**Introduction: It Started with Sandstone**

Charlemagne had an insatiable goal to conquer Europe and bring the pagan inhabitants of Germany into the Christian religion. In AD 773, Charlemagne began his first campaign into Saxony, in what is now north western Germany. By 804, the last of the rebellious pagan locals were subjugated, and they began to enjoy relative peace as newly, yet reluctant, baptized Christians. To promote their new Christian religion, Charlemagne ordered his new subjects to build a small church in Minden to house the diocese he established there. Through the centuries, the building was destroyed and rebuilt, and in the second Century the building was enlarged to cathedral proportions. This enlarged religious edifice was built from sandstone quarried from the nearby Jakobsberg and Wittekindsberg hills. Originally mined for the rich iron ore found in the rock, the stone, which became known as Porta Sandstone for its location as the gate of Westphalia, or in latin Porta Westfalica, was widely used for building churches, buildings and bridges throughout north western Germany, including the cathedral in Bremen, originally completed in AD 1200.

An existing edifice built from the same sandstone sits atop the Wittekindsberg hill in the town of Porta Westfalica, in North Rhine-Westphalia, Germany. This is a massive monument to an equally massive historical figure of nineteenth-century Germany. Built from 1892-1896, a large bronze statue of William I is housed within a gazebo made from sandstone taken from the very hill upon which it rests. Dedicated to the memory of *Wilhelm dem Grossen*, this monument stands for some today as a symbol of German unity. Entombed under this monument are remnants of an even more recent, yet more divisive German past.

Mining during the nineteenth century left large, open mines in the Wittekindsberg and Jakobsberg hills which are situated on opposite banks of the Weser River from one another. Virtually unused throughout the early twentieth century, the mines found use again in the final years of World War II. Beginning in 1942, concerted efforts were made by the German government to protect the increasingly targeted aircraft industry by relocating factories to physically separate locations, and in some cases into underground facilities. Forced laborers from nearby concentration camps supplied the labor to convert existing mines into factories or carve new workspaces from the cold, unforgiving stone. One such project was located in the unused mines in Porta Westfalica’s hills, with labor supplied mainly by the inmates from the Neuengamme Concentration Camp near Hamburg and POWs from Russia and Poland. Stone once used to commemorate and memorialize the unification of fragmented German kingdoms was now discarded in favor of the underground space; just as the lives and humanity of inmates was discarded for the labor they could provide. Such projects actualized Nazi desires to eradicate anybody they felt undeserving of life.

This dissertation expands knowledge of German history and the field of historical research in three unique ways. First, nearly all scholarly narratives about the numerous underground dispersal projects throughout Germany, France, Austria, Poland and the present day Czech Republic are written in German. To date, there are only two publications⁠[[1]](#footnote-1) written in English that are dedicated to the history of an underground dispersal project and associated forced labor camps. Some projects are mentioned briefly in several books, most notably those detailing the history of a particular business that was scheduled to move to underground facilities. Neil Gregor's work on a German automobile and engine company, *Daimler-Benz in the Third Reich*, and others like it, are examples of such scholarship.[[2]](#footnote-2) These works provide a slight, but preliminary, foundation for understanding the underground dispersal projects from both the Nazi as well as a business perspective, but mainly focus on the history of the business and only tangentially narrate the history of the forced laborers. This work increases the English scholarship relating to the history of underground dispersal projects by uncovering the history of the tunnels, camps, and inmates at Porta Westfalica.

Secondly, interviews of and memoirs by concentration camp survivors frequently mention places and times, often using temporal and spatial structures to form the framework for understanding and dealing with their traumatic experiences. Interviews from over 30 former prison laborers describe the temporal spatial awareness and movements of these individuals during their time at the Porta Westfalica camps. Maps and geospatial data are plotted and generated to track changes over time, using standard GIS software like ArcGIS, Omeka and Neatline. The first study shows the gendered way in which camp and work life were remembered, arguing that the male laborers focused more on the work and negative aspects of camp life, and the female laborers found much more positive things to recall. The second study shows the locations that the inmates travelled to in order to reach the camps and worksites at Porta Westfalica, and also includes their journey home after liberation. The interactive map also includes data about the locations and individuals, providing a way to recreate the experiences of individuals.

Finally, the research materials, the primary and secondary documents, as well as the scholarly writing process, are open to the public through the use of an online repository and scholarly website, and by linking the sources in the footnotes to a reproduction in the online repository. It is believed that better research will result if the process of research and analysis and the sources upon which that research is based are open, available, and actively collaborated on. Our modern society benefits from the results of the Open Source software community (much of the Internet and smart phone software runs on Open Source software), where the underlying code is available for all to see and improve upon. Historical scholarship can benefit from a similar open model. Two supporting aspects, two sides of the same coin, seem to make an Open Source project successful; availability and collaboration. The code must be available for others to work with it, and improvement happens when many people work on the same code. This project will focus on only one side of the coin, making the resources and research available. All of the research and resources used in this research are made available at an accompanying website and online repository. To facilitate the link between the work and the sources, all footnotes that reference a primary source contain an HTTP link to the corresponding primary source in the online repository. Research and analysis are improved when other researchers can see the source of arguments and information and provide corroboration or contradiction. Making the sources available online and providing a link to the sources eliminates the need for collaborators to do much of the time and labor intensive work of locating the primary source for themselves, a process that often discourages fellow researchers to cross check the original argument. This dissertation stands as an example of a new model of scholarship, with open and available sources, and argues the value of an open source model of scholarship.

