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Understanding technological developments through Social
Construction of Technology

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B.A. Tobias Kühne

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Technology

TOBIAS KÜHNE



universität
wien

Department for the Social Studies of Science
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ABSTRACT

The thesis at hand analyzes an aspect of the emergence of zeppelin airships in Germany during the first decade of the 20th century. Particularly the engagement of a broad public to support the development of the zeppelin technology by financial aid is a point that is taken under scrutiny. The interest for this question emerges from the fact that hardly any return was to be expected for supporters. It thus comes to mind to ask why people would engage if no return is to be expected. Furthermore the question is interesting to study because the support for Count Zeppelin, the inventor behind the airship, emerged rather quickly after years of relative disinterest.

Using the methodology of *Social Construction of Technology (SCOT)*, the author explores how this technology eventually became very popular after having been widely ignored for years. The research focuses on the timespan around the general public's turning from a skeptical to a very supportive attitude after the crash of a prototype in the summer of 1908.

Additionally to the SCOT approach, the concept of *Sociotechnical Imaginaries* is introduced and combined with SCOT methodology in order to enhance the capabilities of the analysis. Sociotechnical imaginaries provide a particular understanding for the role time and future-bound expectations played in the support of the technology.

The analysis concludes that a combination of technological progress in terms of the reliability and capability of the airships themselves as well as a fit with the social and political events of the time formed the basis for a very fast change in peoples' perception of it in the summer of 1908. Furthermore, it is observed that the zeppelin development did also profit from an inner political conflict in Germany at the time. While not being an actual part of it, it was used as a means to demonstrate the people's resistance against Wilhelminian monarchy, which led to a stronger support than there might have been for solely technological reasons.

Moreover, the study contributes to the use of SCOT for the description of technological development by successfully integrating some sociotechnical imaginaries, the attempt to reach a more detailed analysis in terms of both the timely character of elements at work in the process and the emergence of those elements in the first place.

ZUSAMMENFASSUNG

Die vorliegende Arbeit untersucht die Entwicklung von Zeppelin-Luftschiffen in Deutschland anfangs des zwanzigsten Jahrhunderts. Der Schwerpunkt liegt dabei auf dem Zusammenspiel von Gesellschaft und technologischer Entwicklung, besonders der finanziellen Unterstützung des Projektes durch eine breite Öffentlichkeit. Aus der Tatsache, dass Unterstützer keinen persönlichen Vorteil zu erwarten hatten ergibt sich die Frage, warum sie Graf Zeppelin unterstützten. Außerdem ist interessant, warum sich diese Unterstützung nach Jahren relativen Desinteresses vergleichsweise schnell entwickelte.

Unter Verwendung des *SCOT* (Social Construction of Technology) - Ansatzes wird untersucht wie diese Technologie nach Jahren des Schattendaseins binnen relativ kurzer Zeit zu großer Popularität gelangte. Die Untersuchung konzentriert sich dabei auf die Zeit um den Sommer 1908, zu der das öffentliche Desinteresse in breit angelegte Unterstützung umschlug.

Zusätzlich zu *SCOT* finden so genannte *Sociotechnical Imaginaries* Verwendung. Dieser Ansatz erlaubt in der Kombination mit *SCOT* eine weitergehende Analyse. Insbesondere die Bedeutung von Zeitlichkeit und zukunftsgerichteten Erwartungen für den Prozess der Technologieentwicklung können so besser abgebildet werden.

Die Analyse kommt zu dem Schluss dass die Veränderung in der Wahrnehmung des Zeppelins in der Öffentlichkeit auf eine Kombination mehrerer Faktoren zurückzuführen ist. Zum einen technologische Fortschritte was die Zuverlässigkeit und Leistungsfähigkeit der Luftschiffe betrifft, zum anderen ein Zusammentreffen mit vorteilhaften sozialen und politischen Umständen im Sommer des Jahres 1908. Außerdem ist festzustellen dass der Zeppelin von politischen Spannungen profitierte, in denen er jedoch genutzt wurde, um Stimmung gegen die Wilhelminische Monarchie zum Ausdruck zu bringen, wovon dieser wiederum profitierte.

Außer den Beiträgen zur Geschichte des Zeppelins leistet die vorliegende Arbeit darüber hinaus einen Beitrag zur Verwendung von *SCOT* zur Betrachtung technologischer Entwicklungsprozesse. Durch die Integration von *Sociotechnical Imaginaries* wird es ermöglicht zeitliche Aspekte, eine Dimension die von *SCOT* nicht zentral behandelt wird, sowie deren Entstehung besser in die Betrachtungen der technologischen Entwicklung einzubeziehen.

*Ein ehrenhafter Projektmacher ist jedoch der,
welcher seine Idee nach den klaren und deutlichen
Grundsätzen des gesunden Menschenverstandes,
der Ehrlichkeit und Klugheit
in angemessener Weise ins Werk setzt,
darlegt, worauf er hinaus will,
nicht in fremde Taschen greift,
sein Projekt selbst ausführt und
sich mit dem wirklichen Erzeugnis als Gewinn seiner Erfindung begünstigt.*

— Daniel Defoe [10, 112]

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ACRONYMS

LZ	Luftschiffbau Zeppelin
SCOT	Social Construction of Technology
STI	Sociotechnical Imaginaries
VDI	Verein Deutscher Ingenieure
STS	Science, Technology, Society
SPD	Sozialdemokratische Partei Deutschlands
ANT	Actor-Network-Theory
DELAG	Deutsche Luftschiffahrts-Aktiengesellschaft

Part I

INTRODUCTION & FOUNDATIONS

INTRODUCTION

The zeppelin is one of the best-known technological artifacts of the 20th century. At its time, it was a groundbreaking step in aeronautics and thereby the human dream of flight becoming reality. Its pioneering accomplishment of overcoming gravity in combination with its characteristic shape made it an iconic technology that anyone recognizes. Even a century of its innovation, it still attracts attention. As the screenshot from my own Facebook-newsfeed shows, its appearance still seems to be worthwhile noticing and sharing with others. Spontaneously, only few other technological artifacts come in mind that would attract such attention.

Its development, however, shared the contingency of many others: it was at stake several times and its success, the appreciation by many and the introduction as an artifact of everyday use highly unlikely. However great the technology may appear in retrospect, its development was all but a straight, linear success story – even though it might frequently be told as such. From an economical perspective, the project should have been abandoned and have run out of funding several times and thus never

have made it to where it actually went. The technology was a failure at first and yet succeeded at last. By failure I refer to the lack of reliability, safety and controllability that made the first prototypes crash and let an everyday application appear unlikely as the zeppelin appeared to be very dangerous. The thesis at hand tries to contribute to a better understanding of how it became what it is remembered as today despite these initial problems. It draws closely on the circumstances of its development and the factors that enabled it. Thereby, it aims at contributing to both historical studies of technology as well as the social science literature on the development of technology.

Flying has been mankind's dream ever since. Balloons, developed in Europe in the late eighteenth and nineteenth century were among the first technological developments that made this dream come true. Invented by the French brothers Montgolfier in 1783, the technique



Figure 1: Screenshot from Facebook

was soon refined and in the 19th century developed from a mere curiosity into a useful artifact: they were used for military reconnaissance. In this context, a man who turned out to change their development encountered them for the first time: Ferdinand Count Zeppelin, then serving in the German military, saw balloons as an observer of the American civil war. Fascinated by this experience his interest in aviation was sparked. After his retirement from military service, Zeppelin turned his passion into a serious pursuit. His main goal was overcoming the major flaw of the balloons he had encountered earlier in his life: their inability to maneuver. Building on existing experimental concepts, he developed a concept for an airship with an inflexible hull during the 1890s. Rejected by the government, Zeppelin found himself in a classical projector's position: pursuing his idea mostly on own costs, he developed a first prototype (the term *projector* is used here in its historical meaning as denomination for someone pursuing and promoting *projects*, a term discussed in chapter 6). On July 2nd, 1900, 10 years after starting his endeavor, his first prototype, 128 meters long Luftschiffbau Zeppelin (LZ)-1 (all his ships were named LZ for »Luftschiffbau Zeppelin« and their serial number) took off under the eyes of thousands of spectators. However, its operation did not convince investors of its potential and Zeppelin, out of funds, had to disassemble his prototype and sell its part as well as his entire tools and workshop. The next chance came only in 1906, when donations and income from a raffle enabled Zeppelin to make another effort to promote his invention. In January of 1906, LZ-2 crashed on its first flight. LZ-3, finally, became the first airship of actual success. Having travelled about 4,000 km on 45 flights, it caught the attention of the military and was bought by the German army. The army intended to also buy the next airship produced. However, it was asked for the ship to be tested prior to its entry into military service. On that test flight, LZ-4 also crashed and was destroyed. Count Zeppelin was left broke once again. Of his 4 machines built, 2 had been lost and just one made it into continuous service. What seems to be a final point for his technology was in fact not. When LZ-4 crashed near Stuttgart, thousands of spectators who had come to watch the zeppelin spontaneously started to collect money for the count to continue his project. They started a fundraising campaign at whose end they would have raised over 6,000,000 Goldmarks, at the time a huge sum. It was handed to Count Zeppelin in order for him to pursue the development of airships further. He founded Luftschiffbau Zeppelin GmbH and the Zeppelin foundation. Despite ongoing difficulties and the loss of more than half the airships built soon after their commissioning, the zeppelin eventually succeeded; over 100 of them were put into military service during World War 1. In the 1920s, zeppelins were the first vehicles able to offer intercontinental flights and grew to a previously unimagined size.

The zeppelin became an iconic and celebrated technology that is remembered and capable of attracting attention until today. This fact alone makes it worthwhile studying. As already observed by Hecht [20, 254], »technologies serve[d] as important symbols for national identity [...]. The relationship between technological change and national identity went both ways.« Particularly the early setbacks for the technology and the turn to its success and the incorporation of a national symbol are very interesting. In my thesis, I want to take a look at how the perception of the zeppelin and its technological development proceeded. Most importantly, however, I want to observe in which way the forming of a shared perception of the technologies fed back to its development - and also influenced the society in which it took place. Studying the relation of science, technology and society, it is of course a focus of my interest whether the perception in society and the development of the technology were related to each other. As I found, especially the early days of this technology were a very interesting history of ups and downs. Particularly the events around the crash of LZ-4 in 1908 and the national donation following it do indicate there has been a relation between the two. And while there are plenty of narratives of what happened and who did what, I found a conclusive reflection on the basis of theoretical considerations as social sciences try to give to be missing.

I hope to be able to contribute to this field of literature in a way that works on this niche that seems still to be empty. Trying to do so, I will run the risk of just running down the beaten path: narratives about the development of Zeppelin airships are manifold and a standard narrative has evolved. However, I do not want to re-tell this story just once more. Instead, I want to apply theoretical concepts the Science, Technology, Society (STS) community has developed in order to gain new insights on the emergence and stabilization of a technology. Particularly, I want to use a Social Construction of Technology (SCOT) [2, 3, 40] approach to show how different publics have been involved into the process of developing this technology and how this involvement has affected the development of the zeppelin. Albeit SCOT has been around for more than twenty, almost thirty years, its basic assumptions are still the same. While there have been some efforts to broaden its perspective, some aspects are still not a focus of the theoretical approach. In my opinion, however, SCOT might very well benefit from connections to other schools of thoughts. In this work I try to combine it with some recent work by Sheila Jasanoff, her concept of Sociotechnical Imaginaries (STI) [27, 14]. Thereby I want to integrate time, a dimension not regarded much by SCOT, into the set of considerations that play a role in technology development. Moreover, Jasanoff provides strong arguments on how 'technical' and 'social' influence each other. She offers explanations on how social and technological developments not only influence each other in a

unidirectional matter but how those processes run reciprocally. Utilizing this approach, I expect to be able to argue a strong case on how the social environment influenced the zeppelin development on the one hand, but also how the zeppelin exercised strong power on the society on the other hand. This argument, as mentioned in the last paragraph, will be a central piece of this work.

As SCOT is not the newest of paradigms, by the combination with STI I want to relate it to some recent theoretical considerations. This way, I hope to be able to provide both to the history of the zeppelin airship as well as to the STS field. Furthermore, the analysis and the many observations can be used for a different task - to portray Count Zeppelin as a heterogeneous engineer [4, 34]. While that perception is not going to be a focus of my analysis, it comes implicit with my theoretical framework. When it is assumed that technological development underlies social influences, it is only consequential to assume the inventor is going to promote his technology and not remain passive about it. Thus I am going to at least mention the concept at some points in order to deal with Zeppelin's role more adequately.

My thesis is separated in three parts. *Part I* contains three chapters: this introduction (chapter 1) is followed by chapters 2 and 3. Chapter 2 contains some background knowledge about the subject of my research: both Count Zeppelin the inventor as well as the development of his technology are presented along general lines. Furthermore, the reader is introduced to different literature bodies on the subject. Chapter 3 develops the research interest out of the existing material and specifies what the aim of this thesis will be. *Part II* consists of 3 chapters, too. Chapter 4 presents the technological framework that is going to be used for the analysis. The concepts mentioned above (mainly SCOT and STI) are explained further and their use discussed in detail. Chapter 5 introduces the methods used to conduct the actual analysis and the materials that are examined. Chapter 6 is the main piece of analysis itself. After examining exemplary concepts associated with zeppelins, it is analyzed how the zeppelin and its perception developed. *Part III* concludes the piece with a summary of the results of the analysis and their reflection through the theory in chapter 7. Furthermore, it contains a reflection upon the thesis' achievements but also its limitations and remaining or new questions that wait for further research.

Before digging deep into some detailed aspects of the development of Zeppelin's airships, I believe it to be necessary - or at least very helpful - to provide a short introduction to the subject. As it will be explicated in chapter 3, my primary goal is not to unveil new facts about Zeppelin or his airship. Nor am I going to write the thousandth piece on the man or his invention - there is plenty of works covering those issues already. Instead, I want to use the story of how the zeppelins came into being as a case to showcase some STS concepts. While applying STS conceptions on it might also provide new insights into the developments around Zeppelin and his airship, my primary goal lies elsewhere: as mentioned in the introduction, the main focus is to give a thorough explanation of how different, mainly social, factors influenced the technology development and how the technology development fed back to those factors. Both SCOT and STI are going to provide new insights; as this perspective is apparently missing in the discourse so far, this structured approach is what I am trying to accomplish. Hence the historic part of this thesis stays with shared narratives: The history around Zeppelin and his technology given below are widely agreed on. It is the standard narrative that has formed over decades that the phenomenon has been re-examined by many and been told over and over again. The same is true for other historic accounts about the time and society the events I write about took place in. Here, too, I used available literature to draw a picture to illustrate my case, without arguing whether or not the common narratives about this time are authentic or not. Nevertheless, I find it necessary to introduce the reader to those narratives. As most likely not every reader is familiar with this particular part of history, I want to provide some background knowledge. Therefore, I will give a brief overview over the events that led to the development of airships by count Zeppelin on the following pages. Then, I will give some insights into the first steps of the technology development, which led to the point my analysis is going to focus on.

