew had died in the process, and to little effect.[85]

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[82] Tami Davis Biddle, *Rhetoric and Reality in Air Warfare, The Evolution of British and American Ideas About Strategic Bombing, 1914-1945* (Princeton: Princeton University Press, 2002), 81-88.

[83] Ibid., 91.

[84] Ibid., 89.

[85] Falconer, 10.

As a result of the Butt Report, several changes were made to aid aircrews in navigation and locating targets, but Bomber Command continued to suffer from heavy losses. The Americans faced similar challenges with their initial training focus.

American bomber crew were trained to conduct daylight, high-altitude bombing missions. They had developed their aircraft and technology, such as the Norden Bombsight, around this premise. But, their early missions against the bunkers in Brittany soon proved they had to transform their tactics. On numerous occasions, American bombers fought their way through waves of enemy fighters, at high altitude, only to find themselves incapable of spotting the target in bad weather, despite having one of the best bombing sights of the time.[86] If they were able to spot and locate their targets in the poor weather conditions of the English Channel, their bombs still could not penetrate the reinforced ceilings of the bunkers. By flying at lower altitudes, bombers were much more susceptible to attack from anti-aircraft guns. Against near invincible targets, the trade-off between success and combat losses certainly influenced the Allies to pause and look for alternative solutions.

There were periods of discontinuity and gaps in execution that plagued the Allies throughout the Brittany bombing campaign. A few of these were very significant to the operational flow and tempo. The first major gap, which was previously discussed, occurred during the construction phase of the submarine pens in 1941. Another one immediately followed a nighttime raid on November 1941, when thirty-seven aircraft out of a force of nearly 400 did not return from a bombing mission over Berlin. Losses of this magnitude were not only unbearable to the British leadership, but they delivered a harsh blow to the morale of British

[86] Williamson, 20-21.

citizens, which ultimately influenced Churchill to order an immediate suspension of all bombing operations until spring 1942.[87]

By late February 1942, the British had discontinued bombing operations over Brest and what followed was "another period of calm, probably because most of the town had been destroyed by that time and existing bombs could inflict only little damage on the might of the U-boat bunker."[88] Furthermore, as stated previously, Harris was transforming Bomber Command into an effective bomber force and focusing efforts on bombing Germany. During the calm, the Germans took advantage to modify the submarine bunkers by reinforcing the already thick, concrete ceilings in order to strengthen them in preparation for future bombardments. Several months passed before the Germans would see Allied bombers overhead.

Another critical gap occurred during the build-up to Operation TORCH. Numerous aircraft were diverted to support operations over North Africa and to protect Allied supply lines. This was due to the limited number of Allied bombers in Europe at the time as American bombers were just starting to arrive in theater in the latter months of 1942. Lastly, another major discontinuity with operations occurred during preparations for the Normandy invasion. During this time the Combined Bombing Campaign concentrated efforts on destroying the German Air Force, gaining air superiority, and cutting off supply lines flowing into Western France. Bases in Brittany were some of the last locations to be liberated and their use as Allied disembarkation points were denied until the very end of the war.

Planners, using design, should concentrate their efforts on developing an operational approach that is properly sequenced and synchronized. Properly conducted design ensures

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[87] Falconer, 11-12.

[88] Showell, 92.

synthesis is achieved in order to create a coherent strategy of intervention.[89] "As courses of action are developed during detailed planning, the operational approach provides the logic that underpins the unique combinations of tasks required to achieve the desired end state."[90] The goal, according to Banach and Ryan "is to exploit the transformative potential of the system's tensions while mitigating negative consequences of instability and change."[91] This is something the bombing campaign seemed to struggle with throughout the war. Design focuses thinking and planning on developing an approach towards solving the right problem. The real issue with this campaign was that a design methodology was not in place to enable the Allies to effectively solve their problem. Instead, they jumped from one solution to another with hopes of delivering a decisive blow to Nazi U-boat operations in the Atlantic. Unfortunately, from the very beginning, they never viewed their problem as complex. The last section of this monograph will explore complexity more in detail.

The operational approach within a design methodology encompasses only one tool for understanding the holistic nature of such a complex adaptive campaign as this one turned out to be. If the Allies had developed a deeper understanding of the operational environment at Brest, Lorient and Saint Nazaire and adequately identified the problems, their campaign against the U-boat menace would have been executed differently. As a result of their operational approach, the Allies expended a great deal of resources and lives in an effort to stop the German Naval menace, but failed to destroy the target and render them non-operational[92] In the process, they

[89] Banach and Ryan, "The Art of Design," 112.

[90] US Department of the Army, *The Operations Process,* 3-11.

[91] Banach and Ryan, "The Art of Design," 112.

[92] Delve, 122.

effectively annihilated three major Brittany port cities despite earlier policies of limiting civilian casualties and collateral damage.

In Randolph Bradham book, *Hitler's U-Boat Fortresses,* he stated, “No one suffers more in war than the civilians in its path. They were unlucky enough to have prime military targets—the submarine bases—in their midst ”[93] In the end, the Allied bombing campaign against German submarine bases in Brittany, which led to the eventual destruction of Brest, Lorient and St. Nazaire, is still being debated today, but it does not appear to be as operationally effective as one might think. Every leader, planner and strategist should be aware of the consequences of a poorly designed operational approach.

[93] Bradham, 5.

Operational Environment

Possessing an understanding of the campaign's operational environment is vital for determining the initial state of the conflict and what the Allies desired in the end. Failure to understand this "focuses to much attention on the superstructure of war and not on the foundation."[94] According to the Army's recent update of Field Manual 5-0, *The Operations Process*, framing the environment involves selecting, organizing, interpreting, and making sense of a complex reality to provide guideposts for analyzing, understanding, and acting.[95] It is through this frame leaders gain a deeper understanding, which enables effective decision-making and integration of other elements of national power.[96]

The Battle of the Atlantic is contextually complex, which made arriving at an appropriate course of action difficult for Allied planners. Rather than the simple good versus evil dichotomy presented by many accounts, France during the German occupation was a confusing social and political world.[97] Internal divisions, regional differences, historical animosities, and economic pressures make this nation difficult to understand in the normal circumstances. Add the problems of the German occupation and Hitler's military demands, and the situation is even more complex. Therefore, three specific environmental considerations can illustrate the kind of understanding planners needed in order to arrive at the correct solution: What were the historical aspects of the Brittany region and the geo-strategic aspects of Brest, Lorient and Saint Nazaire? How did the German military construct and defend the submarine pens? Finally, what were the

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[94] Anthony H. Cordesman, "Iraq, Grand Strategy, and the Lessons of Military History," *2004 S.T. Lee Lecture on Military History* (2004), 3.

[95] US Department of the Army, *The Operations Process*, 3-8.

[96] Ibid., 3-5.

[97] Julian Jackson, *France: The Dark Years, 1940-1944* (Oxford: Oxford University Press, 2001); Robert O. Paxton, *Vichy France: Old Guard and New Order, 1940-1944* (New York: Columbia University Press, 2001).

institutional barriers existing in the Royal Air Force and United States Strategic Air Force that affected the planning process? By answering these questions, the environment becomes more palatable and leads to identifying the correct the problem.

The Coastal Cities

The Germans constructed their submarine pens in an environment rich with nautical and strategic history. While each city was historical different, it was their location that made them especially important to the conduct of the war in the North Atlantic. For the Germans, in the Great War of 1914-1918 and again during the Second World War, these ports were a crucial necessity to executing their devastating U-boat campaign throughout the Atlantic Ocean. This section will explore the historical importance these three cities played to the shipping industry, the developmental efforts of the ports, community and their surrounding cities and finally, their transformation into some of the most important naval ports and facilities along the west coast of France. All of these factors, along with their proximity to the United Kingdom and access into the Atlantic made them ideal staging bases for German Naval operations.