**Historiography**

There are a plethora of works detailing the history of German economy and businesses in Nazi Germany,[[3]](#footnote-3) which provide needed context and understanding about the German economy, issues faced, and options available to German businesses throughout the war. This research uses a discussion of the business perspective on topics such as rearmament and recovery, the miraculous production increases of 1942, the relationship between businesses and the Nazi regime, and the destructive Allied bombing to understand the need for and decisions of businesses to disperse factories into caves, tunnels, and mines. Neil Gregor's work on Daimler-Benz provides an example of discussing German war production from the perspective of both the Nazi regime as well as a German business, and touches upon the above mentioned topics that lead to a more complete understanding as to why a company such as Daimler-Benz would consider dispersing factories in the first place, let alone to underground locations.

Scholarly works about dispersal plans for German armaments factories during World War II, specifically the efforts to move factories underground, are severely lacking. Similarly, several major government officials who played a large part in the underground dispersal projects lack any form of bibliography about them. Hans Kammler and Oswald Pohl, two SS leaders directly involved in the underground dispersal projects, and holding high positions and thereby influencing many lives, are mentioned only briefly in many of the books addressing German businesses and Nazi organizations, and would benefit from a more complete look into their involvement in the Nazi regime.

A large and ever growing bibliography on the lives and experiences of those who suffered through the Holocaust currently exists. Because study and training in the nuances of Holocaust research has not been done, this work does not seek to be a Holocaust study, but rather more a social and technical history of the underground factories and the labor force used to create the work spaces. Memoirs and interviews of concentration camp members are used to present the view of the forced laborers. Because there are no personal accounts from businessmen, civil workers and government officers, ogvernment documents are used to uncover details of the technical and bureaucratic involvement of businesses.

Daniel Uziel’s recent work, *Arming the Luftwaffe: The German Aviation Industry in World War II*, finishes where an earlier work of almost the same name left off (Edward Homze’s, *Arming the Luftwaffe: The Reich Air Ministry and the German Aircraft Industry, 1919-39*), and includes the first work in English to describe and present the underground dispersal projects as a whole. The Luftwaffe was intimately involved in the building of underground factories, not only because they participated in the organization, staffing and oversight of many of the projects, but because their airplanes, fuel, and spare parts were to be built there. Uziel describes with clarity the often confusing national organizational structure that existed to move airplane manufacturing to underground locations. Using sources from the Bundesarchiv as well as captured documents in the U.S. National Archives, Uziel is able to piece together the many issues between the competing interest groups between Göring, Speer and Himmler, which resulted in the formation of the Jägerstab, a short-term committee which included a combination of efforts by the Reich Air Ministry and the Reich Ministry for Armaments and War Production to increase production and relocate factories to underground locations bypassing bureaucratic red-tape by allowing their orders to go through immediately.

Claus Reuter’s, *Reimahg, from Sandpit to Armament Factory: History of Hitler’s Secret Underground Factory: with a Short History of the Me 262 and Fw 190* (S.l.: s.n., 1998), is the oldest English text on one of the underground dispersal projects, but is, in my opinion, very poorly written. The book seems to consist of a jumble of thoughts, rather than a coherent narrative on the underground project, and includes many grammatically incorrect sentences, and a touch of historicism, leaving the impression that this work was quickly done and in no way edited or reviewed. Reuter also is unnecessarily negative towards other historians and their methodology and results. Whereas this can be helpful in showing the weaknesses of an argument or lack of research in order to build a stronger understanding of an issue, Reuter seems to throw around insults just to show how much more he knows than other historians.

In perhaps his most egregious error of hypocrisy, Reuter closes with the argument that there should be a monument, complete with kid-friendly museum, constructed near the Reimahg underground site to show off just the many technical advances and achievements accomplished in building this underground project. Preceding this suggestion, Reuter spent several pages decrying the inhumanity and moral degeneracy of those who forget the "real history of what happened," and of “those who committed crimes." Such a museum would seemingly ignore all of the slave laborers that lost their freedom and lives in favor of technology. One interesting observation in his rant against the Allied bombing strategy was that the British ended up killing more German civilians in just the bombing of Dresden than the Germans killed British citizens in all of their bombing raids on all of Britain.

A more scholarly work in English is *St. Georgen - Gusen - Mauthausen: Concentration Camp Mauthausen Reconsidered*, by multiple authors[[4]](#footnote-4) including a survivor of the concentration camp. This work takes a much more objective historical approach in the research and includes numerous sources previously unpublished. Along with narrating the history of the concentration camp and projects at Gusen, Austria and the relationship to the more well known Mauthausen, the authors argue that the concentration camp at Gusen was in fact larger than the project at Mauthausen, and was for all intents and purposes an independent camp, not a sub-camp of the St. Georgen-Gusen-Mauthausen complex, as had previously been believed. By uncovering the true nature of the Gusen camp, the authors hope to fill in aspects of the still incomplete historical narrative and provide a groundwork for future historians to more easily understand the “function and operation of Concentration Camp ‘Mauthausen’ as the trifurcated system of the two concentration camps at Gusen and Mauthausen with infrastructure and administrational headquarters at St. Georgen/Gusen.”[[5]](#footnote-5) The work also serves as a cipher to the many complex code names used to keep the project secret from the public and the enemy.

One argument that the authors make early on, is that the use of forced laborers served the dual and complimentary purpose of ridding the Nazi party of political enemies and what they believed to be racially impure people while simultaneously rebuilding the physical world to their design. In the early days after the Anschluss in Austria, write the authors, Himmler was already making visits to project sites in Mauthausen and Gusen to assess the availability, quality, and quantity of resources (stone, sand, space for laborers, and so forth) to enact the already long held business and building plans of the Waffen SS. Relying on works by Jochen Thies and Michael Thad Allen, the authors show that plans to remake and redevelop several cities in the Reich were in place as early as 1925, and that business and economics were as much a part of the decision to enslave political dissidents and the “racially impure” as was the desire to simply remove them from the world.[[6]](#footnote-6) They argue that the Holocaust was just as much an affect of anti-Semitism and official persecution of those not of the "master race" as it was the economic and business plan laid out in order to fulfill desires to rebuild the Reich to the plans of a massively demented Hitler (himself a failed architect).