Accounts about Count Zeppelin are virtually unanimous in respect to the most important points regarding the man, his life and his work. Almost all of them base widely on a biography by *Hugo Eckener*. [11] At least this holds true for those that are commonly referred to as sources for further writings about some facet of the zeppelin and that are encountered in virtually any bibliography of pieces about zeppelins. Eckener was a trained journalist, long lasting companion of count Zeppelin as well as his successor (who actually brought the

airships to the sophistication they are remembered for today). His important book »Graf Zeppelin – Sein Leben nach eigenen Aufzeichnungen und persönlichen Erinnerungen« [11] is seminal to approaches to Zeppelin and his work. Despite its lack of documented sources, it is by far the richest source of knowledge about the person of Count Zeppelin. First of all, it contains a vast amount of first hand accounts from Eckener, who was a close companion to Zeppelin from the early days of his invention to his death. Secondly, Eckener was one of only two biographers (the other one was Hans von Schiller) who had access to the personal diaries of Zeppelin. Zeppelin has written those journals meticulously during his entire life. His heirs, however, keep them under lock and key – a fact much lamented by Zeppelin researchers. By the combination of his personal knowledge about Zeppelin and the access to Zeppelin’s journals, Eckener provides a unique insight into the life and work of Count Zeppelin. A certain positive bias of the author is of course to be assumed; nevertheless his biography is to be treated as valuable material. It is probably one of, if not the trustworthiest account about Zeppelin and his airships in terms of accuracy and precise interpretation. As a consequence of this, most biographies on Zeppelin rely on this piece. Although this is not necessarily a good sign, as mentioned above, my work is not trying to challenge this standard narrative. In the context of recreating a timeline of events it should be unproblematic – and is unavoidable anyway. I use some additional pieces that will be introduced later, yet stick mainly to Eckener’s narrative.

2.1 COUNT ZEPPELIN’S BIOGRAPHY AND BACKGROUND

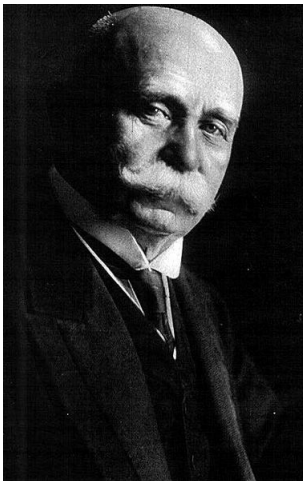


Figure 2: Portrait of Count Zeppelin

Zeppelin’s background is important for several reasons. As he started constructing airships not before the age of 52, his prior life contains quite a lot interesting aspects that also play a role in his later career as an inventor. To begin with, his origin contains some issues that become relevant later. Furthermore, the course of his first career as a military officer and its end became a leading influence on Zeppelin – and on the way the Prussian administration treated him when appealing for support for his project. He was born as Ferdinand Adolf Heinrich August Graf von Zeppelin in Konstanz, Germany on July 8th, 1838. His parents were Friedrich, administrator in service of a local noble court and Amélie, daughter of a wealthy industrialist family. Zeppelin grew up at his family’s estate Schloss Girsberg in Switzer-

land. While stemming from a centuries-old lineage of nobility, his father's line did not provide wealth but a very traditional and socially respected background. His mother's lineage, however, a wealthy industrialist family, provided financial means and a completely different, liberal mindset. As a recent biographer [49, 795] notes, his mother's father had given Girsberg as a present to his parents – so ironically, the family's aristocratic lifestyle was financed by bourgeois money. His education is described as broad and very down to earth: as a boy, Zeppelin worked on the estate in all kinds of roles, herding cattle, serving in a pub, etc. but also being taught fencing and shooting by his father. He was thus brought up in both conscience of his noble roots and patriotism as Württembergian as well as liberal influences of his mother [11]. In 1855, he joined Württemberg's military. By that time, Germany as a nation did not yet exist but was nothing more than a confederation (German Confederation, »Deutscher Bund« in German) of a multitude of different regional states - one of those was Württemberg. His career was exemplary and he became a famous war hero after a spectacular success of a reconnaissance mission in the Franco-Prussian war of 1870/1871 in which Württemberg fought as an ally to Prussia. This war led to the unification of Germany as a national state by founding the German Empire in Versailles on January 18th, 1871. From 1882 until 1885 Zeppelin was commanding officer of a cavalry regiment in Ulm, where he was made colonel in 1884. From 1885 on, he was military attaché to the envoy of Württemberg in Berlin and became his successor as envoy in 1887. Filling this position for two years, he returned into military service in 1889. As a patriotic Swabian he regarded the Prussian dominance in the newly founded empire with suspicion. When Germany as nation-state came into being after the Franco-Prussian war of 1871, Prussia had taken the leading role in the newly formed country. Having grown up in Württemberg and served as military officer during his entire career (and not only fighting alongside Prussians but also during the German war of 1866, in which Württemberg fought alongside Austria against and was defeated by Prussia), his Württembergian origin did not serve him well in the Prussian-led German Reich. One of his last acts as envoy was the writing of an essay harshly criticizing the Prussian command over the united German army – ultimately putting Württembergian military under Prussian control [11, 98 f.]. This piece caused uproar in Berlin, up to the emperor himself criticizing Zeppelin [49, 798]. As a consequence of the disapproval his remarks caused, Zeppelin was displaced from the command post he had returned to after his service as envoy and was retired against his will. After a bad outcome in a review of his command – presumably as a reaction of the administration to his writing [11, 101 ff.] – he had to resign from military service in 1890 at age 52.

His discharge was a dire shock for Zeppelin. The dishonorable end of his military career left him devastated yet formed the starting point of his second career as airship builder. He was hurt deeply by the ignorance of his decades of loyal service and had a hard time accepting it. This event became a turning point of his life. Some old biographies, however, skip this episode, as it does not fit too well into the shining picture they draw of Zeppelin and his life. By doing so, however, they miss a key event to understanding the motivations of Zeppelin in his later pursuits. It left him with an even more complicated relationship towards Prussia. One can say he was torn: On the one hand, his suspicions towards Prussia and Prussia's dominance in the political system of the German empire were greatly strengthened. During his future attempts to gain official's support for his airship project he felt treated unfair for political reasons frequently. On the other hand, he desperately tried to regain his reputation and show 'the Prussians' what he was capable of - no matter how great his despise for Prussia and the way he felt treated, he wanted to regain their respect and esteem at all cost.

After his discharge, count Zeppelin focused on airship construction. First records about building airships in his diary can be traced back to 1874 [11, 104]. A first letter to the king of Württemberg stating Zeppelin's opinion that one needed to build airships for military purposes was written by him in 1887 [11, 106]. He especially mentions the shortcomings of balloons and argues for airships as those would preserve the use of balloons while eliminating their major flaw, the missing maneuverability. So having had airships in mind for quite some time, he made these occasional games of thought his main occupation from 1890 onwards. Although he was having a very hard time to find support for his project, he filed his first patent in 1895. It took him another five years to the first ascent of one of his airships, LZ-1. However, it took his airships several more years to gain the reliability needed for regular service. Until then, he had to build several prototypes of which most crashed for one reason or another and he ran out of funds more than once. His project was perceived as just one of hundreds of foolish attempts to subdue nature and he was ridiculed for quite some time. Human flight was the technological frontier of the time and thus challenged by many. Of those, most failed and were soon forgotten. Zeppelin was soon put into that category - especially as for his fame as a war hero he was to some extent a publicly known figure.

This fame was both a burden and a help: On the one hand, it provided a public awareness that increased the stakes for him - for Zeppelin the project did not only hold the potential to make him famous, it also held the potential to destroy whatever was left of his reputation. On the other hand not being just anybody helped him a lot to be listened to in the first place. As Eckener points out, all the commis-

sions that Zeppelin later felt bullied and unfairly rejected by had only been installed because of his personal history in the first place (original quote: »So ist die Atmosphäre von vorneherein nicht günstig, und man darf offen zugeben, daß es dem Grafen niemals gelungen wäre, die Kommission auf die Beine zu bringen, wenn er eben nicht der Graf Zeppelin gewesen wäre, dessen soziale Stellung, dessen Charakter und bekannte Leistungen als Soldat seinen Bemühungen einen gewissen Nachdruck verliehen.« [11, 123]). Especially with the breakthrough of his technology in 1908, however, he became a popular hero. Emperor Wilhelm II went from calling him the 'dumbest of all southern-Germans' to calling him the greatest German of the century (original quotes: »Der dümmste aller Süddeutschen« and »den größten Deutschen des Jahrhunderts«). The regional emphasis can be seen as a good example for regional conflicts in the German empire that Zeppelin's resentments towards Prussia stemmed from – and illustrate the reservations between Prussia and Württemberg that came to light in Zeppelin's essay mentioned above. Other reports use a slightly different phrasing, 'of all the southern-Germans the dumbest', original quote »Von Allen Süddeutschen der dümmste«, which emphasizes general Prussian reservations towards southern Germans even more.) [11, 164]. The cartoon (Figure 3) nicely shows that change: while Zeppelin is depicted as a grand old gentleman, the balloon he is holding is a reference to both his airship and the former connotation of it being a foolish – maybe pretty but useless – thing.

Following those events, after the 24-hour test and the national donation Zeppelin expanded his operations and built an airship dockyard and founded an airline (Deutsche Luftschiffahrts-Aktiengesellschaft (DELAG), the first airline worldwide to go to regular operations). Eventually he came to witness his airships in combat operations, which he had envisioned them for, during World War I. He died in Berlin on March 8th, 1917.

2.2 COUNT ZEPPELIN'S AIRSHIPS: A BRIEF OVERVIEW

Like for Zeppelin's biography, there is a standard narrative concerning the technological development of Zeppelin's airship itself.



Figure 3: Cartoon portraial of Zeppelin

This one, however, is a bit more complex in terms of how it came into being. Much of it also relies on Eckener's biography - as the development of his airship was Zeppelin's most famous achievement, his biography is rich in terms of information on the airship itself. Zeppelin built his first ship LZ-1 in 1900. Having found some industrial sponsors and contributing half the funds himself (a practice that was quite common - as Wengenroth [51] emphasizes, cartels and mutual support were very common among entrepreneurs in Germany at that time), LZ-1 was built and was able to take off for its maiden flight on July 2nd, 1900. However, Zeppelin's company ran out of funds and had to disassemble the ship later that year [11, 143]. Having been damaged on its first flight, the ship had to be repaired and could only fly two more times in October of the same year - one of the main reasons for the bankruptcy, Knäusel [30, 42] adds. While the maiden flight caught lots of attention, these events were too scarce as to spark a wave of enthusiasm like the one experienced later. After several years of struggle for funding, Zeppelin was able to build his second ship, LZ-2 in 1905 and first ascended with this ship on November 30th, 1905. On its second flight on January 17th, 1906, the dirigible suffered an engine failure and thus became a balloon. Subsequently, a storm carried it away and it crashed into mountains near Kisllegg, about 40 kilometers northeast of Friedrichshafen [11, 151]. The third zeppelin, LZ-3, eventually became the first prototype to fulfill the expectations in it to a considerable degree: It first flew on October 9th, 1906 [11, 153] and finally proved the value of Zeppelin's concept. It was capable of flying almost 100 kilometers with speed of around 40 kilometers per hour (Eckener speaks of 11 to 12 meters per second [11, 153]). The German military was willing to purchase the ship and an additional one, LZ-4, that was yet to be built. Stille, LZ-4 was supposed to prove its reliability on a 24-hour flight before the two ships were to be taken into military service. Zeppelin tested LZ-4 successfully prior to this 24-hour flight. Its maiden flight took place on June 20th, 1908. Having taken the ship to a surprising cruise over Switzerland on July 1st 1908, the airship had been seen by thousands before the ambitious 24-hour endurance test was to take place. The trip over Switzerland had not only surprised the Swiss but also the German public and the press as well. Triumphant accounts of this test made the general public aware and curious of the newest of Zeppelin's airships. Especially the international reactions to the latest achievement of the zeppelin made the German public curious and anticipatory. The 24-hour test was to take place from August 4th to 5th, 1908 [11, 159]. On the route of the ship, life stood still: hundreds of thousands in the cities below (Basel, Strasbourg, Mannheim and others) watched the zeppelin in fascination. To explain this curiosity, fascination and excitement, one should keep in mind that to this day, most witnesses had heard of and fantasized about flying machines

but had never seen a technical object – and by no means one of over 120 meters in length – fly in their entire life. Apart from that, analysis of this fascination for the ship by Frank [15] comes to conclusions agreeing with what Eckener thought about the ship: the aesthetics of form and material of the ship were very appealing (»Ich habe immer das Gefühl gehabt, dass solche Wirkungen, wie sie vom Zeppelin-Luftschiff ausgingen, zu einem großen Teil auf ästhetischen Empfindungen beruhten«, [12, 403]). Further factors that played a role are the subject of my analysis and will be analyzed in later chapters as I think those reasons given above are not all there is to tell about that issue. Particularly the step from passive admiration to active support seems to have drawn upon more than just an appealing exterior and the fact this appealing shape was flying. This point is going to be revisited later on as its key to my analysis. The 24-hour test had to be paused once due to a defect near Mainz and then to be canceled after about 3/4 of the scheduled distance because of a failing engine after all. Therefore, the ship landed in Echterdingen near Stuttgart. The site was chosen because nearby the Daimler workshops, responsible for the zeppelin's engines, were located. Thus, Zeppelin hoped for a quick and easy repair. A storm in the afternoon of August 5th, however, destroyed the ship. It caught fire and burned down completely before the ship could be fixed [11, 161]. Similarly to what happened to the famous LZ-129 »Hindenburg« 28 years later at Lakehurst, New Jersey, early zeppelins were filled with easily flammable hydrogen and hence very vulnerable to fire. The destruction of LZ-4 put an end to the endurance test without having fulfilled the military's conditions for purchasing LZ-3 and LZ-4. It seemed like the final failure of his project, and Zeppelin was prepared to bury his dream at this point.

But his fate turned fast: within hours after the crash, all over Germany a grassroots-movement started to donate money for Zeppelin. During the past weeks and culminating in his test flight that day, his endeavor was no longer seen as a foolish attempt but as a project of national pride. Eckener makes a remark about the pride with which the zeppelin was regarded after the trip over Switzerland (original quote: »Das deutsche Volk las mit ungeheurem Stolz die Berichte über den Eindruck, den sie auf die ganze Welt gemacht hatte.« [11, 159]). Within 24 hours, hundreds of thousands of Marks were donated to von Zeppelin, adding up to over 6 million Marks after a couple of weeks [11, 163]. This »miracle at Echterdingen« [16, 18] became the turning point for Zeppelin's endeavor: finally equipped with sufficient funds, he was able put together an actual corporation and found subsidiaries to supply the actual airship construction with parts and know-how. As the military's willingness to buy ships stayed small, DELAG, the world's first airline was founded in order to purchase

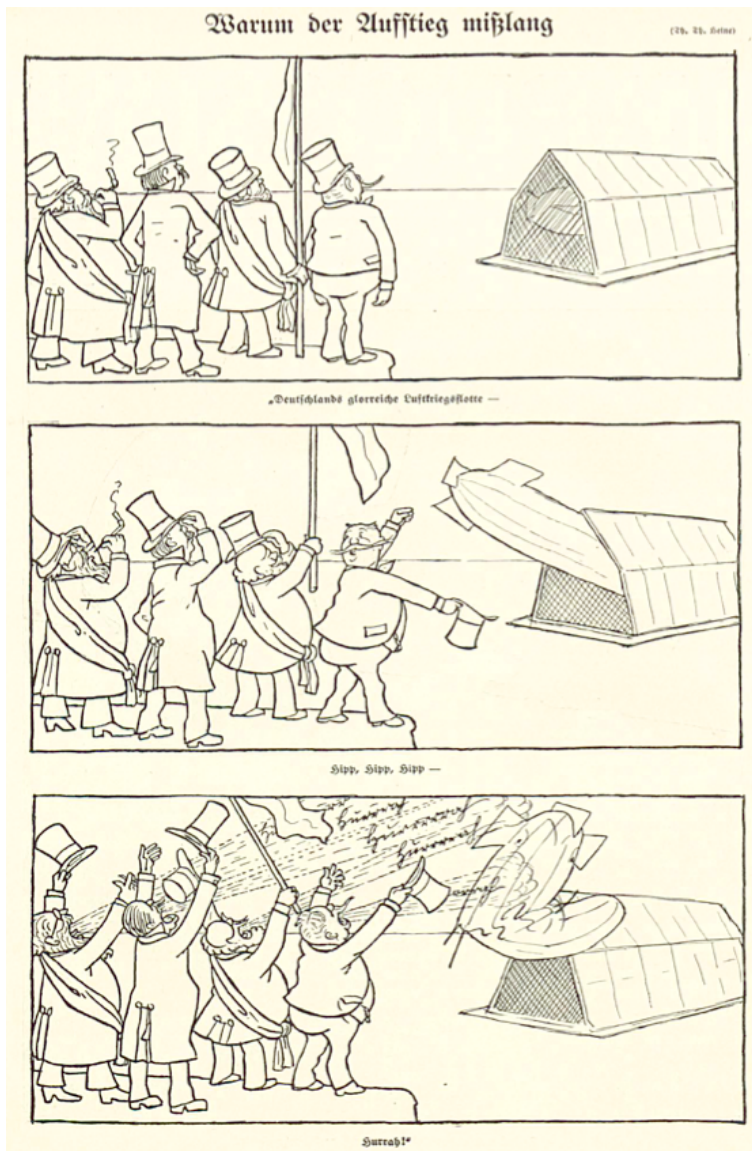


Figure 4: 'Why the ascent failed'

the cheering masses caused the winds that damaged the airship in the picture.)