Today, Brest remains an important coastal city just as it was when the Romans settled it between 250-350 A.D.[98] The city was the site of early naval innovations that proved critical to shipping today. One such example occurred in 1687, when the town became the first port city to possess a dry dock that improved effectiveness of naval construction considerably.[99] From the late 1600s until the end of the 1700s the French government expanded its military role through

[98] The City of Brest: Metropolis Océane, "History of the Town of Brest", The City and Brest Metropolis Océane. http://www.mairie-brest.fr/brest/histoire.htm (accessed November 16 2009).

[99] Showell, 86.

major engineering projects such as coastal fortifications along the Penfield River and the construction of a naval academy.[100]

During the nineteenth century, Brest continued to thrive and expand its growing presence as a key military naval port. The community established this by building a commercial port for international trade and shipbuilding. Soon the city faced major challenges with the development of the hinterland surrounding the port city.[101] The citizens desperately needed a transportation network that provided connections deeper into France and Europe for the goods and services it received through international trade. So in 1865, the city inaugurated its first railroad, but still, it did not provide an easy, direct route to the interior of France.[102]

During the Great War of 1914-1918, Brest became a critical lifeline for battling German forces. The Americans used the port as a major point of disembarkation. Immediately following the war, the city became overwhelmed by military and commercial projects. Major improvements to infrastructure were essential to keep up with the city's increasing population and economic activity.[103] By 1939, workers undertook massive refurbishment and modernization projects to the docks and port facilities that included the installation of electrical lighting, construction of large cranes, and updating naval support equipment. Unfortunately in June 1940, the German 5th Panzer Division rolled into town and occupied the city until September 1944.[104]

Lorient was founded in the late sixteenth century on the mouth of the Blavet River.[105] It has always been viewed as an important, strategic port of France. The city's origins were

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[100] The City of Brest: Metropolis Océane.

[101] Showell, 86.

[102] The City of Brest: Metropolis Océane.

[103] Ibid.

[104] Williamson, 16.

[105] Showell, 94.

founded upon its utility as a critical naval yard for trade with the Far East. The original name of the town, *L'Orient*, meaning 'The East', was an eponym of a 1,000-ton ship, *The Soleil d'Orient*, often referred to as *L'Orient.*[106] Eventually, the name of the city was shortened to *Lorient.*[107] For many years the city served as an indispensable trading port for the East India Trading Company spice trade between Europe and Asia.[108] In addition to trade, the city began its first military venture in 1690 through the establishment of a French Royal Navy military administration in Lorient. This endeavor set the stage for the creation of construction workshops responsible for the upkeep of naval squadrons.[109]

As trade expanded and profits began to pour into the city, the population rose at an incredible rate. Between 1709 and 1730, the population of Lorient rose from 6,000 residents to 20,000 residents.[110] Because of this growth, the city began an urban expansion project and became the sole marketplace for goods from the American colonies, while also serving as the operational center for naval construction.[111] During much of the eighteenth century, the community further developed the military port by constructing naval defenses in an effort to fortify the city's arsenal and protect its vital trade and shipbuilding industry against emerging competition in England.[112]

The nineteenth century ushered in a technological revolution in the ship building industry. This included the invention of the steam engine, the propeller, and the use of iron and

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[106] Ville de Lorient: 17th and 18th Century, "De La Ville De Lorient", http://www.lorient.fr/La_naissance_de_Lorien.1391.0.html?&L=2 (accessed October 14 2009).

[107] Showell, 96.

[108] Ville de Lorient.

[109] Ibid.

[110] Ibid.

[111] Ibid.

[112] Showell, 96.

armor plating on ships.[113] The most critical challenge facing Lorient was their ability to adapt to these emerging technological innovations and still maintain the capacity to accommodate the constant need to update, repair and improve the shipbuilding industry while still remaining competitive with other nations. Between 1890 and 1930, the harbor areas further benefited from considerable infrastructure improvements such as: expansion of the drinking water supply, construction of trams, roadways, and apartment and administrative buildings. The city also benefited from the opening of numerous mining projects needed to support the growing fishing industry.[114]

Lorient's population quickly rose to roughly 46,000 just before the start of the Second World War. Little did the French know, the fishing industry and the location of the fishing harbor enticed the Nazis who were looking for potential French port U-boat cities to support future naval combat operations.[115] This location was ideal since the French had already constructed rail connections to the Keroman fishing harbor. Moreover, the area surrounding the harbor contained many modern facilities and lots of open space for additional construction projects.[116] Throughout most of the Second World War, Lorient served as the German Naval Headquarters for U-boat operations.

Prior to the nineteenth century, Saint Nazaire was nothing more than a simple harbor town with a modest fishing industry. The city's true identity, as a major seaport, steadily ballooned during the late nineteenth and twentieth century, when it transformed from a small

[113] Ville de Lorient.

[114] Ibid.

[115] Williamson, 97.

[116] Ibid., 101.

fishing village into one of the largest floating harbors in Europe.[117] Situated on the northern mouth of the La Loire River, the community's growth as a major seaport was constrained by the banks of the Loire River. Fortunately, with the advent of the steam engine and the creation of dredgers, construction to widen the passage inland towards the seaport of Nantes, allowed for port expansion.[118] Much like Brest and Lorient, Saint Nazaire prospered during the industrial revolution as it continued to develop and upgrade facilities to compete with other seaports around the globe.

During the Great War of 1914-1918, the city became a major port of disembarkation for American and Canadian forces. Port facilities were more than adequate for sizeable logistical operations, but they required further development during the interwar period to keep up with the enormous ships being constructed during this time.[119] New ocean-liners that were constructed and designed during this era were far too large for the depth of the river and harbor entrances. Despite these challenges, the city kept pace producing some of the largest French liners in the world.[120]

Even as the economic depression hit most of the world during the interwar period, Saint Nazaire's shipbuilding industry evolved and adapted to the changing environment. They expanded their operations and began producing seaplanes to diversify their industry and economy.[121] Alas, new major developments to improve the community's economic situation were cut short. Construction of a massive lock that connected the inner basin of the harbor to the

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[117] Showell, 106.

[118] Ibid.

[119] Ibid., 107.

[120] Saint-Nazaire Website, "Ville De Saint-Nazaire," http://www.mairie-saintnazaire.fr/en/ (accessed 12 January 2010).

[121] Andrew Toppan, "World Aircraft Carriers List: France," http://www.hazegray.org/navhist/carriers/france.htm (accessed 14 January 2010).

sea and dredging of the channel to deepen the inlet were put on hold by the outbreak of the Second World War.[122]

Understanding the historical context of Brittany and the history of these three cities provides planners a basis of understanding for why they are operationally significant. Furthermore, this understanding provides insight into civil activities and the socio-economic impact of Allied operations. The Allies could not have predicted it would take Brittany more than fifteen years to recover from the adverse effects of their intense bombing. But understanding the historical aspects of the environment helps leaders keep unintended consequences within their scope of planning.

The Enemy's Operational Environment

Another area of grave importance is how much, or little, the Allies did and did not understand the enemy's operational environment. For the Allies to be effective, they required an extensive understanding of the German organization tasked with constructing the submarine bases. Only one report covered this aspect and was written after the war. Moreover, they needed to comprehend the construction and repair operations of the bunkers, their defenses and gain an appreciation for their robust design in order to develop an effective plan to destroy them. It is apparent from analysis of the operational approach, the Allies failed to truly understand just how impregnable these facilities were and the efforts the Germans undertook to secure their naval presence in Northern France. Without this foundational wisdom, an operational approach is only as good as guessing.

Construction of the submarine bases is an important environmental aspect to know and understand for properly defeating the Nazi Naval presence in France. The efforts undertaken by

[122] Showell, 109.

the Organization Todt, carried out in the space of a little over five years, represented the most impressive building program in the region since Roman times."[123] This work became one of the most important endeavors to Hitler during the early months of French occupation.[124] Upon their arrival, the German military desired seaports to expand their naval operations. With Allied becoming an important aspect in war, they designed reinforced U-Boat facilities to protect their assets.[125] In order to accomplish this feat they realized they needed a sizeable, civilian workforce. So, they used all necessary means to build a considerably large French and foreign labor force.