In order to create an economically independent Waffen SS, as Himmler desired even in the early days of the Reich, he would need a large and inexpensive labor force. Racial ideology provided the (warped) logic to satisfy the need by claiming a large portion of the European population as less than human, and therefore appropriate for enslavement, thus providing a large and relatively free labor source.[[7]](#footnote-7) The authors argue that one of the motivating factors for the mass murder of Jews and others was not only because of their belief that these people were of inferior race, but because they were needed as a labor force to build the new Reich in the format designed by a crazed Hitler. Nazi leaders realized that the current capitalist model of business was not going to supply them with the manpower to win the war nor rebuild the cities in the length of time they wanted. They needed to abandon capitalism and devolve to fascism and the use of slave labor. The obvious flaw in their theory, which may be explained by the shortsighted and hate-filled missteps of those enacting the plan, was the abuse and misuse of their labor force. More cost effective and economically sound would have been to cultivate a slave labor force (much as the Egyptians did the Hebrews) rather than terminally abuse them (as did the Roman Empire). In other words, it would have been economically better to let the population of potential slaves increase rather than kill them all off. But again, the Romans had the same problem. The life expectancy of a slave was such that there was always a need for more slaves. The slave population did not regenerate itself faster than they were killed off. It was a declining population. Thus the need for Romans to conquer more lands to get more slaves. Perhaps this was one of the driving forces pushing Nazi leadership’s desire to expand as well. The Nazi policy of forced labor is summed up succinctly by historian Rainer Fröbe who writes that concentration camps were set up to provide destruction through labor (Vernichtung durch Arbeit), as opposed to work makes you free (“Arbeit macht Frei").

Regardless of the possible reasons for using forced labor, the authors show that “murder would remain the shared ultimate goal of all segments of the SS"[[8]](#footnote-8) as seen in the multiple acts of senseless beatings, malnourishment, in-humane working and living conditions, and every opportunity taken by SS guards to shoot concentration camp inmates. As an ultimate goal, the authors hope this book will bring to light the experience of thousands of individuals who’s life was extinguished at the Gusen Concentration Camp.

While english scholarship in the area of underground dispersal projects is only now increasing, the German scholarship has many examples[[9]](#footnote-9) which focus on individual projects, mainly narrating the associated concentration camp and its victims’ role in creating the underground space and subsequent working of factory machinery. Most notable are the works by Jens-Christain Wagner, current director of the Mittelbau-Dora Concentration Camp Memorial, Bertrand Perz, Rainer Fröbe, and Christine Glauning. Many more works exist in Polish, French and Czech, but due to lack of knowledge of these languages and time constraints, these books can only be mentioned, and their research left uncovered.

An unconventional source for historical works is found on the World Wide Web. Web pages provide an inexpensive and low barrier to entry for personal publishing. Many arguments exist about the quality and reliability of research presented on personal websites, forums, and publicly edited encyclopedias like http://Wikipedia.org. The existence of many websites about underground dispersal projects is proof that there is interest among the general public about such a topic. In particular, this research notes four websites with content specifically revolving around the tunnel projects at Porta Westfalica.[[10]](#footnote-10) Many other websites provide information regarding other dispersal projects, both from an individual or group effort at an amateur level, as well as professional sites run by memorial groups located at project sites. Also of interest are the pages on city and county websites that address their history of concentration camps and tunnel sites.

Only two scholarly works have been written about the dispersal project and concentration camps at Porta Westfalica. A dissertation in 1984 written by Reinhold Blanke-Bohne at the University of Bremen[[11]](#footnote-11), *Die unterirdische Verlagerung von Rüstungsbetrieben und die Außenlager des KZ Neuengamme in Porta Westfalica bei Minden*, provides a scaffold upon which to build the chapters describing the creation of the tunnel project at Porta Westfalica. Other research has been published by Rainer Fröbe,[[12]](#footnote-12) most notably his *“Vernichtung durch Arbeit”?: KZ-Häftlinge in Rüstungsbetrieben an der Porta Westfalica in den letzten Monaten des Zweiten Weltkriegs*. A masters thesis by Thomas Lange also exists.[[13]](#footnote-13) Of tangential importance are the books by Jochen Bergmann who writes with the intent to prove the Nazis were involved in creating perpetual energy devices, atomic weapons, and other implausible and fantastical creations. The only real scholarly benefit of Bergmann’s books are the color photographs of the tunnel systems which he visited in the 1980's.[[14]](#footnote-14)

Several books written by survivors of the concentration camps at Porta Westfalica are used in this research. *“Das Leben ist schön!”: Uberlebensstrategien eines Häftlings im KZ Porta,”* by Pierre Bleton, provides the earliest published account of inmate life in Porta’s concentration camp. The first and most immediate benefit of this work is the very brief, introductory explanation of the camps and tunnel projects at Porta Westfalica, which describe the location of the concentration camps and project sites, the type of work carried out by the laborers, the number of inmates, and the companies that were supposed to occupy the underground factories when completed. This memoir of Pierre Bleton is an extraction and translation from Bleton’s complete memoir in French, which covers his entire experiences in the various concentration camps throughout the war time.

This work was the product of seven students and their teacher at the Municipal High School Porta Westfalica as an entry in the national school competition for civic education. Work on the text was followed by articles in the local newspaper to bring attention to the experiences of the concentration camp inmates, and the organization of a seminar that included Hermann Langbein, a fellow prisoner and prolific writer of his experiences, as guest. They also confronted the local government to be more proactive in the acceptance of their city's heritage with the creation of an informative brochure about the camps and inmates, a section of which was to include an excerpt from Pierre Bleton's memoir, for the city to distribute.