The army finally purchased several ships, and the final breakthrough was achieved when the navy – under Tirpitz (who despised airships [11, 171]) the most fostered and most expensive military branch – changed its policy [11, 180]. While having tried to build a fleet to equal Britain's in the years before, this goal had to be put into perspective if not abandoned. After ten years of massive efforts it became obvious that this goal could not be reached. Instead airships were taken into consideration as a potentially game-changing technology. During World War I, however, airships proved to be much less effective weapons than expected: Relatively slow but big (one of the factors that led to the aesthetic attraction described above, as the

and use zeppelins and keep the airship production running. Furthermore, DELAG operations had two major purposes: for starters, they would bring airships to the entire country, feeding the people's demand to actually see what 'they' had funded by their donation [9, 1] cites Eckener as speaking of »Millions of shareholders«) – hence providing an abstract return for their donations. Furthermore DELAG operations increased the experience operating airships very fast. Still suffering heavy losses in terms of airships (only few lives were lost) in the beginning, the technology became safer and more manageable quickly as the experience in its handling increased. The losses after the Echterdingen miracle were tolerable for Zeppelin as the capital backing through the national donation was comfortably high. The public, too, took the setbacks without turning away from the technology – there were even humorous interpretations of the repeated losses of airships (see the cartoon in Figure 4, indicating

low relation of speed and own length is responsible for the majestic appearance) they were easy to hit targets at the front. Bombing raids to Britain proved to be possible yet to be very ineffective. Navigation was a big issue; airship crews weren't even able to tell which city they were bombing. Additionally, many ships were lost - crew losses were actually higher than the casualties caused on the British side. In the end, airship operations were discontinued even before the end of the war. Zeppelin himself had seen the failure of his technology (and the increasing potential of developing airplanes) coming. During the last years of his life, he promoted and funded plane developments for several years before dying in 1917 [11, 182 f.]. With the Versailles treaty, construction of airships was forbidden. It took several years for the struggling company (manufacturing other goods in the mean time) to begin building airships again (now under Hugo Eckener's leadership). This second cycle of airships was the time of the famous big zeppelins that are most commonly remembered (especially LZ-127 »Graf Zeppelin« and LZ-129 »Hindenburg«) and which were the first vehicles to provide intercontinental flight services. This short era lasted only about 10 years, though: With the infamous crash of LZ-129 »Hindenburg« in Lakehurst, New Jersey in 1937 the era of airships ended. Remaining airships were disassembled and the material used for airplane production. In Friedrichshafen, one of the succeeding firms of Luftschiffbau Zeppelin started to build airships again in the 1990s. Nevertheless, Airships remain a means of transportation from the past and its modern successors (as the one that can be seen on the Facebook-Screenshot above) have only little practical use – they serve mostly advertising and sightseeing purposes.

2.3 LITERATURE BODIES ABOUT AND AROUND ZEPPELINS

As Zeppelin airships are a famous technology that is still fascinating to many and known to everybody (at least in Germany), literature about them is manifold. Surrounding coverage of the issue apart from the technology itself or praise for its inventor deals with various issues. As it is a technological artifact of iconic status, all kinds of reports about it are numerous. While many of them are largely redundant - the zeppelin history I have shortly summarized above is part of most accounts along with many ever reprinted photographs and other materials that are able to cater to the myth those books are feeding on. If looking for reliable sources for scientific studies, only such books that give sources and accomplish a certain degree of transparency and accountability for the claims they make can be considered. Many of the books on zeppelins are primarily concerned with depicting the artifact and its fascination respectively its creators and care little about giving accurate accounts about it and many do not give sources. Knäusel [30, 10] puts it nicely: He states trivial literature

to be the by far biggest category of accounts about zeppelins, marked by the redundancy of copied and rephrased repetitions of the same narratives that are as shiny as they are desired and care less about the accuracy than about telling the heroic story they intend to tell (and sell, original quote: » [...] das Triviale überwiegt bei weitem. Die Trivialität ist dadurch gekennzeichnet, daß durch ständiges Abschreiben und Umformulieren ein mehr oder weniger aktuelles Zeppelin-Bild destilliert wurde, das schön und glänzend ist; die Transparenz hat allerdings eher gelitten, denn der Graf und seine Luftschiffe werden so dargestellt, wie man sie haben möchte, nicht wie sie waren und was sie waren.«). Among those, to give some examples out of many, are Ege, Lundø, & Frello [13] and Griehl & Dressel [17]. This lack of consistent quality, though is not too much of an obstacle for a decent approach to the subject. There are numerous high quality accounts - the existence of the mentioned popular literature parallel simply means that a careful sampling of used literature has to be done in order to receive results that represent reliable works suitable as material for scientific work. Fortunately, the archives of Luftschiffbau Zeppelin GmbH in Friedrichshafen maintain an own library. This library contains a vast number of books. Thus I could examine a great number of publications and am confident to say I reached a satisfying level of both a high number of reliable accounts and an overview over the existing literature enabling me to assume I did not miss major publications.

As I am going to explain in the materials and methods section below (chapter 5), those publications will form the basis of my analysis. Building my empirical analysis on books, I want the reader to be familiar with the character of the works I use - the following passage is hence intended to serve more as a point of reference for my analytical part than itself giving too much information to the reader about the events I am going to analyze. Those works are, as the popular works, too, redundant in wide areas. Almost all of them, again, rely on Eckener and his biography. Nevertheless, many add details to the bigger picture: as most go into historic sources themselves, they differ a bit in their findings and are therefore worthwhile considering. Therefore, I bring up lots of sources that are each going to provide little pieces to the mosaic I am going to create. I will give a brief overview over existing material in the following sections. For the purpose of this overview about the body of literature that is exploitable for scientific endeavors, I'd like to introduce three categories: biographies, airship history and writings dealing with aeronautics and airships in particular from a social science perspective.

2.3.1 *Biographic Accounts*

A first very important category is biographies, most of them about Ferdinand Graf von Zeppelin. As the zeppelin technology has always been associated closely with its inventor and its development depended a lot on Zeppelin's personal finesse, those accounts give important insights. The by far most important source in this category that has already been cited abundantly in this piece of writing is the biography »Graf Zeppelin – Sein Leben nach eigenen Aufzeichnungen und persönlichen Erinnerungen« by Hugo Eckener [11] that I used for the short introduction above. As mentioned above, it contains very detailed accounts of Zeppelin's life and background as well as a comprehensive chronology on the zeppelin technology. Eckener's close personal relation to Zeppelin and his involvement in the zeppelin companies make his accounts extremely valuable. Nearly all accounts on Zeppelin are based on this book in one way or another. Hans Rosenkranz's book »Graf Zeppelin - Die Geschichte eines abenteuerlichen Lebens« [43], a second big monograph on Zeppelin's person in turn offers relatively little. At times he is coming up with new information, which rather raises doubt than curiosity as it often draws different pictures than other authors - especially Eckener. Considering it was released during the short period of airship glory in the Weimar Republic - and seven years before Eckener's work on the subject - it has to be considered as a glorifying narrative of Zeppelin as a popular hero that has been outdated by Eckener's book. The details Rosenkranz brings up simply seem to be unreliable, especially in direct comparison to Eckener. Therefore, I rely on Eckener's book. Despite some of the authors I cite use it, my personal judgement led me to mistrust it and therefore not paying further attention to it. Two more recent pieces close the circle: *Clausberg* [6] and *Italiaander* [25] both dedicated monographs to the life of Zeppelin. Both have a similar structure – instead of one continuous narrative like Eckener's work, they both divide their books into different chapters. This structure allows for a more comprehensive and detailed approach to different aspects of Zeppelin's life easier. Additionally, there is a multitude of small pieces on Count Zeppelin. Many of those are relatively recent and of high quality regarding their accomplishments in discovering and analyzing new material or obtaining untouched sources. Typically these papers focus on individual aspects of Zeppelin's life - e.g. by *Barbara Waibel* [49], head researcher at the Zeppelin Archives, on Zeppelin's desperation after his discharge and the motivation this fact brought along that was cited above. Several of those shorter pieces are collected in an anthology on the occasion of an exhibition for the centenary of LZ-1's maiden flight Meighörner and Zeppelin-Museum [35]. While all of these accounts largely rely on Eckener's work, they still end up with more balanced narratives than Eckener's very positive

depiction. The temporal distance as well as additional sources leads to a broader and deeper analysis than Eckener's at times affected description. Moreover, those recent works focus equally on smaller aspects of Zeppelin's life. This way, they shed light on various sides of Zeppelin's personality and life and accomplish more differentiated and detailed analysis on single issues than Eckener's narrative thus serving as a valuable enhancement of the existing literature.

Further information can be drawn from two biographies on Hugo Eckener. Having become famous himself especially as the zeppelin's savior during the Weimar Republic (and especially after the Versailles Treaty), his life story is capable of giving some insights. The work of Nielsen [39] is less informative. Yet Eckener's autobiography »*Im Zeppelin über Länder und Meere*« [12] gives some accounts from his memory that prove equally valuable as those given in his biography on Zeppelin. The last piece I want to mention here are the memories »*Luftschiff voraus! Arbeit und Erleben am Werke Zeppelins*« by Alfred Colsmann [8]: As CEO of Zeppelin's company, he was an important advisor and companion to Zeppelin. In particular his insights into the politics and managerial decisions of the early airship era Colsmann gives insights that Eckener's accounts lack.

2.3.2 Airship History

Of course, there are numerous works about the technological artifacts itself - I limit my overview to those I found valuable to look into for my endeavor as an exhaustive list would probably be both impossible to create and irrelevant to the reader. A very comprehensive history of the Zeppelin airships is given by Christopher Chant [5]. It draws a quite complete picture from the very beginnings including Zeppelin's personal background. Apart from being informative it offers one other major advantage: It is written in English and offers a native speaker's version of many special terms that appear and makes writing about zeppelins in English a lot easier. Meighörner & Kleinheins [28] offer a history of the zeppelin that is only partially valuable for my analysis. While Meighörner & Kleinheins are very technical and therefore of not much use here, Meyer [37] reconstructs early ascents in detail in is therefore partially useful. However, as those ascents themselves are of interest only in grades of detail that are available in other sources, too, it offers no unique information for my project. An anthology published by the city of Friedrichshafen [47] for the centennial of the 'miracle at Echterdingen' depicts the entrepreneurial side of the Zeppelin story - especially regarding the difficult beginnings. Likewise does Hans G. Knäusel in his book »*Zeppelin - Die Geschichte der Zeppelin-Luftschiffe: Konstrukteure, Technik, Unternehmen*« [32] which ties the entrepreneurial, historic and technical storylines together. In a different piece [30], the same author gives

both a chronological depiction of the technological development and the surrounding conditions. Yet he is more concerned about stating events than interpreting the environment of the airship to a greater extent. The history surrounding the technology and the biographical information serves more as a sort of frame for the technological narrative. After criticizing other redundant narratives, his original sources bring up some issues that are not mentioned by many other authors and thus provide some added material to the discourse. Two further publications by Knäusel are informative: »LZ1 - Der erste Zeppelin« [31] and »LZ1 - Die große Verheißung« [29]. Both books are identical in large parts. They provide a very nice account of the very beginnings of Zeppelin's interest in airships and the efforts it took him to build his first prototype. Apart from the analysis Knäusel provides, the books offer a quite unique feature: Knäusel publishes reproductions of original documents from the time - speeches Zeppelin gave, letters to and from him and various other documents that offer first-hand insights into the difficult beginnings of Zeppelin's airship venture.

2.3.3 *Studies of the Zeppelin from a Social Science Perspective*

While the former categories provide the frame of the entire story, for an STS research project the social science literature about and around count Zeppelin's airship provides the most interesting pieces. Probably the most holistic approach comes from *Guillaume de Syon* [9]. He gives a great overview – basically re-telling the entire history of Zeppelin airships from a fairly balanced perspective (not being German might be helpful at this point - if understanding the zeppelin as a technology with a national connotation, sharing the national cultural background in which it is remembered with such affection might prove to be a liability if one is not careful) and connecting the history of the technology with surrounding phenomena. He pays special attention to the relation of 'Germany' to the technology – his book is subtitled »Germany and the Airship 1900-1939«. As his approach to cover the entire span of existence of the airship gives not too much room to the early developments, it still gives a very informative overview. In his book »Deutschland hebt ab«, *Helmut Reinicke* [42] lights the craze around the zeppelin airship from various perspectives. The perspectives he chooses cover various angles – focusing on different meanings the airship incorporated. Some important ones of those are the airship as an example for the general fascination for technology, the »national donation« (»Volksspende«) as a »cultic sacrifice« (original quote: »Opferfest des deutschen Volkes«, [42, 25]), the airship as symbol of upper class comforts in contrast to socialist tendencies and the airship as imagined supreme weapon. Giving a great amount of historic sources and material, a generally dramatic and elevated style of writing sometimes gives the impression of Reinicke himself being

sucked into the craze (original quote: »Zeppelinkult«, [42]) he writes about. Nevertheless, his book is very rich on historic material and discovers very many meanings of the technology that contribute to my pursuit. Similar to Reinicke's different perspectives, *Rüdiger Haude* [18] introduces an even clearer categorization in his book »*Grenzflüge – Politische Symbolik der Luftfahrt vor dem ersten Weltkrieg: das Beispiel Aachen*«. He focuses his analysis on a particular region (the city of Aachen) and analyzes different symbolisms of aviation and aeronautics in general. His study focuses on the impact of aviation on this city before World War I. The book complements Reinicke's rich accounts in a helpful way, giving a much clearer framework and background information about the society all these accounts took place in. While it is not limited to airships, those do play a major role in his book. The categories Haude uses to analyze reflect different interpretations about the technology in society at this time. These include the airships role in international understanding vs. military supremacy, struggles between humankind and nation, the Rhine region and Prussia, middle class and aristocracy, political left and right, individual and collective, sports and war, central authority in contrast to self organization as well as technology and nature. [18, 7]. With »*A Nation of Fliers*«, *Peter Fritzsche* [16] wrote another piece on the fascination of Germans for flight in general and airships in particular. His perspective is not all too new - he mostly re-tells the entire story of how Germans got all excited about the airship for an English-speaking audience. Nevertheless, Fritzsche, too, contributes by finding individual pieces of evidence on certain details that others before him have missed or left out. And similarly to Chant's piece mentioned above, the English language is helpful in order to write about the specific technology and its time. *Frank* [15] focuses on the media's role in the Zeppelin movement. While she explains very nicely how the aesthetics of the airship added to the fascination of the public, she focuses on the role risk and catastrophe had in the creating and maintaining the myth around the Zeppelin. Sadly, she does not cover the role of Zeppelin himself and his use of the media for his purposes. Instead, she focuses on the elements of the public's fascination through media, mainly photographs that are not of much use for my research. *Warneken* [50] gives a broad overview on the working class movement's position to and opinion about airships. Being an ethnographer with specialization on this movement, especially the work he does sampling newspapers and newspaper articles from the time around the Echterdingen miracle is invaluable for my study. Further sources of interesting insights are the scientific annuals published by the Zeppelin Museum in Friedrichshafen. Those are anthologies of all kinds of research around Zeppelin and his airships - some of the papers contained are more valuable to my project, some are less. Among those are *Henry Cord Meyer's* accounts on national-

ism in the conception of the zeppelin [36] and *Jeannine Zeising's* pieces about journalistic exploitation of the Zeppelin airship [54, 53]. In her dissertation that forms the basis for both publications, she unveils the relation of Zeppelin and the press in a detailed analysis. This analysis brings to light several of the motives I am going to mention. Her broad analysis of the media gives great insight into the visions, hopes, dreams and fears that were associated with this new technology. Another piece by *Clausberg* [7] analyzes the imagination of airships in German science fiction literature in the early 1900s. This category is the most important one for my research. While I, too, draw on Eckener several times, those works listed in this section form great starting points for my endeavor as they provide great observations.