At first, French civilian labor was not hard to find due to the current war-torn economy. The immediate effects of Nazi occupation led to widespread unemployment and fear.[126] Working for the German construction agency became the logical choice for many French citizens to provide for their families during occupation. Todt soon transformed itself into massive organization with its own organic army totaling over 300,000 German workers.[127] German authorities claimed they employed a force of 1.5 million German and Non-German workers during its greatest expansion from May 1942 to May 1943.[128] By the Summer of 1944, at least a quarter of a million people worked for the organization in France, and an additional half a million worked for other German agencies."[129]

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[123] MIRS (Organization), *Handbook of the Organization Todt (OT)*, (London: MIRS, 1945), 1.

[124] Richard Vinen, *The Unfree French: Life Under the Occupation* (London: Penguin Group, 2006), 116.

[125] Ibid.

[126] Ibid.

[127] Williamson, 8.

[128] MIRS, *Handbook of the Organization Todt (OT)*, 3.

[129] Vinen, 117.

After the fall of France and the Low Countries, a separate Todt element was established to control and manage the various construction projects within the occupied departments.[130] Under the command of *Oberbaudirektor* Karl Weis, the *Einsatzgruppe* was subdivided into a number of command areas, *Oberbauleitungs*, many of which took direct responsibility for the construction of the U-boat bunkers in their respective areas.[131] Most of the construction work, from the end of the French Campaign to late 1941, was on coastal installations along the English Channel from Belgium to Brittany.[132] Soon thereafter, administrative headquarters were relocated at Lorient and controlled a number of construction sectors along the French coast.[133] Todt flourished and peaked during the period of 1942-1943. Because of the organizations massive size, effectiveness, and efficiency at which it operated, they were able to develop methods of standardization and rationalization in construction to an extent and on a scale never before attempted. The speed with which they repaired and upgraded facilities and communication systems due to air raid damage was impressive.[134]

The intensity of Allied air raids in the winter and spring of 1943 through most of 1944 caused a series of readjustments in construction activities, particularly in Brittany, which kept German operations under consistent pressure to rebuild and repair.[135] Persistent bombings by the Allies created a somewhat restive atmosphere among Todt personnel by lowering morale, facilitating desertions amidst the confusion following bombing attacks, and reduced periods of

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[130] Williamson, 9.

[131] Ibid.

[132] MIRS, *Handbook of the Organization Todt (OT)*, 8.

[133] Ibid.

[134] Ibid., 1.

[135] Ibid., 12.

productive work.[136] However, the Allies were only focused on the task of destroying the actual concrete bunkers for a relatively short while. They soon shifted focus towards preparations of the Normandy invasion.

The Allies failed to understand how Organization Todt operated, conducted recruitment, performed construction, and conducted repair operations throughout the course of the war. If the Allies possessed this knowledge they may have been in a better position to design an approach aimed at breaking apart Todt's adaptive system and its evolving operations in Brittany. At the very least, analysis such as this is useful in the development of alternative and indirect courses of action.

Construction

Construction of the submarine bunkers in all three cities contained certain environmental and operational challenges. But, for the most part, building tactics, techniques, and procedures were well established by Todt and conducted similarly at each location. The only major differences between these three ports were their physicality and improvements of existing structures. In any case, there were certain vulnerabilities with each location that could have been exploited by Allied bombers. This is why it is vital to understand how the submarine bunkers and facilities were constructed in Brest, Lorient and Saint Nazaire.

Upon their arrival in Brest, the Nazis took control of the port facilities, which were badly damaged during the British withdrawal in June 1940.[137] They immediately began reconstruction of the port facilities but, due to a lack of adequate railway access from the interior of France, had to rely on naval efforts for transporting pre-fabricated parts, construction equipment, and

[136] Ibid., 13.

[137] Williamson, 16.

resources.[138] By fall of 1940, the port facilities were back in service and began accepting U-boats for immediate repair, retrofit, and combat operations. With port facilities now open, the Nazis focused on selecting an adequate building site for their massive concrete submarine bunkers.

Finding a location suitable for a concrete submarine pen was far more difficult in Brest than in Lorient and Saint Nazaire due to the rough terrain within the harbor and the lack of large, flat areas on which to build. In January 1941, the Germans began constructing the bunker on an existing seaplane station on the west side of the harbor.[139] Its location was ideal since it was conveniently located next to the naval base and already possessed the facilities necessary to support U-boat operations. The final layout of the submarine bunker consisted of ten drydocks and five wet docks that were capable of housing twenty boats.[140] Overall, the concrete bunkers measured 333 meters wide, 192 meters long and seventeen meters high.[141]

Final major construction efforts were completed in summer 1942.[142] The bunker's ceiling was reinforced several times over the years to shield them from increased Allied bombardments. In some places, the bunker's concrete roof was over six meters thick. To strengthen them further, large granite stones were laid as foundational caps for flak towers and radar equipment.[143] The Germans also created an intuitive design called a 'catching grid' and installed it over the existing roof. The catching grid consisted of an elevated concrete, false-ceiling over the existing one to absorb the impact of falling bombs and to prevent them from penetrating the actual upper

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[138] Showell, 88.

[139] Ibid., 89.

[140] Karl-Heinz Schmeelke and Michael Schmeelke, *German U-Boat Bunkers Yesterday and Today*, Schiffer Military History (Atglen, PA: Schiffer Pub. Co., 1999), 8.

[141] Ibid.

[142] Williamson, 16.

[143] Schmeelke and Schmeelke, 8.

ceiling.[144] Additionally, to allow for major U-boat overhaul work to be done, each of the docks contained large, overhead cranes to move heavy sections and equipment. For protection, most of the vital machine shops were located inside the bunkers to prevent them from being exposed to Allied bombardment.

The Germans captured the port at Lorient on June 21, 1940. Within sixteen days of capture the first U-boat arrived for resupply.[145] Eventually, this location served as Headquarters for the German U-boat Command. The new submarine base received several immediate upgrades upon occupation, specifically, converting existing repair bays into hardened, concrete *Dombunkers,* meaning cathedral or dome bunkers.[146] It was obvious why they were called this since the structures were built with high cathedral-like ceilings that dispersed bombs away from the steep roofline of the structure. They were used to conduct maintenance and repairs on U-boats, but the added hardening now offered some additional protection from Allied attacks. They were not as robust as the submarine bunkers, but they offered the necessary protection.

Work on the first submarine bunker on the Keroman Peninsula, aptly named Keroman I, began on February 2, 1941, utilizing over 15,000 construction workers.[147] These bunkers were approximately 120 meters long, eighty-five meters wide and eighteen and a half meters in height. The outer walls were almost two and a half meters thick and the ceiling over three meters thick.[148] Keroman I consisted of five dry pens, each designed with their own overhead cranes. In addition to the first bunker, Todt constructed a very intricate rail, winching, and trolley system to

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[144] Ibid.

[145] Williamson, 41.

[146] Ibid., 101.

[147] Gudmundur Helgason, "Uboat.Net," http://www.uboat.net/flotillas/bases/lorient_bunkers.htm (accessed October 14 2009); Williamson, 42.

[148] Williamson, 42-43.

move U-boats from wet dock to dry dock repair facilities in quick order. The Nazis incorporated a system of transverse units and a rotating turntable fitting, much like those used in rail yards of the time, to move the U-boats to their designated repair bunkers. Three months later, Keroman II was built, consisting of seven dry pens and measuring 138 meters long, 120 meters wide and eighteen and a half meters in height.[149] Eventually, an eighth pen was constructed to house the traversing equipment. Finally, in October 1941, construction of Keroman III started and was completed in January 1943.[150]

Keroman III, the largest of the three bunkers, consisted of five dry pens and two wet pens that opened directly into the deep water of the Keroman harbor.[151] This bunker had the ability to house twelve U-boats at one time. This bunker was the largest in Lorient at nearly 170 meters long, 135 meters wide and 20 meters in height.[152] The concrete ceilings on this bunker were over seven meters thick with a gap intentionally designed between the roofline and the ceiling to absorb and disperse direct hits from the larger bombs the Allies had developed. Undoubtedly, the submarine bunkers at Lorient are one of the most impressive construction projects of its time. After the war, the bunker remained in service as a French submarine base until 1997 and today remains open to the public as a tourist attraction.