After translations of Bleton's memoir for the brochure returned an unexpected "irritatingly optimistic" outlook on his experiences, the students felt that the text did not deserve to be shrunk to eight pages of a small brochure. They therefore proceeded to raise funds to turn the translation, with accompanying review of the memoir by historian Rainer Fröbe, into the present book. In a very mature realization of their generations role in coming to terms with their heritage, these young adults wrote how this work had changed their lives.

Why did we engage in the Nazi past, here and elsewhere, for one and a half years? Perhaps out of fear of repeating the past? Or out of uneasiness caused by confronting the question of how we might have behaved at that time? Don't we act just as cowardly in similar, seemingly innocent situations? None of us has the right to claim he would have acted differently than the majority of the population - namely, do nothing! If we can't be sure that we would have acted differently, we can't be sure of a repetition, then for the sake of the future we must deal with this past. ([[15]](#footnote-15))

In practical terms, the students determined that they must not, could not, sit idly by when comments were made about the "merits" of the Nazi regime, or, as one student experienced, allow students to go unchallenged when saying that a disabled student should be "gassed.” The students changed through this experience; they became more aware, even hypersensitive to their national past and the issues involved in living with that past. Can a society, they ask, become too cautious of the adaptation of small but unnecessary restrictions of freedom and responsibility, to adapting to "immutable constraints" and to silence? “Das Leben ist schön” is a valuable book for the remembrances of a survivor, the critical analysis of the memories by Rainer Fröbe and the insights gained through the group of students who organized the production of this work.

*Survival in the Organization: Gunnar Hjelholt Looks Back at the Concentration Camp from an Organizational Perspective*, by Benedicte Madsen and Søren Willert is a very light foray into the remembrances of psychologist Gunnar Hjelholt who survived the labor camp at Porta Westfalica and his thoughts on the concentration camp system as an organization from the viewpoint of an applied social psychologist. It is light in the sense that the issues and events are not discussed or probed in any real depth. In interview format, the authors pose questions, and Hjelholt's responses are given. No further inquiry or explanation is given on most accounts. Not intending to be a scholarly treatise on the Nazi concentration camp organization, the book only briefly touches on Hjelholt's professional knowledge of the psychology of large groups and systems. In only a few short paragraphs do we see Hjelholt's analysis of the Nazi concentration camps as a system, and that only to say that, all inhumanity aside, it was a nearly perfect system of organization in that the members regulated themselves. "The concentration camp system is clear, transparent, and effective," Hjelholt explains. "It controls itself using the oppositions found between the various groups, vertically and horizontally in the system. Every position is connected to privileges."[[16]](#footnote-16) The inmates themselves were the ones who enforced the rules of the system. The opposition between national groups within the inmates and between the inmates and their captors kept the system stable and productive. This small book, really more a transcript of an interview through letters, provides more questions than answers, and simply exists as a brief glimpse or gateway into the deeper philosophical and psychological discussions that could be had about the organizational structure of concentration camps under the Nazi regime.

More recent works by survivors have been published including *Anus Mundi* *: Fünf Jahre Auschwitz* by Wieslaw Kielar, *A Final Reckoning: a Hannover Family’s Life and Death in the Shoah*, by Ruth Herskovits-Gutmann[[17]](#footnote-17), *Resistance Fighter: a Personal History of the Danish Resistance Movement*, by Jørgen Kieler, and *Die Stärkeren* *: Ein Bericht Aus Auschwitz Und Anderen Konzentrationslagern*, by Hermann Langbein. This dissertation also utilizes the written transcripts from interviews of twenty-four concentration camp survivors, which were conducted in the 1990s’ by researchers at the Neuengamme Concentration Camp Memorial and have not been utilized in research or published.

Digital history is still in a nascent form, yet several books[[18]](#footnote-18) have been written to address the issues and options available for doing history in a digital age. This research makes use of the knowledge these books provide as it seeks to do just that, write and present history using digital tools. Foundational books, like Cohen and Rosenzweig for putting historical content on the World Wide Web, and Gitelman for arguing that questions about how to use new media are answered in the ways old media was adopted, are supplemented by a plethora of blog posts. The number of influential scholars who elaborate, debate, argue for and against, and think about and share digital humanities, and even digital history specifically, are too numerous to mention. They have in many ways influenced this research, most specifically in opening new paths for visualization, representation, quantifying and exploration that is possible through traditional text based research.

The focus on geographical and spatial aspects of historical research goes by many names, each with a nuance on how historians think of and manipulate data points of location; geo-history, spatial-history, historical GIS. Although not the only purpose, one end result for each focus is usually some kind of representation of historical data on a geographical representation, a map. Focusing on geographical and place based aspects of history opens up alternative ways to represent the past than describing who, what, when, why and how. A spatial focus adds the where to an aspect of research. Any aspect of historical study actually includes a spatial element, everything happens somewhere.

*Historical GIS: Technologies, Methodologies, and Scholarship* by Ian Gregory and Paul Ell provide a very compelling and detailed look at GIS, explaining with detailed examples the terms used in GIS and the implications of using GIS for historical research. Most importantly, they stress that Geographic Information Systems are one specific approach to scholarship, and are more than just a software tool. GIS prompts the scholar to ask “what are the geographical aspects of my research question?” rather than “what can I do with my dataset using this software?[[19]](#footnote-19)” GIS is a way to structure your data, organize your research, and visualize the results. Software is used to aid this process.

Karen Kemp reminds and challenges in her work “What Can GIS Offer History?” that historians need to apply historical methods and research skills to the data of GIS and don't just trust what the software supplies.[[20]](#footnote-20)

Geography professor John Pickles writes to fellow geographers, but his book *A History of Spaces: Cartographic Reason, Mapping, and the Geo-Coded World* speaks to the historian about how he or she can use maps in historical research. His approach is discussed in the Methodology section.