RESEARCH QUESTION

As the short account of events I have given in chapter 2 has shown, zeppelins had eventually become a matter of very high interest both in Germany and abroad. Airship types were framed as national technologies; the airship was seen as a technology able to change the world's face and the subduing of air and mastering flight a universal quest. This unanimous support for aeronautics and Zeppelin airships in particular as a 'national interest' was all but clear in the beginning and evolved only after several years. Yet when it did, the interest in zeppelins and their appreciation grew very fast. However, the support was the result of various factors coming together. As mentioned in the summary, explanations for the fascination for airships are rather unsatisfactory so far. Although the literature on zeppelins is extensive, it has not been in the focus of academic analysis how the technology managed to reach this degree of popularity. While some authors do of course talk about that, it is a question that receives relatively little attention. It mostly comes up as a side note in the context of different issues – for example the analysis of press coverage by Zeising [53], or the fascination for flight in general by Fritzsche [16], Haude [18] and Reinicke [42]. Maybe the case seems too clear and obvious to be taken under scrutiny, yet I believe a thorough analysis is indicated. Some authors just note the Volksspende taking place as if it were a normal occurrence that such an event is covered through public donations. Kleinheins and Meighörner [28, 20 f.], for example, just note that people donated money out of sympathy for Zeppelin and a feeling of regret of having lost LZ-4 (original quote: »Ergriffen vom Verlust des LZ4 und begeistert für den Nationalhelden Graf Zeppelin spendeten [...]«). Why a nation should be touched by the loss of a technological prototype is not even questioned but taken for granted. Clausberg [6, 57] goes even further; stating everything Zeppelin had struggled to achieve for years just fell into his lap without him having a hand in the matter after the crash at Echterdingen (original quote: »Was Zeppelin noch wenige Jahre zuvor trotz aller Bemühungen und dringender Appelle nicht zu erreichen vermocht hatte, das wurde ihm jetzt ohne sein Zutun in den Schoß gelegt«). This interpretation lets the donations for Zeppelin appear as a random phenomenon. It disregards social influences and, even more, contributes to the classical determinist cliché (a little more on that in chapter 4) of a prescribed development – as if the intrinsic qualities of the zeppelin made the donation to be expected. The interpretation that Zeppelin airships were attracting so much attention just by being

of an appealing exterior seems to be at least questionable. It can be assumed by what material has been collected and published in other publications that the popularity of zeppelins had reasons that were more complex. Moreover, I allege that STS as a discipline can make valuable contributions to this issue. Thus I want to go back right to the beginning of the Zeppelin discourse and repeat the most basic questions of them all:

»WHAT WAS IT THAT MADE ZEPPELIN AIRSHIP CAUSE
THE INTENSE REACTIONS IT AROUSED?«

»HOW DID THE TECHNOLOGY BECOME A NATIONAL
SYMBOL?«

and

»HOW COULD ITS POPULARITY DEVELOP SO QUICKLY
AFTER MANY YEARS OF IGNORANCE BY THE PUBLIC?«

Those questions aim at a core ambition of STS – the explanation of technology development and its connection to the social. Moreover, my approach contains an understanding of the process as not being an isolated one but an intrinsically socio-technical setup, an entanglement of social and technological factors. Also, a structured analysis that relies on theoretical concepts is missing so far. What is there on the issues touched by the questions asked above makes claims about the phenomenon (such as the two statements by Eckener and Frank that I mentioned before) without a clear framework of analysis. Consequently the results are, as for example in the case of Reinicke's book on the zeppelin craze [42], somewhat inconclusive. STS methodologies are well suited for this task. They offer a rich toolkit for the exact purpose of analyzing the relation of technology and society.

Part II

ANALYSIS

THEORETICAL FRAMEWORK

As Zeising [53, 196] states, the fact that the entire society, in a moment of unity overcoming all differences of politics and social class, decided upon the continuation of an innovation is unique in Germany's industrial history (original quote: »Die Zeppelin-Luftschiffahrt konfrontiert uns mit dem in der deutschen Industriegeschichte einmaligen Fall, daß die Bevölkerung über die Weiterführung einer Innovationsleistung entschied. Nach dem Unglück von Echterdingen verschmolzen Vertreter aller Stände zu einer „Glaubensgemeinschaft“ im Zeichen des Zeppelins.«), a particular STS approach comes to mind right away; this statement seems to straightforwardly ask for a SCOT approach. The general public deciding on the development of a private innovation is obviously a soci(et)al influence on technology development – so what discipline would be qualified to think about it if not one that is concerned with relations of technology and society like STS is?

4.1 STS-APPROACHES AND CONCEPTIONS TO BE USED

In the attempt to understand technology production, STS fellows have elaborated several concepts. Among the most common today is the *social construction of technology* (SCOT). SCOT argues that technologies are developed not according to some grid or game plan, but in a social process: different groups influence the development according to their own interpretation of the value of a technology and make progress and outcome of technological developments very hard to foresee. In the first articulation of the SCOT research program by Bijker and Pinch [40] they mention that in their opinion, existing strands of research have shortcomings in explaining the development of technologies. They particularly mention innovation studies, history of technology and sociology of technology [40, 404]. They criticize the first to be oversimplifying developments while historians do not even examine them due to the 'obvious' success of the artifact. While they do not reject sociology of technology right away they propose their own, clearer, SCOT program as an improvement. The two central concepts of SCOT are *interpretative flexibility* and *relevant social groups*. Summarized very briefly, SCOT argues that different social groups that are relevant for it and its development regard every technology differently. Basically this is any group of individuals that is relevant to a technology and its development. This begins with those developing it, continues with anyone in contact with the technology

and ends with those rejecting it. What the technology means to those groups is flexible: while it may be entertaining for some, it may be useful or even threatening to others. Most importantly, there is not *one* meaning or place a particular technology or artifact takes in a social context. Much more, it has multiple meanings that are different for different actors.

These two conceptions are particularly interesting for the zeppelin case: the social structure of the German Reich at the time was quite fragmented. Without any ambition to create an exhaustive list, one could come up with several societal divides along which groups of some sort could form. Just to mention a few there were groups of social status (working class, bourgeoisie, nobles, ...) different sexes, genders, confessions, regional distinctions (as we came across before - remember the resentments of Prussia and southern Germany mentioned in chapter 2), and others more. The notion of relevant social groups allow for different perspectives to be investigated on at the same time. It acknowledges the diversity of a society and by allowing for interpretative flexibility grants the right for everyone to develop their own perception of the artifact. In order to approach the situation as I do, this openness is a key feature to the theoretical framework.

Both conceptions are very open and exclude almost nobody or anything from being influential: anything could happen. This built-in contingency is very much aiming at the paradigms of technological determinism, a school of thought Pinch and Bijker were struggling with and to which they built SCOT as a counter argument. The conception of interpretative flexibility is as simple as intuitive: technologies can be put to more than one use – what is seen in them depends not only on themselves but also on individuals encountering them. The consequences thereof are not limited to the use of an artifact – all kinds of interactions with an artifact can be affected. An example Pinch and Bijker give is

»not only that there is flexibility in how people think of, or interpret, artefacts, but also that there is flexibility how artefacts are designed. There is not just one possible way, or one best way, of designing an artifact. [...] It can be shown that different social groups have radically different interpretations of one technological artifact.« [40, 421 ff.]

This flexibility is what makes SCOT so valuable for studies like mine: both interpretation and design to be flexible has meaningful consequences for technology production. Assuming both sides of the process are flexible implicates that they can interact – or even negotiate about both the design and the interpretation of the technology.

This perception is already enough to defy a determinist development: integrating the contingency of interaction, a linear development can no longer be expected. However, »If one does not accept interpretative flexibility, one is almost certain to fall prey to determinist

thinking.« [2, 281] Technological determinism argues for technologies to have essential features and qualities. These qualities, according to technological determinism, decide upon their success and the impact they have on social structure. As they are inherent in the artifact, their impact and thus also their development is foreseeable and walks down a prescribed path. My approach, however, does not follow this perception but of course assumes the technological and the social co-evolve and form each other. As Sismondo [45, 101] puts it: »To accept that technologies do not have essences is to pull the rug out from under technological determinism.«

Further core conceptions of SCOT are the terms *stabilization* and *closure*. Those refer to the interaction/negotiation of meaning. According to SCOT, the interactions between relevant social groups lead to a »emergence of consensus and stabilization« [40, 424]. Thereby, they refer to the development on one predominant and shared perception of a technology. Usually, SCOT says, »one artifact, that is, one meaning as attributed by one social group - becoming dominant across all relevant social groups.« [2, 271] Once this stabilization progresses, the discourse about the technology will eventually experience closure through consensus. Then finally there is *one* meaning of a technology that is widely shared. This does, however, not mean that only one perception exists. Rather, it means one perception is predominant and commonly agreed upon. Individuals or groups may still disagree. Yet this consensus does not necessarily mean anything has actually happened.

»Closure in technology involves the stabilization of an artefact and the 'disappearance' of problems. To close a technological 'controversy' the problems need not to be *solved* in the common sense of that word. The key point is whether the relevant social groups *see* the problem as being solved. In technology, advertising can play an important role in shaping the meaning which a social groups gives to an artefact.« [40, 427]

How closure is achieved differs: problems can 'disappear' through technological progress, they can be 'solved' by changing surrounding conditions or they can, as one might see later in this piece, find closure through a redefinition of what the actual problem was and what it was that one was disagreeing about.

The summary given of count Zeppelin's endeavor to create rigid airships gives a very nice example of such struggles and unforeseen difficulties. Again and again, Zeppelin interacted with relevant social groups, in his case (at least early on) mostly the Prussian military administration, about the interpretation of his technology – in that case mainly about whether the technology was seen as having enough potential to be worth funding its further development. As has been shown, Zeppelin also looked for support by various groups and

progress in his project largely depended on scarce and hardly predictable events of support as the military remained hesitant. Yet the reasons for this support and the eventual breakthrough of the technology are not really explicable by a simple SCOT approach. The troubles during the project are; its resolution is not: When the Volksspende took place in 1908, the zeppelin LZ-4 had just experienced another crash, which could very well have been interpreted as one more setback and confirmation for the deficits of the technology. At least to perceive the zeppelin as a solution to an actual technological challenge of the time seems to have required a very optimistic perspective. And simple aesthetics (as Eckener and Frank, mentioned above) seem to be only a small part of the solution. One very crucial aspect SCOT does not touch (and has that in common with much of the literature on Zeppelin airships discussed above) are motivations for actors to get involved in the process of technology creation the potential consequences of technological development. However, as the huge wave of support Zeppelin encountered in 1908 – a stage when his technology was still immature would greatly benefit from that information. This aspect is crucial to my endeavor of finding out how a firstly unreliable and apparently dangerous technology was given not only the chance to evolve despite its early setbacks but was additionally supported so broadly with substantial financial means.

4.2 SOCIOTECHNICAL IMAGINARIES COMPLEMENT THE SCOT-TOOLKIT

One opportunity to shed light into them is provided by a different school of thought that is able to take the SCOT approach further than where it originally went. In her recent work, Harvard scholar Sheila Jasanoff has developed a concept she introduces as »*sociotechnical imaginaries*« (STI) [27]. Those are, in her conception »collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects.« [27, 120] The notion »imaginaries« already introduces an important feature of this concept. Imaginaries open up time as a dimension of analysis - while SCOT does not take into account the timely development of technological development, using imaginaries introduces the possibility to create a future that is distinct from the present through technology. SCOT bases its concept on an ex-post perspective on decisions about a technology. In their famous bicycle case, Pinch & Bijker [40] show nicely how bikes as we know them have evolved over time and how many of the innovations along the way have been left behind again. However, those technologies left behind are described not from the perspective of what their prospects might have been but in terms of what these did or did not fit in the present time of their introduction. The contingency of the relation between variation

and actual necessities is a feature both approaches share. A dimension that SCOT does not touch, however, is the ex-ante perspective on time and development: while ex post many things are explicable, the ex ante perspective is much less closed and subject to great insecurities - yet to opportunities that have later on been closed by time: while commercial failure of an innovation is hard to negate, advertising a bright and shining future for a technological artifact before its actual development is not limited. Likewise unrestricted is the placement of hopes and expectations into a development that is uncertain. Implicitly, of course, this is contained in SCOT, too: the inventor or entrepreneur building an artifact or developing a technology does, of course, think of the future. If he gets lucky, his expectations may even be fulfilled. Thus, a selection takes place before actual development. By dedicating time and funds to a project, someone manifests his or her vision of a technology. The concept of sociotechnical imaginaries opens this stage for a broader audience. The imagination about possible futures does not only concern single individuals but can take entire groups or even societies into consideration. Actually it was created explicitly for the purpose of looking at *national* conceptions of technology. In that way, sociotechnical imaginaries can very well be seen as a version of technology interpretation that is not oriented toward the past and present but towards the future.

One tangible example is the space race of the 1960s: upon John F. Kennedy's vision of exploring space, an entire society developed a common goal of sending a man safely to the moon. The most crucial aspect here is clear: expectations change present action. They have the potential to change behavior from a reactive to a proactive attitude. An expectation enables subjects to adapt to potential and/or probable futures. They can take an optimized position in the present to be better off in the future. Yet this privilege is not unlikely to become a mandatory reaction. Not only does it offer the chance but demands a reaction - once an individual is alert about the impact it has upon its own future, an attitude of actively seeking to shape it is likely to evolve.

Furthermore, the concept of sociotechnical imaginaries circles around national conceptions of technology and how technologies collaborate in the creation of national identities. The collective imagination quoted above refers mainly to policy-makers. The research program Jasanoff proposes and partly executes in her 2009 paper [27] is focused on science & technology policies. She explains »S&T policies thus provide unique sites for exploring the role of political culture and practices in stabilizing particular imaginaries, as well as the resources that must be mobilized to represent technological trajectories as being in the 'national interest.'« [27, 121] In that sense, the approach she uses is a top-down perspective. The state plays a huge role defining what is the public good, who should be served by S&T

policies, who should decide about S&T policies and how controversies in the field are to be ended.