The city and port of Saint Nazaire fell to the Nazis in summer 1940, following one of the worst British maritime disasters in history. While the British were evacuating by sea from invading Germans forces, their escape vessel *Lancastria* was attacked and sunk by German

[149] Ibid., 43.

[150] Helgason, "U-boat.Net."

[151] Williamson, 104.

[152] Ibid., 43.

Junker 88 bombers, killing an estimated 4,000 soldiers.[153] Churchill, horrified by the disaster forbade, "any knowledge of the sinking reaching an already demoralized public."[154] Once the British fully withdrew from the area, Organization Todt began moving critical supplies to upgrade current facilities and construct hardened submarine bunkers.

Work on the bunkers began in March 1941, with the first four of fourteen pens completed and ready for naval operations by July 1941.[155] Within four months, three more were operational and the rest of the fourteen pens, eight dry-docks and six wet boxes were completed by June 1942.[156] The bunkers were 295 meters wide, 130 meters long and 18 meters in height.[157] Construction designs and techniques were very similar to those in Brest and Lorient with one exception. There was an obvious weakness identified by the Nazis. If the lock system could not be properly defended or hardened, naval operations could literally be stranded in the harbor and unable to enter or exit the bunkers. The British also knew of the weakness and exploited the situation during Operation CHARIOT in March 1942. The HMS *Cambeltown* rammed the exposed locks, causing extensive damage. Following this event, Todt designed and built new bunkered locks amongst the floating harbors to prevent future ships and U-boats from becoming trapped. Despite their efforts, the protected lock systems were not completed until summer 1944 and provided little contribution to U-boat operations throughout most of the war.[158] In the summer of 1943, workers reinforced the ceiling of the bunkers by a few additional meters

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[153] Official Lancastria Association of Scotland Website, "Lancastria Association Scotland," (Lancastria Association of Scotland) http://www.lancastria.org.uk/home.html (accessed 12 February 2010).

[154] Ibid.

[155] Williamson, 43.

[156] Schmeelke and Schmeelke, 20.

[157] Ibid.

[158] Showell, 110.

concrete and added a bomb-catching grid, just like the one installed in Lorient. Again, much of this later work would not be completed by wars end.[159]

The most significant defensive measure of the Nazi Submarine bunkers stemmed from their robust design. Because of Organizations Todt's renowned construction designs, methods, and techniques, the bunkers were built to near impenetrable standards. Of the three submarines bases in this study, the bunkers at Brest were the only ones ever penetrated by Allied bombs. In August 1944, the bunker's ceiling was punctured from a newly designed penetrator bomb called a *Tall Boy.* The *Tall Boy*, which could only be delivered by a British Lancaster bomber, weighed roughly 12,000 pounds and stood over twenty feet long.[160] Despite their ability to break through the reinforced bunkers, the Allies had limited opportunities to use them, which explains why most submarine pens along the Brittany Coast are still standing today with few signs of adverse damage.[161] However, concrete and steel were not the only means for defending these U-boat fortresses against Allied attacks.

Significant defensive measures were put into place at all three submarine bases. The Germans developed a complicated communication network designed to activate the Luftwaffe's system of early-warning radars and spotter posts. These were critical for notifying the bases about impending Allied attacks.[162] These radar sites, aided by spotters, guided Luftwaffe fighters towards approaching Allied bombers and provided targeting data for anti-aircraft artillery. Allied fighters and bombers routinely came under attack from the Luftwaffe and changed tactics several times to reduce the possibility of being intercepted and shot down.

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[159] Ibid., 112.

[160] Falconer, 86.

[161] Williamson, 7.

[162] Ibid., 8.

Anti-aircraft flak guns and machine guns scattered throughout the structure heavily defended the submarine pens. Most of the flak gun emplacements were built into the rooflines of the bunkers in hardened pillbox-like fashion.[163] They also tethered several small balloons near the entrance of the pens to discourage Allied fighters from penetrating at extremely low altitudes. These measures provided an additional layer of defense against Allied bombers and fighters when the Allies changed tactics from high-altitude to low-altitude bombing runs.

The submarine pens were situated very close to their respective cities and surrounded by a French population under Nazi control. Based on these geographical restraints, the Allies initially depended upon precision bombing in order to achieve operational success and limit civilian casualties and destruction. Despite advances in precision bombing, techniques and tactics, their efforts proved to be more difficult than originally anticipated. Based on analysis of bombing missions against targets in Brittany, weather conditions along the Channel coast, more than anything else, greatly reduced the effectiveness of Allied bombing missions targeting submarine pens.[164] Often times, fog and clouds obscured an aircrew's ability to spot the target and drop their bombs directly on the bunkers. Many bombing runs simply missed their intended target and landed in and around the city. Despite Mother Nature and German defensive measures, "At the end of the day, the single greatest factor in the successful defense of the [submarine] bunker was its inherent, massive strength."[165]

Institutional Barriers

Institutional barriers contributed to the ineffectiveness of the Allied bombing campaign over Brittany. Political motivations overwhelmed military strategy and Allied bombing doctrine

[163] Ibid., 20.

[164] Davis. Excel spreadsheets of bombing data from 1940-1945.

[165] Williamson, 7.

left the impression the Allies were somewhat guessing at how best to go about destroying the submarine bunkers. Many authors tend to minimize such factors in their writings on the Combined Bombing Campaign over Europe. But, some authors such as Robin Neillands, Forrest Pogue and Conrad Crane, view this as a necessary evil of the operational landscape worth mentioning and investigating. All of these factors, when combined, negatively affected how the Allies solved the problem and developed their approach. The study of institutional barriers is indeed essential in terms of learning and understanding how tensions such as these can prevent proper analysis and understanding of the operational environment.

Perhaps the most damaging factor for Allied planning and execution efforts were the overriding political motivations interfering with military strategy. Ever since the British evacuated from Brittany in June 1940, Churchill was determined to formulate a plan to re-enter the continent of Europe.[166] But, by 1942, British Joint Planners concluded German fortifications on the Channel Coast prevented the opportunity for a land invasion and determined emphasis should be focused on fighting and destroying the German Air Forces in the West.[167] However, the United States insisted on planning for a Cross Channel invasion as early as 1943, and developed plans to buildup American forces in the United Kingdom, pending an emergency return to the continent. This operation was codenamed SLEDGEHAMMER. As soon as plans were moving forward, Churchill, uncertain of a cross-Channel invasion, asked about the possibility of an attack in North Africa, which certainly upset American planners as they proceeded with the buildup.[168] Eventually, Churchill and Roosevelt agreed on what would become known as Operation TORCH. Political interference with military strategy certainly

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[166] Forrest C. Pogue, *The European Theater of Operations Vol. IV, The Supreme Command*, United States Army in World War II (Washington DC: U.S. Army Center of Military History, 1996), 98.

[167] Ibid., 99.

[168] Ibid., 100.

inflames tensions over designing a strategy for winning a conflict. Political and military differences were not the only tensions contributing to ineffectiveness. At the operational level, differences in doctrine built a wall between the allied air forces that effectively prevented truly combined bombing operations.

Differences in bombing doctrine between the Americans and British led to additional tension throughout the war. Leaders on both sides often accused the other as being uncooperative or not in alignment with the overall military strategy. The disagreement between Harris and Spaatz was based on doctrinal differences. Both sides believed the bomber was a weapon that could end wars quickly and prevent mass combat casualties such as those experienced during the Great War of 1914–1918.[169] Unfortunately, the bomber brought with it additional questions of morality and political considerations, none of which could easily be explained or justified during and following the Second World War.