**Methodology**

Memory places an integral role in the historical research. Much of history is due to what someone remembered, either recalled later or wrote at the time. Arguably, government documents, newspaper articles, books, and any object created by mankind is a form of memory. Printed textual documents are created by humans to record something those humans felt important to be remembered. Art work is memory; it is the physical embodiment of the memory of the artist, his or her ideas, emotions, feelings and desires either stirred from the past or present as the artist creates. But memory is contentious when applied to historical research. Historians attempt to enact their craft, recreating the past, as a science, but without the ability to deal with absolutes. Even scientific absolutes can be debated, but for historians, the conflict is on the surface. Mathematicians deal with numbers, one plus one equals two. Historians deal with interpretations of memories which are incomplete and fallible.

Many historians have and continually grapple with the issues inherent with historical research and memory. When dealing with Germany’s past and the Holocaust, memory becomes even more contentious. Issues arise around conflicting and altered survivor memories. Do victim, bystander, or perpetrator’s recollections deserve more merit and attention? What to do when two survivor accounts conflict? Does modern media attention to the Holocaust story manipulate and change survivor memory? Many historians have written about the role of memory in Holocaust studies and attempt to answer such questions, most notably Saul Friedländer, Rudy Koshar, and Alon Confino.

Three chapters of this work are based on memoirs, interviews, and written reports of survivors. They utilize the memory of the survivors to reconstruct a representation of life as an inmate in the Porta Westfalica camps, and the work done in the factories and mines. Glaringly absent from this reconstruction are the memories of German civilians from the towns, civilian workers, and German guards. So few records exist from those who lived in this time and place, even from the former inmates.

This work uses several methodologies typical of historical work, but also seeks to incorporate ideas from different fields such as geography and the computer sciences. This research takes the approach of a micro-history to illuminate Germany’s use of underground dispersal projects. It would be much too big a project to catalog and narrate in any meaningful detail all of the more than thirty underground dispersal projects undertaken by the Waffen SS and under the direction of the Jägerstab, let alone the many more similar projects not organized by this branch of the Nazis. Of necessity, then, this research focuses on one single project in present day Porta Westfalica, near Minden in North Rhein-Westphalia, Germany. A focus on the technical, practical and economic issues, the use of slave labor and the interaction between business and government, and how the local population and governments have dealt and currently deal with the memory of the tunnel and concentration camps, while keeping in mind the similarities and differences found in other projects, establishes baselines and commonalities with which to compare other dispersal projects as well as other localities that must confront their involvement in forced labor projects.

Such historical micro-studies are common and are useful in addressing the multiple layers with which to view a historical topic. An exemplary work using the method of micro histories is *The Nazi Seizure of Power: The Experience of a Single German Town, 1922-1945*, by William Sheridan Allen. In this work, Allen not only addresses the issue of how the Nazis came to power, but shows the small details from one town and is able to expand that to a larger national framework. While Allen's results can not be applied to every town in Germany, the findings are indicative of many such towns. The insights and knowledge gained about the local application of the NSDAP changed historical understanding of the rise of the Nazi party in Germany. A similar outcome is expected with this study.

Usage of interactive graphics, maps, and 3D representations of some of the tunnel systems, enhance the understanding of spatial aspects of the underground project. It is hoped that through this use of technology, the project shows how our understanding of the past is augmented and enhanced by forms of new media in that new ways of looking at data require historians to ask different questions and perhaps come to different conclusions. Information about the digital aspects of the project, including analytical and scholarly writing, as well as digitized source materials, are available at http://nazitunnels.org/.

What does new media and digitization provide to historical research? Does it enhance or provide a different experience, or way to research that wasn't there before? Some historians, such as David Staley, argue that history can and should be told through other mediums besides linear sequential text. Just as the vibrations of sound are altered depending on what medium they travel through (air, water, wood, etc), the result of putting history through a different media would produce a different way of understanding that history.[[21]](#footnote-21) Most historians, insists Staley, use computers "to laterally transfer textual culture from paper to screen." This, he says, is like using a car only to park.

Other sciences, like architects, use computers not to show pictures of their buildings as a two dimensional blue print, but to design and create multiple levels of abstraction for understanding and developing a building.⁠[[22]](#footnote-22) They use the technology of the computer to enhance and understand their plans in new and different ways. Images or diagrams can represent data, history, and information in different and sometimes better ways than just words. Better than just a solitary diagram or plain text, is the combination of both mediums. The one explaining and expounding the other.⁠[[23]](#footnote-23) There is no analysis with just a diagram. And analysis is what the historian uses many, many words for. Images and diagrams enhance the analysis and provide information in much quicker and in more succinct ways.⁠⁠[[24]](#footnote-24) The old adage that a picture is worth a thousand words is applicable to historical research. "Where writing emphasizes sequence, unidimensionality, and linear chains,” argues Staley, “visualization enables simultaneity, structure, and association."⁠[[25]](#footnote-25) When viewing a diagram or image, the observer is able to comprehend multiple scenarios, time frames, and associations. With text, each explanation must be taken in one section at a time. Visuals, as it were, allow the observer to process multiple paragraphs in one glance.