Moreover, a comprehensive summary of Jasanoff's ambitions is formulated by her as follows: »How do national S&T projects encode and reinforce particular conceptions of what a nation stands for?« [27, 120] The power of technology upon social structure is not limited to actual technology. As with any other unifying momentum such as belief or political view, the imaginary forming groups is not bound to existing things. Likewise, utopias and ideal imaginations can serve as a unifying momentum. Jasanoff mentions this explicitly and refers to this fact in her introduction of sociotechnical imaginaries:

»The concept of sociotechnical imaginaries builds in part on the growing recognition that the capacity to imagine futures is a crucial constitutive element in social and political life. Imagination is no longer seen as mere fantasy or illusion (Sarewitz 1996), but as an important cultural resource that enables new forms of life by projecting positive goals and seeking to attain them. [...] imagination helps produce systems of meaning that enable collective interpretations of social reality (Castoriadis 1987); it forms the basis for a shared sense of belonging and attachment to a political community (Anderson 1991); [...] In short, imagination, viewed as "an organized field of social practices," serves as a key ingredient in making social order (Appadurai 1996; Taylor 2004).« [27, 122]

On a smaller scale, this social order can refer to 'groups' in a classical sense: Interest groups, lobbies or many others. On a greater scale, however, this concept is applicable to entire societies: »collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects.« [27, 120] not only are able to reflect a national society, but are able to create a national identity from a society that is not so united. I intend to show in this case study how this worked through the collective imagination that zeppelins would deeply transform society and change it for the better or the worse. This ties nicely to the very beginning of this chapter: the quote of Zeising mentioning the role the Zeppelin airships played in the forming of German national identity. (original quote: »Nach dem Unglück von Echterdingen verschmolzen Vertreter aller Stände zu einer „Glaubensgemeinschaft“ im Zeichen des Zeppelins.« [53, 196]) It is to be revealed how those points tie together in the analysis. Yet they give a very interesting prospect. In fact, it promises both crucial concepts, **SCOT** as well as **STI** to be able to showcase their particularities: While **SCOT** promises to integrate the diversity of the German society around 1900 and the its many inherent conflicts, **STI** brings a different asset: While **SCOT** perceives closure as meaning that »typically a closure process

results in one social group's meaning becoming dominant« [2], the concept of *STI* allows for a new interpretation. Assuming a new imaginary »encode[s] and reinforce[s] particular conceptions of what a nation stands for?« [27, 120], it might just as well be that a new meaning emerges out of the discourse that then redefines the constitution of relevant social groups. Going with the United States' motto 'e pluribus unum - out of many, one', the zeppelin could in this way be depicted as an important factor for the unification of a fragmented society.

4.3 TYING TOGETHER SOCIOTECHNICAL IMAGINARIES AND SCOT

As the zeppelin case will show, the pursuit of a vision, the development of a technology not as a reaction to current challenges but as an effort to push boundaries can be a driving force. The development of a shared vision can thus open up entirely new technological spaces (in opposition to gradual development over a large timespan) and secondly the shared vision can itself, as quoted from Jasanoff above »encode and reinforce particular conceptions of what a nation stands for« by providing a piece of shared identity. It is not limited to applying an existing technology to present challenges, but it enables one to open up entirely new fields – scenarios that are yet only imaginable and seem unrealistic.

Imaginarities and their orientation towards the future bring along some very substantial aspects that greatly enhance the interpretative flexibility of an artifact. First of all, the point of time at which the imagined is to become reality can remain indefinite. In other words, the imaginary has at (almost) no point to be declared as failed - the vision can rather be adjusted to changing surrounding conditions and prerequisites. Just as well, time can simply remain opaque: a reference to the future - whatever that means - can be enough to create an expectation or make others start imagining themselves. Second, not only can the vision be adapted. The imagined future can be made more likely to actually unfold by own actions. These prospects and actions, however, change the present - and the actor itself as well as his or her behavior. This active pursuit of one's future allows for an actor or a group of them to change and adapt in order to make one particular vision of the future more likely. Moreover, the futuristic character of the imaginary frees the vision from the restriction to rely on existing and/or realistic technologies. As it is about what is *going to be*, not what *is*, the range of what can be envisioned increases dramatically. Technological development has not to be thought in consecutive steps but can be seen from the end - which might ease engagement into a long process in contrast to seeing the process from the beginning. Thus those imaginaries can be ahead of their time and

encourage others to think outside the box of what is feasible at the moment. A very nice example for this is how Zeppelin propagates the potential his technology has for mail services. In 1895 [57], 5 years before the maiden flight of his first prototype and more than 10 years before his technology became actually successful, Zeppelin was already capable of giving a vivid description of what would be possible. Without even the smallest hint on when, if at all, this is actually going to be the case he gave the audience detailed information about mail delivery times to New York (5 1/4 days), Bombay (6 days) and several others. He even announced heavy freight to bring along no further complications. (original quote: »Größte Bedeutung werden die Fahrzeuge jedenfalls im Weltpostverkehr erlangen. Die Post ließe sich von Berlin aus nach Konstantinopel in 38, nach Alexandrien in 60 Stunden, nach New York in 5 1/4, nach Bombay in 6 Tagen, je in einem Fluge befördern. Dabei dürften die Postsäcke mehrere hundert Kilogramm schwer sein, und bedeutende Lasten könnten in Schleppfahrzeugen, ohne erhebliche Fahrtverlangsamung, verfrachtet werden.« [57]). There was, of course, no point of knowing for him whether any of that was even realistic at that time - all calculations about speed that existed at the time were rough estimations, nothing more. And as we know today, an airship mail network never existed (except for a brief period of time in the 1920s when Zeppelin airships LZ-127 and LZ-129 delivered mail on their transatlantic flights, though it was single routes, no network). Zeppelin was wise enough not to promise anything to happen at a certain point in time. Yet in the end (years later) he said enough for his compatriots to follow their imaginations and support him.

That way, Jasanoff's concept introduces a new temporal dimension SCOT left behind. It opens up interpretative flexibility to more dreams, visions and utopias. In addition to this opening of discourses about technologies, there are very complementary if not even unifying elements to the two approaches. Specifically, with her concept of sociotechnical imaginaries, Jasanoff ties into the (never asked) question what makes a relevant social group a relevant social group. Pinch and Bijker introduce the concept of relevant social groups as if it was self-evident that social groups are existent and exercise influence on all sorts of developments. So why should there be any exception from that? The argument appears somewhat self-evident to the reader, too, and it is not for nothing that SCOT was received so well and the conception of relevant social groups has been accepted. However intuitively right and comprehensive through anyone's own experiences, an explanation why those groups form and what constitutes them as groups is missing. Jasanoff now provides one possible explanation of what these groups can actually be: communities sharing similar perceptions of what and how future should be. All groups have a unifying momentum: a belief, language, culture or else. However

defined in detail, by all means they share something. The founding fathers of SCOT, Pinch and Bijker acknowledge this:

»The key requirement is that all members of a certain social group share the same set of meanings, attached to a specific artefact. In deciding which social groups are relevant, the first question is whether the artefact has any meaning at all for the members of the social group under investigation.« [40, 414]

Later, Bijker continues to stress the influence not only by the groups and their shared influence on the invention process itself, but by a much more subtle influence. Since inventors are themselves socialized human beings, their origin and socializations may manifest itself in the technological artifacts they build all by themselves.

»The characteristics of these individuals, however, are also a product of social shaping. Values, skills, and goals are formed in local cultures, and we can therefore understand technological creativity by linking it to historical and sociological stories« [2, 4]

However, this perspective is a one way street. It is all about preexisting social groups showing interest in an artifact. Just as well, the relevance can be expressed by a lack of interest. The fate of unsuccessful innovations is often not decided by interested groups but by targeted social groups not finding »any meaning at all« [see above] for an artifact. In the case of Zeppelin airships, history would not have become so complicated if those targeted with the artifact had accepted it from the beginning. As mentioned, the Prussian military administration did not acknowledge or even recognize the potential of count Zeppelin's invention. It was simply too fantastic. The second, more crucial critique I want to raise is the point that existing social groups are said to be interested (or not) in an artifact. This clearly implies a solely unidirectional influence of the social onto the technical: existing social structure influences the fate of technological development. It could, however, be much different. The relevant social group could just as well form around a shared interpretation of an artifact. This interpretation (or imaginary) can just as well serve as constituting element of a social group that evolves due to its positioning towards an emerging technology. It has to be stated that at least a potential of the technical development to influence social structure has to be acknowledged. It would be naive to state otherwise, as brief thought allows coming up with many examples of technologies having had heavy influence on the development of social structure. And even though SCOT is called social construction of technology, not technological construction of the social, the possibility of the game being played the other way round should at least be mentioned. Other theories have managed this point with a less unidirectional conception.

Actor-Network-Theory (ANT), for example, describes the interaction of technology and social as »heterogeneous networks that bring together actants of all types and sizes, whether human or nonhuman.« [1, 206]

In my empirical analysis, I am going to showcase such groups. Accordingly imaginaries do not only admit to a future user possibly finding the technology useful in a way - whether as intended by the inventor or not (called interpretative flexibility by Pinch and Bijker) - but allow for a concept of societies making efforts to come to terms with a vision. Thus, they manifest the side of the coin SCOT avoids: the technical construction of the social. Not for nothing is it called *social construction of technology* - the unidirectional focus is clear in its original conception. However, Bijker is aware of this flaw. Therefore, he opens SCOT up in a publication from 2010[3]. He expands SCOT, admitting that social actors react to technologies and thus those are not without influence on society:

»The central concept here is 'technological frame'. A technological frame structures the interactions among the members of a relevant social group, and shapes their thinking and acting. It is similar to Kuhn's (1970) concept 'paradigm' with one important difference: 'technological frame' is a concept to be applied to all kinds of relevant social groups [...] A technological frame is built up when interaction 'around' an artefact begins. In this way, existing practice does guide future practice though without logical determination. A technological frame describes the actions and interactions of actors, explaining how they socially construct a technology. But since a technological frame is built up around an artefact and thus incorporates the characteristics of that technology, it also explains the influence of the technical on the social.« [3, 69]

This is where and how Bijker's method is to overcome its flaw of being a one-way concept of the social influencing technological development. By introducing the 'technological frame', he creates an arena in which both the social and the technical can influence each other. Once this is established, he soon bridges the limitations of the frame by introducing the outcome of a stabilized frame: A sociotechnical ensemble of both technological and social actors. Many of those ensembles then form the entirety of sociotechnical reciprocity: technological culture. Reciprocal influence of society and technology is a well-known concept in STS. It does not take Bijker long for a transition:

»"Co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which

we choose to live in it. Knowledge and its material embodiment are at once products of social work and constitutive of forms of social life.” (Jasanoff, 2004, p. 2) The idea is to explain the developments of society and technology as two sides of the same coin. This borders on thick description and answering ‘how’ questions, rather than answering ‘why’ questions with clearly explicated causal chains.« [3, 69]

Yet while these concessions open SCOT in terms of conceptually integrating technology’s influence in society, the temporal dimensions remain very implicit. Hence Jasanoff’s concept of imaginaries remains very relevant to my work in order to integrate the anticipatory aspects imaginaries raise and their consequences as well as power. Ulrike Felt adds to the explication of an aspect of sociotechnical imaginaries that is very crucial and was not mentioned by Jasanoff before. In her recent contribution »*Keeping Technologies Out: Absent presences and the formation of national technopolitical identity*« [14], she is particularly concerned with the question how sociotechnical imaginaries build up over time. This aspect is very helpful answering the ‘how’-question just referred to by Bijker. It enables us to see and take notice of changes imaginaries undergo over time. In her conceptualization of how discourses about sociotechnical imaginaries stabilize, Felt speaks of »memory practices« [14, 11]. She describes the discourse as a series of rehearsals in which different perceptions of a technology are ‘tried out’. Each ‘performance’ is then evaluated and remembered during following discourse rehearsals. This way, the rehearsals lead up to a finished play, a studied performance that has proven reliable and can be stuck to over time. Those construction processes are called assemblages in her approach: Out of several interpretations and pieces of imaginaries, a stabilized ‘assemblage’ is formed. Also, the experience from a discourse emerging in a specific socio-technical setting can easily, as is demonstrated, influence and/or support another. This way, technological cultures can form over time and evolve through the experiences they make during this process. This piece is particularly important as we will see that the imaginaries carrying the Zeppelin phenomenon were themselves „standing on the shoulders of giants“ if one wants to alienate the expression; important discourses prior and parallel to the development of Zeppelin’s airship played a big role. Proceeding with the efforts of relating sociotechnical imaginaries to SCOT, assemblages might be presentable as an alternative notion for the actual process of stabilization and thus in its details provide a further level of analysis SCOT does not dive in too deeply.

4.4 A SIDE NOTE: THE HETEROGENEOUS ENGINEER

The theoretical conception I choose in combination with the case I apply it to brings along an implicit assumption. As was to be seen in the narrative told in chapter 2, Zeppelin was very active in advertising, placing and talking about his invention. The success of his technology is therefore his success as a promoter for it. Acknowledging the dependence of technological development from social proceedings of course means that individuals can have an influence on it. As has already been said in chapter 2, and will become even more apparent in the analysis, the zeppelin venture depended greatly on Zeppelin's talent and finesse. Not only his engineering skills, but his talents as a salesman, media manager and other things were important to the development. STS coined a term for this phenomenon: The so-called heterogeneous engineer, developed by Hughes (e.g. [4]) and others, is a concept that was developed to include all those capabilities needed into an assembled package to describe an engineer as more than just the 'brains' of technological innovations but also their initial motor. Moreover, it formulates (again quite contrary to technological determinism) that the greatest idea is nothing without a proper development beyond the mere technological construction. Law nicely summarizes:

»The argument is that those who build artifacts do not concern themselves with artifacts alone but must also consider the way in which the artifacts relate to social, economic, political and scientific factors. All these factors are interrelated, and all are potentially malleable. The argument, in other words, is that innovators are best seen as system builders.« [34, 112]

While this conception is no big addition or challenge to the theoretical framework, I propose for the reader to keep it in mind. The fields of Zeppelins activities, as the analysis is about to show, were manifold. Having in mind that innovation work consists of more than just inventing and constructing artifacts may be rewarding to better understand the industrious activities of Zeppelin.