Early bombing doctrine differed between the British and the United States in the way they designed their bombers and developed their operational approach. The Eighth Air Force entered the war believing their doctrine of precision, daylight, high-altitude bombing and the defensive capability of their bombers were quite effective. However, they soon discovered their doctrine did not work due to several reasons such as: technological shortfalls, weather and navigation difficulties, range, lethality of the German Air Force, and the robust nature of targets such as submarine bunkers.[170] They soon realized they must change and adapt to the type of warfare they now found themselves involved in.

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[169] Neillands, 23. Discussion on Lord Trenchard's influence on British bomber doctrine. He believed in attacking enemy morale, which, meant attack civilian population in order to win future wars. Additionally, Trenchard believed air attacks needed to be concentrated on the industrial towns.

[170] Ibid., 162.

The British were viewed as having embraced a policy of "indiscriminate night area bombing, while the Americans pursued daylight aerial offensives against well-selected military and industrial targets that were justified by both 'strategic judgment and morality"[171] Regardless of what view scholars and historians take on the matter, research conducted by American historians Ronald Schaffer and Michael Sherry stated, "Official policy against indiscriminate bombing was so broadly interpreted and so frequently breached as to become almost meaningless."[172]

According to Conrad Crane many American historians perceived a difference between the practices of the Royal Air Force and the United States Army Air Forces.[173]

> "The Americans were blamed for the casualties caused by high altitude bombing (the British were believed to be more accurate and also, having been bombed themselves, to be more sympathetic to the plight of civilians), and for having betrayed the French by pushing on to the east and leaving poorly equipped French troops to deal with the pockets of German resistance on the Atlantic coast: 'When it is a question of destroying French factories they come with their big Flying Fortresses, and now that it is necessary to destroy submarine bases into which a thousand German troops are crammed, you no longer see them.'"[174]

The Allies were very aware that if the destruction of cities became necessary to disrupt German submarine operations, further questioning of such operational decisions might prevent any and all attacks from being carried out.[175]

Summary of Operational Environment

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[171] Conrad C. Crane, *Bombs, Cities, and Civilians: American Airpower Strategy in World War II*, ed. Theodore A. Wilson, Modern War Studies (Lawrence: University Press of Kansas, 1993), 1.

[172] Ibid., 3.

[173] Ibid., 1.

[174] Vinen, 330.

[175] Konvitz: 32.

Understanding the operational environment is absolutely critical to setting the problem and developing an operational approach in the proper context. In a sense, this is the foundation component. It is important for leaders and planners to ensure proper analysis of the environment "depicts the current state of the operational environment and defines the desired conditions that constitute a desired end state by examining the tendencies and potentials of relevant actors and operational variables."[176]

One idea aspect to keep in mind is that the "environmental frame evolves through continuous learning but scopes aspects of the operational environment relevant to higher guidance and situations."[177] That is why it is crucial to understand all factors within an operational environment such as: historical context, the enemy and how it operates, and how institutional barriers can impede operations. By failing to conduct an in-depth analysis of the operational environment the Allies were led to identify the wrong problem and jump straight into execution.

[176] US Department of the Army, *The Operations Process*, 3-8.

[177] Ibid., 3-9.

The Problem Frame

Basil Liddell Hart, a noted British military historian, called the practice of indiscriminate Allied area bombing of cities "the most uncivilized method of warfare the world has known since the Mongol devastations"[178] Historian Conrad Crane backed up this belief by saying, "there was no doubt that analysis of Allied strategic bombing during the Second World War generated controversy among historians regarding both results of operations and motivations."[179] There are several unanswered questions including whether all of this destruction was necessary in order to defeat the Nazi U-boat threat. In order to understand the nature of this complex problem it is best to revisit how the Allies developed their operational approach towards solving the wrong problem.

It is dangerous for any strategist or planner to focus too much attention on direct means towards countering potential threats. By analyzing problems using simple cause-and-effect logic, planners and strategists run the risk of developing unsound conclusions towards solving complex problems. The reason the Germans built these massive concrete bunkers was to protect their resources and defend themselves against Allied attacks. But, they also chose these strategic locations to reduce the amount of time it took for U-boats to operate in the Atlantic.[180] This should not automatically steer planners to assume that destruction of the bases results in disappearance of the threat. Complex problems do not survive by simple logic such as this. There is more to understand before employing critical resources toward loosely, developed operational objectives.

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[178] Crane, 1.

[179] Ibid.

[180] Williamson, 4. U-boats faced a long journey from German and most of their operational time was spent moving between German ports and the Atlantic. This reduced their operational service period and increased their vulnerability to enemy attacks.

The problem frame identifies positive, neutral and negative implications of tensions in the operational environment.[181] The Allies lacked an in-depth analysis of tensions within the operational environment and how best to exploit them in order to transform existing conditions in future success.[182] Some tensions that require exploration include understanding the enemy threat within the current context of the conflict and how the Allies defeated themselves due to numerous changes in directives, policies, and priorities. By looking into these tensions, it will become clear how ineffectively the Allies understood their problem, which ultimately led them to an inadequate operational approach.

The U-Boat Threat

The German Navy seemed set on repeating history by destroying England's supply lines and security through the extensive use of U-boat as it did during The Great War of 1914-1918. The Germans seemed focused on threatening England's very existence. In 1939, U-boats faced a lengthy and dangerous voyage through German waters into the North Sea.[183] In order to reduce U-boat operational service period in the Atlantic and decrease their vulnerability to enemy attack through the English Channel, the Germans needed additional submarine bases along the Atlantic coasts of Norway and France.[184] By 1940, they occupied France and secured coastal bases that were used during The Great War of 1914-1918.

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[181] US Department of the Army, *The Operations Process*, 3-10.

[182] Ibid. By deciding how to address tensions, commanders and planners identify the problem that the design will ultimately solve.

[183] Williamson, 4.

[184] Ibid.

At the beginning of the Battle of the Atlantic, specifically from 1940 through early 1941, the British lost vessels three times faster than shipyards could replace them.[185] Nazi U-boats and capital ships were attacking British ships with overwhelming success. By 1940, the Nazis destroyed more than 1.8 million tons of Allied shipping and by February 1941, that number rose to over two million.[186] Allied defenses against U-boat attacks were simply under-developed, which made them easy targets. In comments after the war, Winston Churchill claimed, "The only thing that frightened me during the war was the U-boat menace."[187] Based on his instincts, Bomber Command devoted a considerable number of aircraft and lives towards solving this growing problem.

Historical submarine construction efforts, the time required to complete the bunkers and the reasons the German military chose Brittany as their base of operations were not only essential to understanding the environment, but also to identifying the correct problem to solve. To be effective early on, the Allies needed to attack the German submarine bases consistently from the very beginning of the war. They should have centered their efforts on disrupting German supply lines, dissuading construction efforts, and attacking the bunkers through indirect means. Instead, they spread their bomber assets far too thin and focused on too many targets and objectives with inadequate resources. The benefits of hindsight certainly aid in understanding the problems they faced, but the Allies clearly let exploitable opportunities slip by early on. Once the Germans gained a foothold in Brittany Coast, U-boat operations became, operationally, harder to defeat.

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[185] Delve, 122.

[186] David F. White, *Bitter Ocean: The Battle of the Atlantic* (New York: Simon and Schuster, 2006), 26.

[187] Bradham, 9.

The Allies believed their problem was to destroy the U-boat bunkers in order to bring an end to the German Naval threat in the Atlantic. The Allies developed an operational approach aimed at direct attacks on the submarine pens without effectively exploiting indirect options. During the first two years of bombing Brittany, the Allies failed to see the errors in their initial approach and understanding of the problem. Additionally, the frequency at which they changed their bombing strategy never allowed the campaign in Brittany to flow in a logical manner.