In a recent blog post, historian Fred Gibbs noted the need for historians (humanities scholars in general) to be conversant and critical of visualizations. Visualizations are increasingly computed, not just designed, and as such have inherent arguments. These nuances of visualizations need to be recognized and addressed by the creators (historians, humanities scholars) and understood and critiqued by the consumers (other scholars). “Visual criticism is not a digital ~~history~~ [humanities] problem, it is a ~~history~~ [humanities] problem. [Emphasis mine]”[[26]](#footnote-26)

Maps provide another alternative medium to text for the understanding of history. Geography professor John Pickles, in his work *A History of Spaces*, describes the many different levels with which to use maps. While speaking to geographers, his remarks show how historians can view and interpret maps in unique ways. "At one level, the map and the mapping exercise can be seen as the careful scaling and coding of worldly objects and spaces for particular purposes,” states Pickles, “the topographic map enables accurate assay of and navigation through the landscape; the geological map identifies regions of similar surface and subsurface rock, along with boundary features such as faults and fracture zones; the architectural plan identifies the inner and outer spaces of built objects to guide the builder, lawyer and owner; and the street map identifies property boundaries, public infrastructure and official names for buildings, streets, and public and some private spaces.”⁠[[27]](#footnote-27) Maps of this sort tell us information. When this information is viewed in relation with time, it becomes valuable for those who study the past. Indeed, Pickles shows that maps form a way to see what is important and unimportant to the cartographer during that time. Just as historians must decide what information is most important to include in their writings, a cartographer must decide what icons and information, what lines and spaces, are most important to his or her story.

What is historical writing but attempting to recreate past realities with words. Cartography is very similar. Cartographers try to recreate reality through symbols; lines, shapes and images. It is telling on the history profession that we are not included in Pickle's list of fields that are increasingly seeing the importance of maps in their study. Maps provide a "new analytics and a new view of modeling reality." He continues, "It is comparatively easy to visualize maps as representation models of the real world, but it is important to realize that they are also conceptual models containing the essence of some generalization about reality. In that role, maps are useful analytical tools which help investigators to see the real world in a new light, or even to allow them an entirely new view of reality."⁠[[28]](#footnote-28) Writing history is precisely what Pickles defines as maps, albeit historians seek to simulate a past reality. Maps can provide, just as they do for cartographers, an analytical tool for seeing past realities in a new light. One way maps help shed this new light is by allowing historians to discover new relationships.[[29]](#footnote-29)

Modern availability for modeling and printing in 3D make it possible for the humanities scholar to create 3D representations of historical artifacts. 3D replicas can make scale, viewable angles, shape, and design more understandable.

This research makes use of visuals in the form of graphs, diagrams and maps. Graphs in chapter five allow for a much easier way to compare the accounts of place within the camps. Specifically, the graphs and scatter plot showed a difference in how men and women looked at their experiences by their focus on events.

One of the unique aspects of this dissertation project is that it explores the confluence of new media with historical writing. This project is greatly enhanced by many digital aspects including creating an online repository of primary sources, and a website and blog for public and peer feed back as the dissertation is being written. An online repository, website, and online forum, provide research and sources to the public and scholars alike. Even in the early stages of the dissertation research process, the presence and availability of a dissertation website have instigated correspondence with interested non-scholarly individuals. Some of these examples are discussed in the concluding pages of this work.

One important question in the historical profession is how and when a dissertation should be made available to other scholars. In July, 2013 the American Historical Association officially supported[[30]](#footnote-30) the option for recent PhD graduates to embargo their work for several years to allow them time to complete their research in book form. The statement argues that new historians could be at a serious disadvantage if required to grant public access to their newly completed dissertation. While I have not yet published a scholarly piece, I do know that my research has only positively benefited from being out in the open. The process of writing this dissertation, then, is an open experiment to see how helpful or hurtful publicizing not only the dissertation, but the also the research and writing process, will be for future publication. I suspect that the more exposure to and conversation about my research I get, the better it will become.

Not much has changed over the hundreds of years that our modern society has been researching and writing history. Modern technology offers historians an increased opportunity to present sources, seek for collaboration, and thereby create more accurate accounts of the past. Evolutions and revolutions within the age of computers, specifically the way software is developed and disseminated, can be applicable to the way history can be done. A growing philosophy of software development is the Open Source movement. Within this philosophy, the underlying code of applications is open and available, freely accessible without cost or restriction.[[31]](#footnote-31) Many wonderful programs are written using this ethos, such as the GNU/Linux operating system that powers the majority of servers making up the Internet and World Wide Web. Software such as Apache, PHP, MySQL, HTML, CSS, WordPress, Drupal, Ruby, Python, and Perl, all of which are web applications and services upon which the World Wide Web is built, and even the operating systems on Android smart phones[[32]](#footnote-32) are all built under the Open Source mantra. Our modern lifestyle exists because of Open Source ideals and the software built within that framework.[[33]](#footnote-33) The historical profession can, and should, learn from this community ethos. One mantra from the Open Source community states in essence, the more people look at the code the quicker problems can be recognized and fixed.[[34]](#footnote-34) I believe the same principle can be applied to doing historical research. Many researchers, not just scholars or professionals, but amateurs and any interested individuals, can put together a more accurate picture of the past than just one person. History is made by a multitude of people’s choices and actions, it’s absurd to think that one person can interpret and analyze them by him or herself. In that vein of thought, this dissertation seeks the input and collaboration of any interested individual to supply sources, critiques, improvements and suggestions for the formation of this work. As with any collaborative work, there needs to be one individual with ultimate authority to say when changes should end, and such a position is held by the writer of this work.

If we look to technology, specifically software programs, for guidance and inspiration, we see that many large, powerful, open source projects are built in part by free, volunteer labor. Why can’t history be the same? Wikipedia, as Roy Rosenzweig has argued[[35]](#footnote-35) for example, is both open source software and an open edited encyclopedia. The users control each other and the result is a generally truthful record, on par with Encyclopedia Britannica.[[36]](#footnote-36) A further look at other academic fields, especially the sciences, shows that collaboration is not only beneficial but absolutely required. No physicist would dare publish a paper in a journal with just his own name attached. A PhD in math is only granted after several co-written papers have been published. Scholarship in the sciences is benefited by and dependent upon multiple authors in order to provide the most accurate and available knowledge. History work could do well to learn from these examples, and this dissertation is an attempt to facilitate such a collaborative work, but acknowledges the limitations placed by adhering to strict timelines and restrictive department regulations. In the end, this work is mostly a traditional history dissertation, but with aspirations to break the mold.