4.5 GOALS AND SCOPE OF THE PROJECT

As mentioned above, I want to try to answer my research questions under as special consideration of the SCOT-approach. Nevertheless, some newer conceptions are very promising for my endeavor. Particularly, including Jasanoff's concept of sociotechnical imaginaries and thereby a perspective on futures into the frame of analysis brings up an entirely new topic: an orientation towards the upcoming, the possible. As shown above, this perspective of imaginations and what

they can bring along has been widely ignored so far although it might be a key aspect to understand people's engagement and support for the new technology. Nevertheless, and I am going to show this in the writing, the imagination of futures was opened up by Count Zeppelin. His different conceptualizations of his technology and its uses enabled not just a limited, but very diverse public to get attached to the airship. He himself opened the discourse around the purpose of his invention thus allowing for more different groups to imagine different futures with his machines. This fits nicely to another theoretical conception mentioned: the consideration of how those imaginaries are assembled by Felt tie into the development of those foundations of SCOT. They show that interpretations of technology are not just there or given, but develop and change over time. This process of development does, of course, underlie influences and can thus be controlled or it can at least be attempted to gain control over it. Therefore, Jasanoff's concept is going to be one keystone to my work. However, I use her concept a bit different from her original intention: Jasanoff aims at illuminating how science and technology policies can lead to a redefinition of conceptualizations on nationhood and its documentation. The case of Zeppelin airships can show how different imaginations of a technology can be united in common points and how this unity can be used to build a shared concept of a nation in the first place. Thereby, S&T policies are made themselves. This conceptualization of a case has three, maybe four goals:

1. First of all to enrich the number of cases with one of a different kind: Many STS cases present deal with recent technological developments. The study at hand would provide another historic example to show that it is suitable for the same analysis.
2. Secondly, it aims at enriching the research around zeppelins by a new perspective. While much has been written about it, it is still hardly reflected what fascinated people about it - the proposed application of imagined futures will contribute to understanding the social dynamics in a better way and enrich the existing literature by a further perspective.
3. Thirdly, it adds to the relatively new concept of STI: while developed as a top-down perspective, the case at hand shows that these imaginaries can also work bottom-up and be a useful resource to bring order into unordered discourse. Top down is meant here as an interpretation that Jasanoff does not mean primarily that STIs are developed through discourse in the entire society. Instead, the STIs are meant to be developed for society and then spread in it. Much like the re-interpretation of 'Frenchness' in the French nuclear energy discourse[20], the discourse happens in rather small groups *for society, not by society*. The formation of groups (or even nations, see above) through shared

perceptions of technologies would form the mentioned opposite case. In that example the *STI* would be the meeting point for individuals - thus social structure would be emerging out of the discourse and the *STI*. It depicts in a very nice way how not only the technological is shaped by the social, but how technological artifacts can shape the social world. This touches grounds the original *SCOT* avoids: the technical construction of the social. Bijker has already reacted to the lack of this aspect: »After successfully criticizing technological determinism and again asking the question— though in different terms—of the impact of technology on society, the development of social institutions as constituted by technology also came to the agenda.« [3, 71] In this 2010 piece, he opens *SCOT* by introducing »sociotechnical ensembles« [3, 66] of social and technical matters that reciprocally influence each other instead of only the social imprinting on technology. The zeppelin case might be able to provide a very nice example for this new conception of *SCOT*.

METHODOLOGY AND MATERIALS

In order to achieve the goals I have set for the theoretical aspect of my thesis, a sound methodological approach is a central requirement to be met. Also, as I claimed an approach using a clear theoretical framework and a structured analysis to be missing in the discourse about the zeppelin's popularity. Hence the methodological approach is of course an important one for my study to achieve its goals of providing exactly that and thereby contributing something previously lacking.

5.1 METHODOLOGY

The methodology for my study comes with the [SCOT](#) approach. It is already introduced in the origins of [SCOT](#) from 1984 [40]. Bijker provides a clearer account of the methodological approach to a [SCOT](#) study in his piece »*How is technology made? -That is the question!*« from 2010 [3]. He describes a three-step process consisting of:

Step 1: analysis of the artifact to regarding its interpretative flexibility and relevant social groups active in its construction

Step 2: a description of the process of social construction of the artifact

Step 3: an explanation how and why this construction process worked with regards to technological frames of relevant social groups

I would like to mostly stick with these steps. Giving more detailed instructions, the methodology is described as followed:

»Key concepts in the first step are 'relevant social group' and 'interpretative flexibility'. [...] relevant social groups can be identified by looking for actors who mention the artefact in the same way. [...] Because the description of an artefact through the eyes of different relevant social groups produces different descriptions—and thus different artefacts—this results in the researcher's demonstrating the 'interpretative flexibility' of the artefact.« [3, 68]

This step Bijker describes is somewhat redundant, at least for I am going to do. As my interest lies in the [STI](#) connected to the zeppelin,

it would be an unnecessary detour, if not even a mistake, to proceed as Bijker proposes: to look for statements made about the artifact to trace them back to their origins and then looking at how the individuals coining them perceive the artifact seems redundant when this positioning towards the artifact becomes apparent in the statements that were at hand in the first place. Approaching the subject with STI in mind and thereby implying that the relevant social groups can just as well be formed around the STI then the other way around, this step seems like an unnecessary complication.

As my interest is the formation (or assemblage, as Felt might call it [14]) of the stable zeppelin imaginary which became widely shared, I am not going to dig all too deep into Bijker's concept of relevant social groups. I believe my research topic allows addressing this conception through a detour that fits my approach better. As I want to have a look at the imaginaries and the way they formed, not the people having them are the most relevant part but an imagination they share.

Moreover, social groups interested in the airship are not easily separated. As to be seen in the categories Haude [18] introduces (see chapter 2.3.3), the social divides separating those are not necessarily consistent with each other or mutually exclusive. This makes a sufficiently consistent classification of relevant social groups difficult if not impossible. Additionally a thorough analysis of multiple groups in the level of detail demanded here would go beyond the scope of this study and most likely end with a narrative confusing to the reader and in big parts irrelevant to my project. Readers interested in such a detailed examination of the German society of the early 20th century might find the level of detail they are looking for in Haude's [18] or Reinicke's [42] books when looking for material directly related to the social order and aeronautics. A more general yet comprehensive and detailed description of the development of the German Reich and its society between 1866 and 1918 is given by Stürmer [48].

Therefore, I propose a different approach to the entities of my analysis. Such a shared imagination can be considered as constituting element of a group. Thus it is possible to stick to positions towards and visions concerning the dirigible published. This approach, while turning the process around, is able to come to the same results as the one Bijker proposed – it just turns around the order in which steps are taken. Instead of approaching the relevant social groups first and then having a look on their imaginations of the technology, I am going to look at STI directly. In a second step and as a side note, I will look at who it was that had this interpretation in mind.

Some examples about the typical background of people sharing a certain imagination will for sure be helpful to illustrate what is talked about. And as my materials are mostly secondary sources, such descriptions will be provided along in general lines. The piece

by Warneken (1984), for example, that I am going to use to draw on skeptic voices on the zeppelin is explicitly focused on the working class movement – hence does provide such basic information about the social groups behind it.

This approach is a both feasible and allowable adaption to Bijker's methodological step. As it is going to lead to largely the same results, it is even preferable to the exact approach by Bijker. It is going to be more focussed on the character of STI and its functioning and thereby provide my analysis with a lean and focused approach to what matters most about my research. In order to demonstrate the interpretative flexibility of the zeppelin, I am going to introduce two exemplary in-depth interpretations of examples for it. Those are going to introduce different perspectives on the airships and illustrate them sufficiently to then go on to proceed with the second step of the analysis.

»In the second step, the researcher follows how the interpretative flexibility diminishes, because some artefacts gain dominance over the others and meanings converge [...] Here, key concepts are 'closure' and 'stabilisation'. Both concepts are meant to describe the result of the process of social construction. 'Stabilisation' stresses the process character: a process of social construction can take several years in which the degree of stabilisation slowly increases up to the moment of closure. 'Closure' [...] highlights the irreversible end point of a discordant process in which several artefacts existed next to each other.« [3, 69]

This second step is going to center on the events at Echterdingen and the time around it: after all, it seems to have been that it was the crash of LZ-4 that led to the stabilization and closure upon Germany's airship fascination. However, years of work before that event did not accomplish what did then happen. This long timespan of non-initiation of stabilization and closure is going to be examined, too. It is especially relevant because it put pressure on Zeppelin and by the times changing also changed the environmental conditions of the technological development. It will be examined how the imaginations towards the airship and its potential changed in the relatively short timespan in summer of 1908 when the zeppelin craze broke loose. Particularly interesting is going to be how a public that did not really support the technology before came to do so after an event that was actually a failure – the zeppelin, in the end, did not pass the 24-hour endurance trial – and how interpretative flexibility and STI supported the process. The latter, then, will be the focus of the third step of my analysis.

»In the third step, the processes of stabilisation that have been described in the second step are analysed and ex-

plained by interpreting them in a broader theoretical framework: why does a social construction process follow this way, rather than that?« [3, 69]

This is the decisive step of my analysis as it is exactly concerned with the question I framed as my research question. My working hypothesis is that Zeppelin's opening of the technology to interpretative flexibility enabled this stabilization and final closure. The irony of opening leading to closure is remarkable. I am going to argue that the openness Zeppelin proposed for his technology was cleverly introduced in a way that it would not get in his way of realizing his own conceptualization of what his invention was good for. This way, the zeppelin could be more than just the technological system it was promoted as in the beginning.

5.2 MATERIALS

Materials with which to work on my subject are abundant. Like many researchers before, I am rather facing the problem of having too much at hand than having too little to work on: A first very important source for my work is the archive of *Luftschiffbau Zeppelin GmbH* in Friedrichshafen. As part of Count Zeppelin's heritage, the Zeppelin foundation operates a museum about the airship, its history and its inventor. Associated with this museum is an archive holding all remaining documents from the airship era - a vast amount of material. Also, the archive preserved many writings of Count Zeppelin that can give informative insights on the way the inventor promoted his airship. Last but not least the library at the archive holds many (if not all) books on the subject. This allowed me to select the literature I mentioned before not only by snowball sampling through bibliographies but by actually holding in hand, reading and then choosing or dismissing lots of books. The only potentially very valuable source in relation to count Zeppelin that remains unavailable are his diaries, as these are held under lock and key by his heirs and unavailable to the scientific community. Another huge source of information are newspapers: especially when dealing with the reception of and popular opinions about the airship, newspapers can give a great insight into the contemporary discourses about the Zeppelin airship. A great number of historic newspaper editions is available either online or in libraries.

A problematic feature, however, is the fact that many newspapers are politically biased. This problem gets even more serious when considering the long time difference and the fact that many of those newspapers do not exist anymore. This makes it hard to find out if and which bias a particular newspaper had at the given time. As my state of the art has shown, writing on many aspects of the Zeppelin airship and its history is abundant. While this richness of ac-

counts is not necessarily positive, it brings along a very positive side effect for my research. As abundant as written pieces are, as abundant are potential sources of my work. The authors before me have done a very important step: they have screened lots of material, allocated it and transcribed historical elements. At times, of course this pre-selection has effects on the material available, yet not necessarily negative ones. The piece of Warneken on the German working class movement and their opinion about the airship [50], for example, profits a lot of his ability (he is an ethnologist with a research focus on the German working class) to sample historic newspapers with a social-democratic bias. This is a work that I could not have done - at least not with confidence that my selection is right and I do not just end up with a coincidental sample. As this is generally the case with newspapers (see above), I want to exclude first-hand newspaper articles from my analysis. I cite newspapers exclusively from secondary sources that have contextualized them for myself to be sure how to interpret them. There is one exception I want to make of this proceeding: I am going to integrate some original pieces from *Simplicissimus* and *Der Wahre Jacob*. Those were satirical magazines. They stick out as they were very popular on the one hand and as it is not bound to reporting actual events. Their satirical nature allows and demands for exaggerations. Those exaggerations, while no accounts of actual events, draw very nice pictures of mentalities and phantasies related to the new technology.

Likewise, Clausberg [7] shows how science-fiction novels about aerial warfare can give valuable insights into actual mind-sets of that time. Much like that, caricatures and cartoons can sometimes give nice examples and illustrations, which I am going to use them for. Furthermore, the work on sources that has already been done by other researchers is particularly valuable for the conception of my study: I am not so much into discovering totally new facts from the history of Zeppelin airships. Instead, I want to take a look on known events from a different perspective. As mentioned above, the focus lies on applying specific theoretical conceptions. Hence, instead of obtaining unexploited material, re-arranging existing pieces of the puzzle and looking at them from a different angle already provides a great benefit for my research. Apart from that, I want to rely on writings by count Zeppelin himself: he gave various speeches and presentations over the years. Many of those (respectively the manuscripts) still exist and I was able to access them at the archive in Friedrichshafen. They show nicely how Zeppelin himself used the interpretative flexibility of his invention to promote his project. Especially the analysis on how his promotion of the airship changed over time and in front of different audiences is a valuable and informative aspect to my research as it gives insights in the very concept of interpretative flexibility.

In the following section, I will get into my actual task of analyzing what happened to the perception and imaginaries of Zeppelin airships in order for their perception to stabilize. As mentioned above, I want to show how the process went on with an example of two imaginaries out of many - this way having a chance of covering those imaginaries to a promising extent.

According to the three-step methodology proposed by Bijker (see above), this chapter consists of three parts. Section 6.1 contains an analysis of the artifact's interpretative flexibility, particularly concerning different relevant social groups active in its construction. This demonstration of interpretative flexibility is done with an example of two different imaginations about the zeppelin's future and its impact. Section 6.2 continues with a description of the process of social construction of the zeppelin. It focuses on a description of the developments around the Volksspende – in the sense that it is concerned with Zeppelin's situation as well as the German society as a whole and how those factors influenced the building of a common imaginary. Section 6.3 seeks for an explanation how this construction process worked with regards to technological frames of relevant social groups. It shows how both the technological features, but mainly the imagination of what those features could become as well as a strong emotional appeal of the inventor, Zeppelin himself played major roles in the process. Section 6.4 then concludes the chapter. It makes some final observations that are important for the discussion of the findings.

6.1 IMAGINARIES AND SOCIAL GROUPS AROUND AIRSHIPS

I want to begin my analysis with a look on two major imaginations about the zeppelin that kept coming up again and again. Since the analysis is not going to be exhaustive and will not be able to cover even nearly all of the divides mentioned in the introduction and by Haude and Reinick, I want to focus on two major conflicting visions of airships. Those two perspectives are sufficient to demonstrate the differences between opposing – or at least strongly different – attitudes towards the new technology present in its early days. I think such an exemplary demonstration about the arenas of disagreement about the zeppelin took place in is sufficient. After an introduction to these examples of interpretative flexibility, I will go on and talk about the social circumstances of the development. Finally, I am going to

have a look how the interpretation of airships eventually stabilized. A short recapitulation: Jasanoff defined STI as

»collectively imagined forms of social life and social order reflected in the design and fulfillment of [...] scientific and/or technological projects.« [27, 120]

In the beginning (before stabilization and closure as described by Bijker) the number of those imaginaries around airships and their potential effects was most likely as numerous as people around at the time.

However, the main features of airship technology and its potential uses that were thought of revolved around similar aspects. People saw airships (in general, yet the issue was strongly associated with Zeppelin airships and greatly affected their reception) as either a tool for peace or war. While it appeared that the possibility of air travel was about to change many aspects of life[21], its potential future as a weapon was often focus of either worries or hopes. Being an era of nationalism and imperialism, war was not seen with the critical distance as it is today. Germany had won the last major war against France in 1871 and German armament especially against the British fleet was pushed with great efforts. Many found Germany's role in global politics was to be one of the great colonial powers of the time, thus supporting aggressive foreign politics. Others saw those aggressive ambitions much more critical - especially the political left at the time believed in a future of peaceful international exchange and coexistence.