It is normal in any conflict to expect changes in directives, policies, and priorities. This is an accepted practice due to the dynamic nature of the battle and the enemy. But, it is critical to ensure changes are relevant in time and synchronicity as to not hinder or introduce undue tension in the operational environment or towards reaching campaign objectives. Over the course of the Second World War, fifty different bombing directives were issued to British and American bomber crews.[188] Some were appropriate changes as the war evolved and some were not. Whether this number is too high or too low is not of particularly importance. The right question to ask is how often did it change and how much did it disrupt the Brittany bombing campaign? The Allies struggled to develop a logical flow for bomber operations and could not agree on priorities throughout the war.

At the outbreak of war, the British developed two plans: the *Pre-war Defensive Plan* and the *Pre-war Offensive Plans*. These plans primarily focused on destroying German oil capacity, aircraft production facilities, and naval targets with an intent to dislocate and demoralize the enemy.[189] By March 1941, the British issued a new, four-month policy of defensive strategy to prevent enemy attacks on convoys to and from the United States, but this soon changed back to

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[188] United Kingdom, *The Strategic Air War Against Germany 1939-1945*, ed. British Bombing Survey Unit (London: Frank Cass Publishers, 1998), 28-30.

[189] Ibid., 28.

an offensive strategy.[190] Concerned about the rising rate of merchant vessels lost, Churchill gave the war against the U-boat his highest priority and ordered an offensive against these threats "at sea, in the building yards or at dock."[191] For the first time, his directive laid out how this threat should be neutralized based on three courses of action: attacks on Nazi U-boat facilities, attacks on capital ships in harbor and attacks on industry associated with submarine construction.[192] This directive would come to be known as Churchill's 'Battle of the Atlantic' directive.[193]

Prior to this directive German oil resources remained the priority target for Bomber Command. Air Chief Marshal Portal viewed this as a step in the wrong direction as many of his bomber assets were required to "pull the Admiralty out of the mess they have got into."[194] But, from March to July, the British changed priorities back towards a policy of defense to prevent enemy attacks on American convoys headed to England.[195] Unfortunately, priorities changed again, emphasizing the destruction of railways in order to dislocate the German transportation system. This change gave the Nazis time to build their submarine bunkers well into 1942.

By 1942, the Nazis were engaged in an uncontested battle in the Atlantic and the North Sea. The U-boat threat was increasing at an alarming rate, month after month. Early attacks on Germany's shipbuilding industry, including U-boat bunkers, were for all practical purposes ineffective.[196] By the end of 1942, more tons of Allied shipping had been lost to submarines than

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[190] Ibid., 29; Dodd and Ryan, 476.

[191] Ireland, 60.

[192] Delve, 122.

[193] Ireland, 60.

[194] Hastings, 100.

[195] United Kingdom, *The Strategic Air War against Germany 1939-1945*, 29.

[196] Ibid., 66.

nearly the previous two and-a-half years combined.[197] "The Allies knew the number of Nazi submarines on active duty was increasing, from thirty in May to nearly one hundred in September."[198] So once again, they refocused their attention on the Brittany bases. In a directive issued on October 20, 1942, the Allied Commander-in-Chief, General Dwight D. Eisenhower, gave the submarine pens and production facilities, first and second priority for planning and targeting.[199] In the end, from March 1940 until February 1942, twenty different bombing directives were issued with only five of them prioritizing submarine factories, yards or bases.[200]

What is interesting to note, is the change in tone and restrictions placed on bombing directives and policies from 1940 through 1942. Dodd and Knapp point out, "Unlike directives, bombing policies defined rules of engagement rather than targets."[201] They further explain that the policies of 1940 were far more restrictive when it came to bombing occupied territory. In fact, it was considered illegal and care was taken to avoid such atrocities. But, by 1942, an emphasis on destroying civilian morale was an essential goal. It was in line with the enemy's view of unrestricted air warfare and therefore justified area bombing, but care was still to be taken on targeting occupied territory.[202]

By late October 1942, General Spaatz issued a revised list of objectives from Eighth Air Force. "Until further orders, every effort of the VIII Bomber Command will be directed to obtaining the maximum destruction of the submarine bases in the Bay of Biscay." This included

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[197] Konvitz: 26.

[198] Ibid.

[199] The United States Army Air Forces in World War II, "Bombing German Submarine Pens: October 1942 - April 1945," http://www.usaaf.net/ww2/uboats/uboatspg6.htm (accessed 1 October 2009).

[200] United Kingdom, *The Strategic Air War against Germany 1939-1945*, 28-29.

[201] Dodd and Ryan, 473.

[202] Ibid., 474.

targets in Brest, Lorient and St. Nazaire.[203] In addition to Spaatz's new objectives, General Eisenhower followed with a new bombing directive. It clarified previous guidance on the strategic policy concerning daylight bombing operations in an effort to increase accuracy and prevent mounting civilian casualties.[204] Eisenhower required Eighth Air Force, as a matter of first priority, to attack the submarine bases on the west coast of France, considering the defeat of the submarine "to be one of the basic requirements to the winning of the war."[205] By the end of 1942, it was not clear to the Royal Air Force or the United States Army Air Forces whether their attacks were beneficial in reducing the U-boat threat.[206]

Monthly intelligence summaries regarding attacks on U-boat bases stated the Nazis were anxious to create the impression of invulnerability of concrete bunkers as a way to discourage future attacks.[207] American intelligence did believe they were "extremely well protected" and noted vulnerabilities surrounding the concrete fortresses that were ripe for targeting: machine shops, warehouses, railroads, living quarters and other units all directly tied in to the U-boat organization.[208] Analysts determined it was these secondary targets, the one's that directly supported the submarine pens, that should receive strict attention. But even through the course of secondary targeting, it was difficult to evaluate results and effects on U-boat operations.[209]

By January 1943, the destruction of the submarine bases was priority number one for several reasons. First, on January 11th, the War Cabinet approved a policy of area bombing

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[203] Konvitz: 28.

[204] Frank Craven, Cate Wesley and James Lea, *The Army Air Forces in World War II - Europe: Torch to Pointblank August 1942 to December 1943* (Chicago: The University of Chicago Press, 1949), 237.

[205] Ibid., 237-238.

[206] Ibid., 242.

[207] US Army Air Force, *Monthly Summary*, 21.

[208] Ibid.

[209] Ibid.

against U-boat bases on the west coast of France.[210] "Three days later a directive to Air Marshal Harris ordered him to level Lorient first."[211] This was the first time the British reversed their stance on attacking civilian populations of occupied countries.[212] The Allies believed attacking the bases in this manner would affect morale of German forces and deter workers from supporting the base. However, these attacks did not last long. Soon, bombing missions over these targets were significantly reduced due in preparation for future combined bomber operations.

One explanation for the drop in attacks was due to the implementation of Bomber Command's Offensive Plan in June 1943, which executed the Casablanca Directive. This directive outlined a variation in the priority of targets from the original set in January.[213] In this directive, submarine bases were no longer a top priority and the German aircraft industry was substituted in its place. The Allies felt they were making a significant impact on the German Naval threat and decided to eliminate the German air threat to gain and maintain air superiority prior to the invasion of Normandy. Intelligence reports during this time period certainly painted a positive picture against the reduced threat at sea, but all three bases remained operational. They simply underestimated Nazi repair and construction efforts, which allowed them to remain operational until the very end of the war.[214] A year prior to the Casablanca Conference, Harris proposed bombing the submarine bases, but he changed his mind once he found himself involved

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[210] Davis, 94.

[211] Ibid.

[212] Ibid.

[213] United States Strategic Bombing Survey, *The United States Strategic Bombing Surveys* (Maxwell Air Force Base: Air University, 2003), 43.

[214] Konvitz, 33.

in the "hopeless misuse of airpower" to be a distraction from bombing Germany.[215] It would seem, in this instance, he might have been more right than wrong.

Bombing Brittany bases became more sporadic throughout the planning and execution of the Normandy invasion. Both the Americans and British were in disagreement on the best course of action for aiding the invasion and bombing the Germans. Allied relations were extremely tense as both sides struggled to agree on a Supreme Allied Commander in Europe, control over bomber resources, and prioritization of enemy objectives.[216] Most of the disputes arose during the planning of Operation POINTBLANK, the Transportation Plan and OVERLORD.[217] Despite these challenges, the Allies were unable to defeat the U-boat threat and caused an overwhelming amount of collateral damage to Brest, Lorient and Saint Nazaire.