**Sources**

This research builds a narrative based on primary documents in the Provincial Archives of North Rhine-Westfalia Department of East Westphalia-Lippe in Detmold, interviews of thirty former concentration camp inmates from the archive at the Neuengamme Concentration Camp Memorial, as well as military and civil records from the National Archives in Berlin-Lichterfelde and the municipal archives in Minden, the National Archives in Great Britain, and the National Archives in the United States.

An unconventional source comes from online discussion forums; usually created by enthusiastic individuals who have an interest in World War II history. The process of doing history, piecing together a narrative of the past from facts found in documents, is seen on such forums. On one such forum, hosted at [axishistory.com](http://axishistory.com/), has very thoughtful and academic discussions. A discussion board dedicated to uncovering the effects of area bombing in Germany prior to 1944 provides such an example. Eight pages containing 115 posts (<http://forum.axishistory.com/viewtopic.php?f=54&t=164883>) discuss whether the allied bombings had any effect on German war production prior to 1944. As is usually the case in such open online forums, the discussions are littered with concrete evidence and fact based arguments, but also include nitpicking about semantics and petty passionate personal attacks against opponents. These discussions show that the history being researched is relevant to modern times and to a wider audience than the academic scholar. While not extensively used in this work, research turns up six websites focused on the underground factories at Porta Westfalica.[[37]](#footnote-37)

As surely every historian has experienced, they could always use another month, or year, in the archives, and always more time in writing a work of history. With a generous Hunt Fellowship from the American Council on Germany I was able to make a very successful and helpful research trip to Germany. Unfortunately, this trip was limited to only 28 days. A final trip was funded by the University of Virginia Library in May 2015 to present preliminary research on the inmates at the city of Porta Westfalica’s 70 year commemoration event. Vital connections were made with fellow researchers, descendants of survivors, and even eye witnesses to the atrocities of 1944-45. This visit was central for me to gain a greater understanding of the scope and organization of the project. I acknowledge the incompleteness this research represents, compared to what could have been accomplished about this topic. As all research in effect is, this is an incomplete history, but it is the history that can be written with the sources and time available. This work functions more like the sketch of a single branch from a tree, rather than a detail of every branch and leaf, and will serve as a structure or framework upon which to construct a more accurate account. The limitations and exclusions of this work are acknowledged.

**Chapter Outlines**

Chapter one discusses the wartime events and government decisions that led to the use of underground relocation programs. This chapter relies heavily on secondary sources for describing the wartime bombing practices leading to Big Week in February 1944, which became a pivotal turning point in German strategy, and the Nazi response to Big Week as they moved from an offensive military position to a decided defensive reactionary position. Also briefly discussed in this chapter are the different options considered and used for protecting German factories from Allied bombing. This chapter ends with a look at the use of forced labor in Germany, again relying on secondary material to layout some of the events and decisions made that lead to the creation of the underground factories at Porta Westfalica, the concentration camps constructed nearby, and use of inmates for labor. While not overly original in research, this chapter provides essential background for understanding the Nazi reasoning behind backing the underground relocation programs.

Chapter two moves the research from the secondary to the primary sources surrounding the businesses and physical aspects of the underground spaces. This chapter relies on two documents created shortly after the war by the United States Strategic Bombing Survey and the Combined Intelligence Objectives Sub-Committee. Official records from the businesses and the German government were either destroyed as the Allied forces approached the area, or remain undiscovered in unknown repositories or locations. This chapter begins by describing the landscape of underground relocation projects concurrently being developed with the projects at Porta Westfalica and then moves to a detailed description of the technical aspects of Porta Westfalica’s three underground factory systems.

Chapter three focuses on the experiences of the men who worked predominantly in the Dachs I system and were imprisoned at the Kaiserhof Hotel. This chapter utilizes experiences from survivors to piece together the life as a forced laborer, work, camp life, deaths, and general health of the prisoners, and the prisoner hierarchy.

Chapter four relates the experiences of the women prisoners who were encamped either in Hausberge or inside the Hammerwerke underground systems, and worked exclusively in the Hammerwerke factories. This chapter also relies on survivor testimonies taken during interviews in the 1990s and in a few cases were legal depositions attested shortly after the experiences in 1945, focusing on the work and camp life.

Chapter five looks at the geo-spatial elements embedded within the interviews and testimonials of the men and women survivors. Focusing on the places mentioned by survivors exposed not only the places and events most mentioned, but also a distinct gender difference in the types of places and events that were recalled.

The dissertation ends with a concluding chapter that serves as a very short epilogue to the inmates and town of Porta Westfalica as the Allied forces advanced on the town in April 1945, and the fate of the tunnels since the end of the war. In several of the interviews survivors contemplate the lessons that they have learned and hope that others learn from their experiences. These reflections, combined with thoughts while discussing the role of monuments and commemorative museums and archives with Dr. Jens-Christian Wagner from the Mittelbau-Dora Concentration Camp Memorial Archive provide a context to place the role of this study in a larger German history and global history.

1. Haunschmied, Mills, and Witzany-Durda, *St. Georgen - Gusen - Mauthausen*. and Reuter, *Reimahg, from Sandpit to Armament Factory*. [↑](#footnote-ref-1)
2. Just a few examples: Bellon, *Mercedes in Peace and War*; Black, *IBM and the Holocaust*; Hayes, *Industry and Ideology*; Jeffreys, *Hell’s Cartel*; Pohl, *Die Daimler-Benz AG in Den Jahren 1933 Bis 1945*; Turner, *General Motors and the Nazis*. [↑](#footnote-ref-2)
3. The following are just a few. For a more complete list, see the bibliography.