A projection of these two visions can very nicely be comprehended with the poem on the right (Figure 5). It was published in *Simplicissimus* in 1907. It displays a dialogue between two actors talking excitedly about a flight in an airship. The first exclaims his delight about mankind exploring the third dimension (air). For him, this achievement makes all earthly things become small and insignificant. Particularly the artificial division of mankind through national borders is ridiculed and propagated as having been overcome and no longer being effective and/or

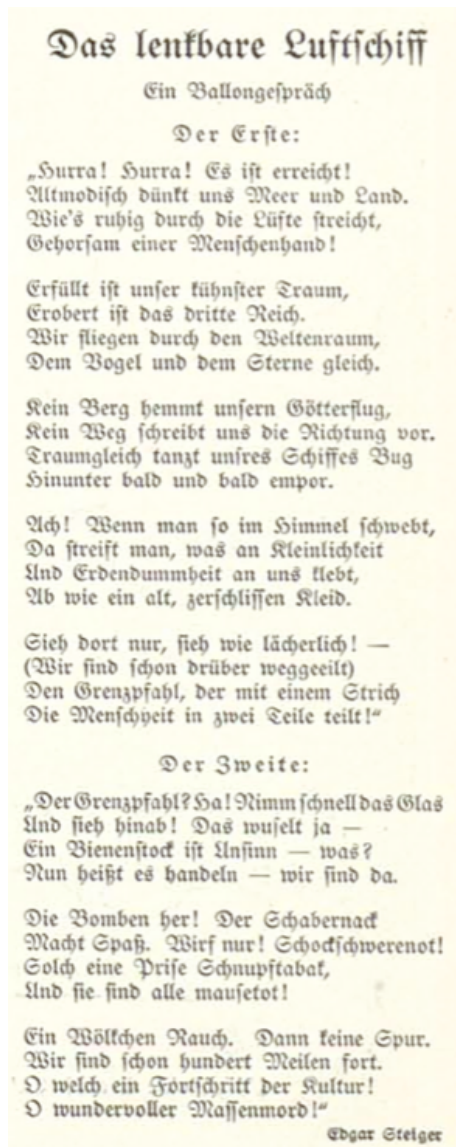


Figure 5: Poem: 'The Dirigible'

reasonable as borders are now apparently so easily crossed. The second one joins in these verses. While not arguing about the greatness of airship travel, he has quite a different take on the borders his counterpart saw disappearing. To him, the easy passing of borders brings along an imperative to take action. In his eyes the airship is a potential weapon of mass destruction and source of superiority. Its availability has to be used to one's advantage. Consequently, he calls for bombs to be thrown onto the neighboring country they just entered. From his position, this innovation in warfare marks great progress for humankind. The cross-border connotation is a popular one. Borders have long into the past served as demarcations of human power – power either to deny access to an area or to keep someone there. The book by Haude [18] is even named (at least partly, as the title can be interpreted differently) after this aspect, titled »Grenzflüge« (Which translates - depending on the interpretation either to 'boundary-' or 'border'-flights). Bound to (military) forces on the ground, it seemed obvious that those borders lost their functionality once the way could not be obstructed anymore as it was leading through the air. While we know today that this was just a temporary development, at the time it was a change people saw as an obvious consequence resulting from air travel. Political developments of the late 18th and 19th century did their part to even complicate the situation a bit. Having been boundaries of power of absolutistic monarchs before, borders at beginning of the 20th century demarcated the zones of influences of relatively new-formed nations. The transition from kingdoms with inhabitants to countries with citizens was grave in respect to borders: had trespassing before been an act against just one monarch's authority was it now an act that concerned any citizen. People were, however, not unanimous what to see in this potential to act on them. Some considered it a chance for fraternization of people across national borders. Others instead saw a chance to use it as an offensive act, a chance to expand one's influence in the newly accessible dimension (and at the same time fearing the „others“ to do so themselves). The border-crossing connotation could thus be judged upon very differently. As the poem stems from the satirical magazine *Simplicissimus*, it is not to be taken too seriously. Nevertheless it displays very nicely how different takes on the technology could be made. Also, it already incorporates a very important element that we are going to come back to: as different as the positions are on what to do with the technology, there is agreement about the positive potential of the technology. I am now going to proceed analyzing these two leitmotifs further.

6.1.1 *Envisioning an era of military dominance: nationalist visions of a new weapon*

The framing of zeppelins as a weapon is obvious - It was envisioned and designed as a weapon from the very beginning by Zeppelin. As early as 1887 Zeppelin tried to persuade the king of Württemberg of the necessity to develop and build 'dirigible balloons' (original quote: »Lenkballone«) for warfare. [11, 106 f.] The inspiration for his early ambitions were first progresses of French engineers Renard and Krebs who were considerably successful with their airship 'La France', performing several flights as well as his encounter of observation balloons in the American civil war during a trip to North America. When Zeppelin's vision of providing a weapon for his fatherland became more realistic, Germany was in the middle of losing an armament-race against the British Empire. Zeppelin had begun to build airships after his dismissal from military service in 1890 and filed a patent in 1895 (see above). When the British became the dominant world power in the late 19th century, the German military began to plan a huge expansion of their own fleet. As the British fleet was seen as the key to British geopolitical dominance, voices calling for Germany to build up comparable naval power were not far. Especially emperor Wilhelm II was very fond of nationalistic and militaristic conceptions. The plan to build up the German navy was developed by and enforced under Tirpitz.

Around 1906, however, it became apparent that this very expensive project was a failure; Germany's strategy would not be able to force the British fleet into battles, as their greater range would allow them to avoid confrontations and outrun heavy yet slow and short-ranged German ships. While this misconception became more and more apparent, the diplomatic damage was done: Germany's aggressive policy had led to considerable damage to its foreign relations. In order to justify fleet building policies, Britain had been framed as an opponent and Germany was indeed rather isolated - which made those in favor of these aggressive politics even more convinced of the need to be an at least even military power. In 1906, the British Empire safeguarded its position as strongest naval power by putting into service a new type of battleship, the so-called dreadnought. The dreadnought gave Tirpitz' ambitions a huge setback. (compare Stürmer [48, 295]. Origi-



Figure 6: 'A peaceful Mood'

Tirpitz' ambitions a huge setback. (compare Stürmer [48, 295]. Origi-

nal quote: »Schwerlich aber wäre ohne Tirpitz aus diesem Traum Realität und dann, als England zum Spurt ansetzte und durch den Bau der "Dreadnoughts" seit 1908 die Deutschen überholte, aus der Realität ein strategischer Alptraum geworden.«) While it did not end the armament race between Germany and Britain, those envisioning Germany as one of the great colonial powers in the world used the Zeppelin as projection space for their military phantasies. The Zeppelin, it was assumed, could easily achieve what Tirpitz' fleet would most likely struggle to achieve: overcome the naval supremacy of Britain. »Germany's future flight technology would surpass that of England's sea fleet«. [9, 33] Once more, a title page of *Simplicissimus* (Figure 6), satirizes the scenario: the picture showing a zeppelin bombing a fleet is entitled "a peaceful mood" (original quote: »Friedensstimmung«)

The enthusiasm for the airship as a weapon was related to several sub-features of the technology:

First of all, the airship seemed unstoppable: as borders and other physical obstacles became meaningless in its presence, it seemed not to be bound to any of the „earthly“ activities: The advancing of an army or a fleet did not form prerequisites for airship operations. One aspect of this fact was particularly framed against Britain: it was envisioned that Britain would lose its insularity. (compare quotes from Zeppelin, to be found in Italiaander [25, 157]: »Dieser Empörung liegt nur die Furcht Englands zugrunde, daß die Zeppeline seine 'splendid isolation' zerstören könnten [...]« and Meyer [36, 49]: »Sie [Zeppeline, T.K.] werden eigens berufen sein, die strategischen Vor- und Nachteile der geographischen Lage der Länder zu verwischen [...]«) Thereby, one of the crucial strategic advantages of the empire and one of the main reasons for Germany's fleet policy seemed to simply vanish. In perspective of the English Channel, the border-crossing imagination of air travel became particularly important since its insularity had rendered Britain in a strategically superior position for centuries. Now, it seemed, this advantage would vanish, an outlook much hoped for by those seeing Germany in an adversary position to Britain. Again, a cartoon (Figure 7) from *Simplicissimus* depicts those ambitions nicely. It is titled »Zep-



Figure 7: 'Zeppelins Shadow'

pelin's Shadow« and shows the British king asleep while a zeppelin's shadow appears over Britain.

Second, aerial warfare and particularly bombardments were imagined as a miraculously precise and powerful weapon. As one would simply have to drop bombs on the enemy's head (or ship), it seemed like a force that could hardly, if at all, be combatted. Thus the British fleet could be fought without risk and while still in operation airships could fly over the British Channel and bomb cities.

This point led to the third argument: the ability to bomb enemy hinterlands would enable an airship fleet to carry combat operations far behind the frontlines. This would change war itself. The integration of civilians into battle through raids against infrastructure and supply facilities would change war forever - what would reach a climax in the infamous (nuclear) bombing raids against civilians during World War II was already envisioned.

Those fantasies become even clearer once one turns away from actual considerations and has a look into science fiction novels of the time that go even further: In his work »CAVETE!«, *Emil Sandt* [44] drew scenarios of German airships rendering dreadnoughts useless, forcing them to capitulate without even fighting. *Rudolf Martin*, in turn, envisioned a German empire reaching to Bagdad, facilitated by a huge airship fleet that revolutionizes transport and military in his book »*Berlin - Bagdad*«. [7, 36 f.] Particularly Sandt envisioned a tactic approach that shares quite some aspects with modern military doctrine: By precise attacks from the airship, enemy's ships would be hit at their tiny weak spot (the chimney leading right into their engine room), thus destroyed with the smallest damage to the crew and impossible to combat. In *Cavete!*, this leaves the British commander in helpless fury, a scenario that must have been tempting to anyone sharing the militaristic ardor of the time. [7, 36 f.]

6.1.2 *Critical voices and different hopes: Pacifists and socialists*

While nationalists praised the airship and dreamed of overpowering Britain and its navy to a point where its situatedness as an island would become irrelevant, others feared just that. Especially in politically left circles, namely the social democrat spectrum, serious doubts existed. The social democrats had only recently been able to establish themselves as a serious political power and were still very suspicious against the government and the societal establishment. As fierce critics of the German ambitions to run an arms race against Britain to challenge British naval supremacy, the conservative/nationalist vision of a huge airship fleet to devaluate the British fleet was more like a nightmare than a dream. Clausberg cites the social democrat newspaper '*Vorwärts*' with an urge to the working class not to care about 'bourgeois' airships and much rather be concerned about its own in-

terests - the airship's fate would be taken care for by militarists anyway. (original quote: »Das deutsche Proletariat hat wahrhaftig Grund genug, sich um seine Interessen, seine Rechte zu kümmern: der Luftmilitarismus wird schon dafür sorgen, das Zeppelins Erfindung nicht verloren geht!« [6, 131])

The resentment against imperialist plans came from two sides: first of all it was considered to simply pursue existing patterns of domination by the upper class and reconstitution of the existing class differences. Secondly, Zeppelin's airships were repeatedly suspected to be exploited for air-related militarism (»Luftmilitarismus«, [50, 63]), which was opposed by the political left. Social democratic newspapers, for example, react with reservations to the public appeals for the donations after the Echterdingen crash in 1908. Warneken [50, 64] cites a social democratic newspaper ('Vorwärts', August 7th, 1908) raising massive doubts about who would profit from airships. (original quote: »die nichtbesitzende Klasse« solle »kaltes Blut walten lassen und sich fragen: cui bono? Wem nützt die Zeppelinsche Erfindung?«). Another one ('Schwäbische Tagwacht', August 7th, 1908) is quoted by him [50, 77] stating its opinion that the Echterdingen crash was perceived as nothing but a missed step forward towards the possession of a new weapon system by many. (original quote: »[...] das in der Katastrophe von Echterdingen weiter nichts sieht, als eine verpaßte Gelegenheit, demnächst zur höheren Ehre Deutschlands fremden Völkern von oben her Dynamitpatronen an den Kopf zu werfen.«) 'Vorwärts' called the national donation initiative after the Echterdingen crash an example of „overzeal“ (original quote: »Übereifer«, Vorwärts“, 9th of August 1908 quoted by Warneken [50, 64]) that would be exploited by the government as a cheap way to build up a fleet of military airships.

The working class movement of the time shared a vision of the international working class to join hands in order to overcome class struggles and overthrow to existing governance structures. Quite in contrast to both the critical voices towards both airships in general as well as the conservative imaginations of how airships should be used, this hope fed to an own imagination of what Zeppelin's airships were to become. The airship was perceived as a tool to increase international transport and exchange, which would lead to peace and tolerance. Airships were thus among others described as a „step



Figure 8: 'To the party convention!'

towards socialism“ as they „teach the indefensibility of national borders“. (Original quote by Warneken [50, 66] from *‘Süddeutscher Postillon’*, Jg.1908, Nr. 18, S.145: »Der ‚Lenkbare‘ ist ein gewaltiger Schritt zum Sozialismus, mögens auch die Hurraschreier bis jetzt noch nicht begreifen. Er lehrt die Überflüssigkeit und zugleich die Unhaltbarkeit der Grenzen [...]«). The title page of the satirical magazine *‘Der Wahre Jacob’* (Figure 8) nicely depicts the phantasy of a peaceful use of the airship by workers (the picture makes reference to the social democrats’ party (Sozialdemokratische Partei Deutschlands (SPD)) national convention in September 1908 in Nuremberg where the group in the picture is supposedly travelling. Furthermore, there were naïve perceptions that pacifist politics would make an exploitation of airships as a weapon impossible before the technology itself would develop far enough to be used as an actual weapon. Instead, it would be used as a mere tool for international exchange (again quoted by Warneken [50, 68] this time from the newspaper *‘Münchner Post’*, 4th and 5th of August, 1909. Original quote: »Die Hoffnung braucht nicht aufgegeben zu werden, daß, noch ehe ein zuverlässiges Kriegsluftschiff in Aktion tritt, eine Vereinbarung unter den zivilisierten Völkern erfolgt, die es ihnen möglich macht, lieber den großen Aufgaben aufbauender Kultur nachzugehen, statt auf immer neue Werke der Zerstörung zu sinnen.«). Not only were hopes expressed that airships would not be used for war, more optimistic articles even claimed wars to be a thing of a past. From this postimperial perspective, the airship could be praised without the risk of supporting lasting militarism (original quote from *‘Schwäbische Tagwacht’* on August 8th, 1908 as quoted by Warneken [50, 77]: »[...] unbestreitbar bleibt, daß eine Erfindung, die es möglich macht, die Luft zu durchsegeln, undter allen Umständen (sic! B.J.W.) einen Kulturfortschritt darstellt, und wenn diese Errungenschaft im bürgerlichen Klassenstaat auch zunächst für den Militarismus reklamiert wird, so ändert dies nichts daran, daß in einer künftigen Gesellschaft das Luftschiff eben nur kulturellen Zwecken dienen wird. [...]«) Needless to say that those naïve expectations were not fulfilled. With two world wars and the invention of ‘total war’ coming up in the 20th century those hopes were to be proved wrong within ten years. Both Zeppelin airships in particular in World War I and flight in general particularly in World War II would lose their innocence sooner rather than later. The political left was thus far from being unanimous about airships and the appropriate attitude towards it. This partly reflects a phenomenon that is also known as ‘double loyalty’ [50, 79]: Social democrats of the time were often trapped inside a loyalty conflict - being both citizens of a national state and members of the working class movement fighting the dominant power structures at the same time, they stood at both sides of the fence sometimes. Especially the developing patriotism and national identifications stood in conflict with

an identification as a member of the working class movement that was keen to join hands internationally. Moreover, the politically left critique was constrained by the working class movement generally being very keen to accentuate their progressiveness. Progress was a shared value of the left movement. It was seen as the times turning towards a better human race - closely linked to the belief in international fraternization and the belief that an improved general education would discard settled societal structures and power relations. It was seen as a tool to overcome class struggles. This position was difficult to combine with the skepticism towards airships - which is one of the led, as will be shown, to its dismissal. After the Echterdingen crash, when a common ground to support Zeppelin was created by the framing of the campaign as a means to save progress for all mankind through German achievements, the newspaper *'Schwäbische Tagwacht'* made this difficulty apparent: almost sounding relieved, it remarked on 8th of August, 1908 Zeppelin had to be supported to bring progress to the people, as it was obvious that it would only be used for „cultural progress“. Finishing this remarked quoted above, it asked, when social democrats had *ever* stood in the way of progress? (original quote: » Wann hätte sich die Sozialdemokratie jemals einem Kulturfortschritt widersetzt?« , quoted in Warneken, [50, 72])

6.1.3 *The first Assembly-Process fails*

These two conceptions of the airship show how the interpretative flexibility of the airship was used differently. Also, the dates of the publications cited show a further aspect: even in 1908, the year of the Echterdingen crash, the discourse about what an airship actually was was still wide open. In other words, Zeppelin's attempts to establish his conception of the airship as a promising new high-tech weapon system in the public's mind had failed. After several years of trying, Zeppelin had still not managed to establish his invention: the efforts promoting his airships and creating an imaginary of the airship as a promising weapon had failed. As Zeising [53, 110] notes, the lack of success to establish the perception of zeppelins as a weapon system (especially with regards to efforts in 1903 and 1904) can be understood from two perspectives; The technology was not mature enough yet for people to actually believe in it as a military tool. Moreover, the political climate and the focus on fleet building did not call for a new weapon system until about 1908. It was still seen very critically by many – there was no 'assembled' imagination as to what the Zeppelin was or should be. Zeppelin engaged with the public through public relation efforts very early. The support he experienced after the Echterdingen crash did not come from nowhere but was an (unexpected) fruit of a constant effort to involve the public and create an attentive audience. Zeppelin gave many talks and presentation

about his airship. Addressing different audiences, this was one way for him to try to gather support of influential groups such as the club of German engineers (Verein Deutscher Ingenieure (VDI) [most likely 57]), the German colonial society (Deutsche Kolonialgesellschaft [55]) or military [56] or finally the entire German people [58].