Analysis of Problem Frame

By utilizing the concepts of design in order to formulate understanding of the problem, this study highlights the fact the Allies simply focused on the wrong problem and executed a poorly designed operational approach towards solving it. In order to neutralize the Nazi U-boat menace in the Atlantic, the Allies believed they must destroy the enemy submarine bunkers in Brittany. Although this thinking seems logical, it falls short in understanding the complex nature of the threat. According to General Ira Eaker the emphasis placed on the U-boat industry in

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[215] Rolf-Dieter Muller, Hans Umbreit and Derry Cook-Radmore, *Germany and the Second World War: The Strategic Air War in Europe and the War in the West and East Asia 1943-1944/5*, vol. VII (New York: Oxford University Press, 2006), 20.

[216] Pogue, 124-137.

[217] Neillands. 201, 263-280, 313. The POINTBLANK directive, issued on June 10, 1943, was a combined effort of US and RAF Bomber Commands aimed at destroying the German industrial and military machine. It entailed a sustained attack against the *Luftwaffe* in order to reduce the German Air Force's capability (June 1943 – April 1944). The Transportation Plan developed under the direction of Professor Solly Zuckerman, scientific to Air Chief Marshal Trafford Leigh-Mallory and Marshal of the Royal Air Force Arthur William Tedder. Operations were designed to bomb railway communications such as: tunnels, bridges, marshalling yards and stations in France in preparation for Operation OVERLORD (March 1944 – April 1944). Operation OVERLORD was the cross-Channel attack in Western Europe by Allied forces (Began June 6, 1944).

successive directives reflected both the fluctuating fortunes of the anti-U-boat war at sea and the increasing realization that the industry was not a very vulnerable target.[218] Eaker further went on to say that it was unnecessary to destroy the pens to disrupt repairs and resupply activities in the bases sufficiently to compromise the careful and precise schedule for the U-boat fleet."[219] When combined, targeting indirect support to the base, disrupting the timing and tempo of U-boat operations, and preventing construction and repair of the bases, could have dramatically altered the operational capabilities of the German Navy.

From an operational standpoint, these ports allowed the Nazis easy access to the Atlantic from which U-boat missions could originate and effectively operate from.[220] These bases were essential for ensuring faster, operational turnaround times, which effectively increased the number of U-boats operating in the Atlantic Ocean.[221] From a contextual understanding of German naval operations during The Great War of 1914-1918, combined with an understanding of how important these coastal facilities were to operational timing and tempo, the Allies could have developed a plan to exploit construction operations and impede on-going U-boat activity along the English Channel. This may seem easy to state in hindsight, but historical analysis and understanding how and why the enemy chose these locations, promotes greater understanding of the operational problem. In the end, Allied leadership could not have predicted the amount of collateral damage the region suffered as a result of bombing, but much of it could have been prevented through a proper analysis of the problem. But before analysis takes place, it is absolutely critical to define what kind of problem the Allies were dealing with.

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[218] United Kingdom, *The Strategic Air War against Germany 1939-1945*, 157-158.

[219] Konvitz, 27.

[220] Williamson, 5.

[221] Ibid.

Defining Problems

Problems are characterized in three ways: simple, complicated or complex.[222] First, simple problems are the kind most people face on a daily basis and have clear, identifiable attributes and elements that make them very easy to solve. According to Glouberman and Zimmerman, a simple problem is like following a recipe. Simple problems like this contain very basic issues of technique and terminology, but once mastered, it carries a very high assurance of success.[223] Complicated problems are ones "that contain subsets of simple problems but are not merely reducible to them," such as sending a rocket to the moon.[224] Their complicated nature is often related to issues of scale, coordination and expertise, but is not an assembly of simple components.[225]

Complex problems are ones that can contain simple and complicated components but cannot be reducible to either since they are unique to local conditions, interdependency, non-linear and often have the ability to adapt to local conditions.[226] Glouberman and Zimmerman refer to raising a child as a complex problem. Out of the three types, complex problems require the most critical and creative thinking and analysis in order to gain insight and understanding. By first characterizing the type of problem, planners and strategists can begin to apply proper reasoning based on the correct nature of their problem.

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[222] Sholom Glouberman and Brenda Zimmerman, "Complicated and Complex Systems: What Would Successful Reform of Medicare Look Like?," in *Changing Health Care in Canada: The Romanow Papers,* ed. Pierre-Gerlier Forest, Gregory P. Marchildon and Tom McIntosh(Toronto: University of Toronto Press, 2004), 22.

[223] Ibid.

[224] Ibid., 23.

[225] Ibid.

[226] Ibid.

Complex problems and systems are extremely dynamic and adaptive due to the relationships and interactions of the actors and agents involved.[227] They also possess behaviors that are hard to understand unless utilizing tools such as complex adaptive thinking and systems analysis for greater understanding. Bar-Yam, author of *Making Things Work,* explains how complexity of military operations increases based on the nature of conflict.

> Complexity increases in military conflict where the application of effective force must be more carefully selected or more accurately targeted, or where the implications of making wrong choices are more severe such as carrying out operations in an urban setting, when objectives require minimal damage to buildings and infrastructure.[228]

Unfortunately for Allied planners, they may have been guilty of something many people do when dealing with complex problems. When people are faced with problems they implicitly describe complex problems as complicated ones and hence employ solutions that are wedded to rational-planning approaches."[229] Henry Mintzberg, a critic of strategic planning, feels this is unacceptable since analysis cannot be reduced to create synthesis.[230] A good example of this according to this study can be found by analyzing the Brittany bombing data. Thousands of missions were generated to destroy the concrete bunkers, but ultimately failed to render any of them inoperable during the course of the war. There were several reasons for some of these failures such as weather, inadequate munitions and resources, enemy defenses, and tactics, but the point is the Allied planners failed to understand the complexity of the problem.

A unique behavior of complex problems is their ability to generate and display *emergent behavior*, which creates unintended challenges in determining how best to go about solving

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[227] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity*, 2nd ed. (London: Elsevier, 2006), 118.

[228] Yaneer Bar-Yam, *Making Things Work: Solving Complex Problems in a Complex World* (Cambridge: Knowledge Press, 2004), 100.

[229] Glouberman and Zimmerman, 23.

[230] Henry Mintzberg, *The Rise and Fall of Strategic Planning: Reconceiving Roles for Planning, Plans, Planners* (New York: The Free Press, 1994), 13.

them. *Emergence* or *emergent behavior* is often the result of changes in behavior through local interactions of a system and the development of patterns or organization.[231] These patterns of behavior are hard to see and predict if a person's understanding is focused on the individual parts instead of the holistic nature of the problem or system. Understanding the individual pieces of a system is important, but when they are all put together, further analysis of what the system creates and how it evolves requires additional critical and creative thinking.

One example of *emergence* with regard to the U-boat campaign took place from 1940 through 1942. Over the course of this time period, the total number of Allied ships destroyed by Nazi U-boats increased every year, despite increased Allied attacks on the submarine bunkers in Brittany.[232] How was this possible? The Allies were so focused on destroying the bunkers they failed to understand the complexities of their problem. Their problem was not a physical one, but an operational one since U-boats were operating to and from these bunkers on a fairly strict, operational timeline.[233] Interrupting the enemy's operational timing, tempo and synchronization was one key to neutralizing the threat versus bombing nearly impenetrable targets. The Allies actually found a somewhat effective way to do this. However, they did not fully develop the means for sustained employment throughout the war due to changing priorities, limited resources, and institutional barriers. Regardless, what they did find was a way to disrupt and destroy U-boats through mine-laying operations, also known as *Gardening.*

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[231] Steven Johnson, *Emergence* (New York: Scribner, 2001), 19-20.