   Allen, “The Banality of Evil Reconsidered”; Allen, *The Business of Genocide*; Bellon, *Mercedes in Peace and War*; Gurland, *The Fate of Small Business in Nazi Germany*; Jeffreys, *Hell’s Cartel*; Nicosia and Huener, *Business and Industry in Nazi Germany*. [↑](#footnote-ref-3)
4. Haunschmied, Mills, and Witzany-Durda, *St. Georgen - Gusen - Mauthausen*. [↑](#footnote-ref-4)
5. Ibid., 14. [↑](#footnote-ref-5)
6. Ibid., 45–48. [↑](#footnote-ref-6)
7. Ibid., 47. [↑](#footnote-ref-7)
8. Ibid., 49. [↑](#footnote-ref-8)
9. Baier and Freitag, “Das ‘Doggerwerk’ bei Happurg (Nürnberger Land)”; Bartuschka, *Unter Zurückstellung aller möglichen Bedenken*; Bleton et al., *Das Leben ist schön!*; Freund, *Arbeitslager Zement. Das Konzentrationslager Ebensee Und Die Raketenrüstung.*; Fröbe, *“Vernichtung durch Arbeit”?*; Gleichmann and Bock, *Düsenjäger über dem Walpersberg*; Hatt, *Deckname Kaulquappe*; Křivský, *Richard - Unterirdische Fabrik Und Konzentrationslager Bei Litoměřice*; Markowitsch and Zwick, *Goldfisch und Zebra*; Muller, *Deckname Lachs*; Ortgies and Wilm-Chemnitz, *Tage im Tunnel (German Edition)*; Perz, *Projekt Quarz*; Reuter, *Reimahg, from Sandpit to Armament Factory*; Wagner, *Produktion Des Todes*. [↑](#footnote-ref-9)
10. 1. http://www.u-verlagerungen.portaforum.de/index.html

    2. http://forum.portaforum.de/

    3. http://www.porta.bergmann82.de/

    4. http://www.gedenkstaette-porta.de [↑](#footnote-ref-10)
11. Blanke-Bohne, “Die unterirdische Verlagerung von Rüstungsbetrieben und die Außenlager des KZ Neuengamme in Porta Westfalica bei Minden.” [↑](#footnote-ref-11)
12. Fröbe, “Die Organisation des Einsatzes von KZ-Häftlingen bei Bauvorhaben der Amtgruppe C des SS-WVHA (Kammler-Stab) am Beispiel Porta Westfalica”; Fröbe, *“Vernichtung durch Arbeit”?*; Fröbe, *Der Arbeitseinsatz von KZ-Häftlingen und die Perspektive der Industrie, 1943-1945.* [↑](#footnote-ref-12)
13. Lange, “Die Konzentrationslager an der Porta Westfalica.” Thank you Thomas for the nice copy of the thesis. [↑](#footnote-ref-13)
14. Bergmann, *Porta Westfalica Underground Pictures*; Bergmann, *Der unterirdische Krieg an der Porta Westfalica*. [↑](#footnote-ref-14)
15. Bleton et al., *Das Leben ist schön!*, 77–78. [↑](#footnote-ref-15)
16. Madsen and Willert, *Survival in the Organization*, 86. [↑](#footnote-ref-16)
17. The original German version is Herskovits-Gutmann, *Auswanderung vorläufig nicht möglich*. [↑](#footnote-ref-17)
18. Borgman, *Scholarship in the Digital Age*; Cohen and Rosenzweig, *Digital History*; Dougherty and Nawrotzki, “Writing History in the Digital Age”; Gitelman, *Always Already New*; Kelly, *Teaching History in the Digital Age*; Rosenzweig, *Clio Wired*; Staley, *Computers, Visualization, and History*. [↑](#footnote-ref-18)
19. Gregory and Ell, *Historical GIS*, 1. [↑](#footnote-ref-19)
20. Kemp, “What Can GIS Offer History?,” 17. [↑](#footnote-ref-20)
21. Staley, *Computers, Visualization, and History*, 21. [↑](#footnote-ref-21)
22. Ibid., 4. [↑](#footnote-ref-22)
23. Ibid., 7. [↑](#footnote-ref-23)
24. Ibid., 48. [↑](#footnote-ref-24)
25. Ibid., 53. [↑](#footnote-ref-25)
26. Gibbs, “Visual Critique in the Humanities.” [↑](#footnote-ref-26)
27. Pickles, *A History of Spaces*, 20. [↑](#footnote-ref-27)
28. Ibid., 27. [↑](#footnote-ref-28)
29. Ibid., 32. [↑](#footnote-ref-29)
30. http://blog.historians.org/2013/07/american-historical-association-statement-on-policies-regarding-the-embargoing-of-completed-history-phd-dissertations/ [↑](#footnote-ref-30)
31. Known in the Open Source community as “free as in beer” and “free as in speech”, respectively, implying that no money need be exchanged in order to see the code, and no restrictions are placed on modifying and further distributing the code. [↑](#footnote-ref-31)
32. Android is actually just a trimmed down and specialized version of the GNU/Linux operating system. According to statistics for 2015, over 82% of all smartphones are using the Android operating system. “IDC.”3 [↑](#footnote-ref-32)
33. See the Open Source Initiative website for details on the definition of Open Source. http://opensource.org/docs/osd [↑](#footnote-ref-33)
34. Known as the “many eyes” law or “Linus’s Law”. http://en.wikipedia.org/wiki/Linus%27s\_Law [↑](#footnote-ref-34)
35. Rosenzweig, “Can History Be Open Source?” [↑](#footnote-ref-35)
36. Ibid., 129. [↑](#footnote-ref-36)
37. http://www.ddahlke.de/reportagen/porta.html, http://www.u-verlagerungen.portaforum.de/, http://www.denkmalstollen.de/indexallgemeines.htm, https://bunker-nrw.de/php/viewtopic.php?f=86&t=9714, http://www.nhporta.de/kz-aussenlager.html, http://forum.portaforum.de/ [↑](#footnote-ref-37)