[232] Gudmundur Helgason, "Uboat.Net: Ship Losses by Month" http://www.uboat.net/allies/merchants/losses_year.html (accessed 9 February 2010). Data compiled from online breakdown of losses per month. This database is current as of 2010.

[233] Williamson, 25. One third of the entire U-boat fleet was on operational duty, another third was always in transit to and from the operational area, and the remaining third was in port for repair and upgrade. It was rare when the bunkers were completely empty.

Mining operations were somewhat limited but did prove effective in preventing U-boats from attacking convoys. These operations were also responsible for sinking quite a few U-boats and ships at sea, as Harris liked to point out to the Royal Navy.[234] According to Delve's analysis, Bomber Command's role of mine-laying was extremely vital, but often ignored.[235] It was highly dangerous for bomber crews would who would fly to specific locations, at speeds below 200 miles-per-hour, and at altitudes between 400-1,000 feet.[236] It required a lot of training and skill, not only navigation, but in the art of delivering the mine. Furthermore, British *Hampdens* were one of the only bombers capable of carrying the 1,500-pound mine in the early years of the war.

The *Gardening* operations that took place throughout the war were mostly viewed as a supporting effort to major bombing operations over the continent of Europe. Despite the political and military tensions over the value of mine-laying operations, Bomber Command believed the most effective bombing operations were ones that attacked the threat at the place of origin: the submarine pens.[237] Moreover, the Allies did not fully appreciate the additional stress put on the German Navy to overcome these and the effects they were producing.[238] The Nazis had to dedicate additional resources to clearing mines and spent a great deal of time and manpower repairing damage vessels. Measuring *gardening* effectiveness may be debatable, but according to military historian Richard Davis, "Bomber Command's strategic mining campaign played a significant role in increasing the overall attrition of German economic resources."[239]

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[234] Neillands, 184.

[235] Delve, 128.

[236] Ibid., 129.

[237] Ibid., 130.

[238] Davis, 84-87. Minelaying operations in the Baltic Sea were so effective they essential shut down U-boat training bases in this region, preventing the German Navy from fielding their advanced XXI and XXIII submarines.

[239] Ibid., 87.

There is no doubt the Allies faced a complex problem during the planning and execution of the bombing campaign over Brittany. Their problem involved understanding tensions, changing situational conditions at the political and operational levels, and required an adaptive, design methodology to keep up with the dynamic environment. Unfortunately, the Allies fell far short in their ability to identify their problem as *complex* and wrongly set their problem frame on an ineffective path towards defeating the Nazi U-boat threat coming out of France. Put simply, they jumped into developing solutions long before they understood their problem.

Conclusion

The coastal cities of Brittany reconstructed after the Second World War were seen as promoters of what a city of the future should strive to be and project an image of a better and more promising future.[240] Ultimately, political implementation gave birth to different post-war urban environments and this led to continued identity problems for each of them.[241] To this day, Brest, Lorient and St. Nazaire still suffer the lasting effects of Allied bombing and the long road to reconstruction, especially when it comes to reinvigorating the business of tourism along the Brittany Coast.

Each of these cities was challenged to find ways to draw more attention to their waterfront. They struggled with long-term strategies on how best to utilize the massive, concrete submarine bunkers overshadowing their landscape. "The cities that visitors discover today are in effect twice new…the lack of historical monuments and sites gives them a peculiar character and penalizes their tourism development."[242] It was not until the 1990s, that these cities started implementing tourism strategies for the first time in their history.[243] Despite these efforts the perceived urban newness would fail to lure tourism to these redesigned cities, while, much of the blame would fall to the reconstruction designs and plans following the Second World War.[244]

The ability to decide whether a campaign was effective or not, should be best answered by examining the conflict through a variety of frames in order to gain an understanding of the conflict. It is shown here, through the various frames of a design methodology, that attainment of an answer can be achieved. The strongest evidence to support the Brittany campaigns

[240] Gravari-Barbas, 253.

[241] Ibid., 252.

[242] Ibid., 251.

[243] Ibid.

[244] Ibid., 253.

ineffectiveness is somewhat quite obvious. The concrete submarine bunkers are still standing today in their respective cities. Furthermore, due to their incredibly robust design, they will continue to stand for many more years to come. To understand the effect on French civilians, it is best to look at how liberation was viewed through the French perspective.

Liberation as seen through the eyes of the Allies far different than the perspective of the average French citizen. Many Americans are used to seeing the black and white photos and videos of Allied soldiers rolling through French cities in a parade-like atmosphere following the Normandy invasion. Towards the end of the war, some French locals would not even speak in terms of liberation but refer to the summer of 1944 as being the time of the 'bombardments.'[245] For many citizens of Brittany, liberation would not come to them until the very end of the war as the Germans retreated to the bases, creating pockets of resistance.

By utilizing a design methodology for studying the bombing of Brittany, leaders, strategists, and historians can achieve greater depth and understanding how the Allies executed thier operational approach, their analysis of the operational environment, and how they developed solutions for the wrong problem. These failures led to serious unintended consequences in Brest, Lorient and Saint Nazaire. Based on this research, it is acceptable to conclude Allied bombing of Brittany was ineffective and in some instances completely unnecessary, Furthermore, failing to understand the complexities of the conflict, limited Allied leaders and planners on alternative courses of action.

This study explores a variety of topics to come to a logical conclusion, but is not inclusive of all aspects of the operational environment, problem and operational approach. However, future studies should strive to focus on additional areas before and after the Second

[245] Vinen, 325.

World War in order to truly understand the campaign holistically. Although Organization Todt is briefly mentioned, it lends itself to more detailed research. This organization is extremely complex and requires further analysis in order to understand this very capable enemy system. Additionally, bomber developmental was not researched in detail in order to keep this monograph properly bounded and focused on the actions taken by the Allies from 1940-1945. It is certainly important to understand how American and British forces developed doctrine, training, and bomber assets and how their developments affected operations during the early years of the war. Finally, future research should be conducted on resistance movements within the Brittany region to compliment these findings. The effects of sabotage, civil resistance, and psychological effects were not taken into account in this study's conclusion. These are all important aspects of the campaign that could provide additional insight into the effectiveness of Allied bombing.

The widely accepted belief is that opinion varied as to the effectiveness and damage inflicted by the bombing.[246] Sir Arthur Harris claimed in his dispatch following war, "At the beginning of these operations I protested against the misemployment of my force on a type of operations, which could not achieve the intended object."[247] He may have been correct in this context. Even the crew of the *Memphis Belle*, which flew twelve missions against submarine pens in Brest, Lorient, and St. Nazaire, questioned operational effectiveness with regard to their owns missions against the bases. They wanted to believe their efforts brought the Nazis to the

[246] Craven, 251.

[247] Arthur T. Harris, *Despatch on War Operations: 23rd February 1942 to 8th May 1945*, 14-15. Sir Arthur Harris talking after the Second World War on the decision to area-bomb the city of Saint Nazaire.

brink of suspending U-boat operations, but they knew all too well, their heaviest of bombs were no match for the 12-foot-thick concrete shields over the U-boat pens.[248] In their own words,

> "The Eighth Air Force became committed to a protracted campaign against the submarine operating bases on the French coast, which though unquestionably inconvenient and harassing to the enemy, proved on the final analysis to have had no appreciable effect on the rate of U-boat operations."[249]

In the end, approximately 20,000 tons of bombs were dropped in the battle against the Brittany submarine pens and a majority of it delivered in directed area-bombings versus the twenty-five percent dropped during precision attacks.[250] Thousands of French citizens in Brittany were killed or wounded, and tens of thousands of ancient buildings destroyed as a result of solving the wrong problem.

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[248] Robert Morgan and Ron Powers, *The Man Who Flew the Memphis Belle: Memoir of a WW II Bomber Pilot* (New York: Penguin Group, 2001), 159, 198.

[249] Craven, 242.

[250] Davis. Excel spreadsheets of bombing data from 1940-1945; United Kingdom, *The Strategic Air War against Germany 1939-1945*, 157-158.

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