Zeppelin had been very eager to involve the press into his campaign for his airships. Right from the start he included journalists into his efforts to promote his airship. For the maiden flight of LZ-1 in 1900, he invited Eugen Wolf, a journalist, to fly on board as one of very few passengers ([31, 109 f.] and [29, 76 ff.]). Wolf was picked for two reasons: first, he was well known for pieces he had written about trips to Africa. These journeys had made him friends with the governor of the German colonies in Africa, which Zeppelin hoped could be exploited to promote his airships as means of transport for the German colonies. Second, Wolf was a correspondent for the then very important Scherl publishing house. Scherl at the time owned and published »Die Woche«, one of the highest circulating magazines of the time in Germany as well as the daily printed »Der Tag« and others. At the time, Scherl was the leading publisher in Germany (original quote: »[...] beherrschte die 'Scherlsche Meinungsfabrik' den deutschsprachigen Markt mit einer Auflagenhöhe von über 4 Millionen« [53, 75]). As desired by Zeppelin, Wolf published an excited report of LZ-1's maiden flight in »Die Woche« in which he went as far as comparing Zeppelin's success to those of Christopher Columbus. [31, 110] In 1903, Zeppelin was able to engage German publisher August Scherl into a partnership. In turn for favorable placement in Scherl's publications, Zeppelin offered exclusive insights into his project and advertised them to Scherl as mutually beneficial (original quote: »Zur Durchführung meines Unternehmens [...] bedarf ich der Unterstützung durch eine weitverbreitete, in allen Schichten der Gesellschaft gelesene Zeitschrift. Keine andere würde dem Zweck so gut entsprechen wie "Der Tag".« and »[...] so werden sie [sic! J.Z.] auch zugeben müssen, dass es für ihr Blatt von großem Werth [sic! T.K.] wäre, den Werdegang eines solchen, die ganze Welt interessierenden [sic! J.Z.] Werkes in allen Stadien fördernd zu begleiten« both from a letter from Zeppelin to Scherl proposing a cooperation written on April 16th, 1903, quoted by Zeising [53, 77]). With Scherl's help he also initiated a first donation run, »An das deutsche Volk« in June 1903 [6, 166]. Zeppelin had ignored warnings not to launch the campaign during the summer holiday season and insisted on the timing. Later that year Zeppelin published an appeal to the public to 'save' airship development (original quote: »Notruf zur Rettung der Flugschiffahrt«, [6, 166]). Both appeals were not fruitful. The appeals were quite different to later emotional appeals. Very technical, they were of a pessimistic tone and did not try to appeal people in a positive, exciting way; »Readers of the appeal waded through confusing

technical descriptions, only to gather the impression that they were being asked to help an old man who was feeling sorry for himself, not a brilliant inventor who was sacrificing everything for the good of Germany.« [9, 26]

A third aspect of Zeppelins public relations efforts was the involvement of science fiction author Emil Sandt. This »German Jules Verne« [24, 79] was a popular author at the time. He used airships as a core technology in his novels [7] and was one of the leading figures in developing fantasies of aerial warfare. Especially popular in Germany, his 1906 novel »*Cavete!*« [44], mentioned above, explicates in a science-fiction context what many imagined the airship to be: in the novel a superior airship in possession of the German emperor renders the British fleet, even their proudest battleships, use- and helpless (The title in Latin, meaning »Be Careful!« in relation to the story line is also a nice hint on the political implications of the book). No one less than Zeppelin wrote the foreword of this novel. He writes the imaginary contents of the novel were so much alike his own conceptions he might have written it himself (original quote: »CAVETE! - Der Warnruf an das deutsche Volk ist mir so sehr aus der Seele geschrieben, daß manche mich durch den Glauben überschätzen könnten, 'Emil Sandt' sei mein Pseudonym« summarized and cited by Clausberg [7, 35]). During his cruise over Switzerland in 1908, Zeppelin, in turn, offered Sandt a seat in his airship. Sandt was thus turned into a hybrid between glowing fan and ambassador of the technology. In a 1908 anthology, Sandt praises airshipmen as contemporary heroes and especially Germans as leading in this pursuit to »elevate mankind« (original quote: »Hebung der Kultur« [24]).

These 'rehearsals' in these interactions with the various different audiences as representation of different publics had had different success: while his speeches were received differently, depending on the audience and time, his appearance in newspapers was rather as an oddity people followed curiously yet with little hope for actual success. While Sandt as a popular author at the time did as shown above, not everyone shared his bellicose phantasies. As a result, the discourse about airships was not yet closed, not even very stable. In sum, the exemplary voices about the zeppelin show that the perception of it were still very fragmented; while some aspired it and wished it to become a common and technically mature artifact, others remained skeptic and were not quite as convinced – Zeppelin so far had not managed to introduce one common and stable perception of the zeppelin.

As it can be seen, none of the STIs described here, nor an entirely different one had become predominant. As this was not the case, a reflection of this stabilization process on the social structure of beforehand fragmented social groups is not observed either. Stabilization

had not occurred, neither had closure. The STIs mentioned above were still fighting over the 'right' interpretation of the zeppelin.

6.2 THE STABILIZATION OF ONE SHARED VISION OF THE ZEPPELIN

As a second section in my analysis, I will now have a look at what happened to the perception of zeppelins: obviously, the perception of them underwent changes from the diffuse interpretations accounted for above. To do so, several steps will be taken: in a first one, I want to show the constraints under which Zeppelin acted, as those certainly influenced the process significantly. Second, I want to give a relatively short description of *what* it was that happened to the perception of the zeppelin before turning to the question *how* it happened. For this question, I am then going to give insights into two other imaginaries that built in Germany at the time: the perception of aviation in general as well as the German peoples' sense of self as a nation. During my research I found those two imaginaries having been crucial for the Germans' zeitgeist at the time and thus an important societal factor of influence. In the third section, I am then going to tie all of what has become apparent together into a concluding attempt to comprehensively answer my research question.

6.2.1 *Zeppelin's struggle for - and need of- stabilization*

Zeppelin's concept for an airship was developed during a span of 25 years prior to the maiden flight of LZ-1. Even after this important date, its breakthrough after the Echterdingen crash in 1908 took another 8 years and nearly failed. This long period of lacking appreciation and commercial success was very hard on Zeppelin for multiple reasons. Zeppelin's reputation was highly at stake. He was eager to retaliate upon the Prussian administration for dismissing him and to restore his honor - a very personal matter. [49, 799] The skepticism is largely grounded in the time: Zeppelin having become a central figure of aviation does not mean he was the only one trying. Literally hundreds of technological pioneers did just as he did - but failed. As such, failure was the obvious thing to expect; »[...] as it stood in 1900, the Zeppelin project was but the next stage in the evolution of the dirigible. Hundreds of engineers, scientists, and enthusiasts had discussed, patented and even built lighter-than-air machines, yet they all had failed to turn the airship into a practical flying system. Count Zeppelin was merely joining a crowd.« [9, 24] Zeppelin's fear of being seen as just another joke becomes obvious when one observes his struggles for his invention to be seen as an important innovation, not just a project. The term »project« was associated with desperate attempts that were mostly doomed to fail. (for a historic take on the

term »Projekt« and its use see Reder [41]. As Markus Krajewski put it »success makes a project a product. It is promoted to be a shining achievement. Failure is what will be continued to be called a project.« (Original quote: »Was kurz davor noch Projekt heißt, wird durch das Gelingen zum Produkt, zur glänzenden Leistung, zur gelobten Erfindung, zum funktionierenden Geschäft promoviert. Allein, was scheitert muss weiterhin "Projekt" heißen«. [33, 23]). Also, projectors, those pursuing projects, were seen with great skepticism as most 'projects' were unrealistic and those looking for support more swaggers than innovators. (Original quote: »[...] Nicht anders erklärt sich die negative Konnotation der Projektmacher, die „insgemein Betrüger sind“. Ihre Erwähnung erfolgt spätestens ab der zweiten Hälfte des 18. Jahrhunderts „meist im abschätzigen Sinn“, der ihnen im Verlauf der Geschichte wie selbstverständlich beigegeben ist.« [33, 13]) In a letter asking for support from the Daimler corporation in 1891, Zeppelin refers to his »Projekt« as one that should be excluded from the usual skepticism towards, as Zeppelin himself called it, »airship-related projecting« (referring also to other inventors such as Schütte-Lanz or Parseval or the 'crowd' De Syon mentioned Zeppelin to be running with original quote: »dem allgemeinen abfälligen Urteil über die Luftschiffprojektmacherei« [11, 109 f.]). In another letter from the same year addressed to the king of Württemberg, he refers to his invention (»Erfindung«) without, however, differentiating it clearly from the term project. [11, 112] This might indicate that the notion's use was a bit different than originally described by Reder [41]. Yet even Eckener goes as far as to speak of him as a »foolish inventor« (original quote: »Närrischer Erfinder« [11, 103]) in reference to his perception by the public. Zeppelin must indeed have been subject of fierce sarcasm as Eckener goes on to tell (original quote: »Es war die Zeit, wo der Graf als kompletter Narr verschrieen wurde und wo man in Stuttgart höhnisch mit den Fingern auf ihn wies.« [11, 134]). These struggles not to be dismissed as a projector show how much was at stake for Zeppelin - he ran serious risks of being dishonored completely and needed to succeed badly. They also help to understand why the Prussian administration was so skeptical about his plans. While generally staging himself as victim of bullying by the Prussian administration because of their antipathies against him and building an image as a martyr for the Germany's good, Zeppelin even expressed understanding for the rejecting attitudes of officials related to the funding sometimes: he acknowledges that in their position as to ensure the responsible distribution of funds they had to avoid risks and are not to give funding to projects that are too risky as he understands and acknowledges to the frugal attitude public administrations are to act with [11, 131]. This is why he had to rely on other sources of funding, as he states at the same time.

Apart from his eagerness to restore the reputation that that had led him to risk being judged not only as failed military officer but as a complete fool he had to react to much simpler needs: by the time of the Echterdingen crash, Zeppelin's economic situation had become critical. Having invested huge sums into his pursuits over the years and even put a mortgage on his wife's estates, he was in bitter need of success for simple economic reasons. The military, as has been shown above, remained skeptical. Moreover, a joint venture that had been initiated to ensure support for Zeppelin through major corporations like Krupp, the German Lloyd and others had failed in February of 1908 [47, 43]. So while there were not many successes to be accounted for, the range of opportunities to raise funds became smaller – thereby the need for the general public to support Zeppelin's project increase by him running out of options. The need for something other than public or industry funds had led him to many of the measures he had taken before. The media-relations built up by Zeppelin (see above) are a great example for that. The longer the stabilization of the airship took, the stronger he started to use a secondary strategy in advertising his invention. To call this a strategy may be a long shot. An answer to the question of whether Zeppelin did in fact intend this, as I imply, can most likely be found in his journals, yet it can not be answered here as those journals are, as already mentioned, inaccessible. Colsmann, however, supports this hypothesis in his memoirs. Writing about considerations what to do after the donation of 1908 he describes Zeppelin as favoring military use of his technology (original quote: »Selbstverständlich standen für Zeppelin militärische Aufgaben der Luftschiffe im Vordergrund des Interesses« [8, 26]). This remark, referring to the time *after* the national donation, is one strong indicator that Zeppelin never let go of his original conception of the zeppelin to primarily be a weapon. While having focused his promotion attempts on other features, he obviously never let go of the imagination of providing his fatherland with a revolutionary arms system. Furthermore the proficient handling of his public relations lets it appear as very likely that this was not coincidental but orchestrated on purpose. Zeising [53, 127] speaks of »versed« handling of the press by Zeppelin (original quote: »[...] Zeppelins versierten Umgang mit den Medien [...]«) when analyzing the different actors involved into the marketing for Zeppelin.

Zeppelin started to do something that I would like to call a second wave of rehearsals in order to finally achieve an assembled imaginary. Pinch and Bijker, in turn, pragmatically call it »advertising« [40, 427] In these rehearsals, he framed his airships not with a particular purpose for which they were an apt tool, but remained more vague about possible applications. Actively seeking for support, he turned to more and more different audiences. Over time, he opened the discourse about his airship up. By staying vague about its purpose and

reframing this discourse, he was able to start over and achieve greater affection by different groups. Interestingly, he ran this “backup strategy” parallel to his focus of advertising his technology as a future weapon. There is no clear break to be seen - rather a fading from a positioning as a military instrument towards an open framing of the airship as a progressive instrument to subdue nature. Zeppelin had very early started to diversify his depiction of the future uses of his technology. In a speech given in Stuttgart in 1895 [57], he already advertised his airship as a multi-purpose instrument. Although title, venue and audience are not known, his addressing of the royal war ministry and the speech having been given in Stuttgart gives reason to assume he pitched his project to the king of Württemberg at the occasion. As it is known that the king of Württemberg supported a talk of him in front of the VDI that year, it is to be assumed this was the main audience. While stressing his primary vision of building a weapon by citing studies in his favor on this issue (original quote: »[...] das Gutachten der Kommission glaubt in diesem Falle an die tatsächliche [sic! T.K.] Verwendbarkeit meiner Erfindung für Kriegszwecke« [57, 2]). However as he was already assuming to be rejected he provided a number of other purposes his invention could be put to use for (original quote: »Sollte dem königlichen Kriegsministerium auch jetzt nicht der für das Heer allein anzunehmenden Nutzen noch nicht groß genug erscheinen [...] wegen der auf anderen Gebieten zu gewinnenden Vorteile dennoch erwarten« [57, 2 f.]). Explicitly, he mentioned:

- The fleet, for which airships were to serve in multiple functions
- Seafaring by being able to fly rescue missions and conduct mapping tasks
- Colonialism by providing fast long distance transportation over unexplored terrain
- Geography, especially by providing transportation to the center of Africa and the north pole
- Meteorology
- Worldwide mail services - again by providing very fast and direct ways of transportation

[all above from 57, 3 and 4] This early adoption to a broader set of possible interest is already very interesting. It shows nicely how Zeppelin was ready to abandon his own conceptions of the technology in order to open the concept up to different interpretations and imaginations of its benefits. Without addressing specific audiences, this can be seen as very clever as it is opening up an entirely new path: it takes away the need to fully convince enthusiasts of its use as a weapon. As Zeppelin mention explicitly the mere fact of the airship to being able

to fly relatively fast opened up a vast field of potential uses. This way his audience did not have to be convinced of the airship's quality as a weapon (which were actually disproven in World War 1 between 1914 and 1917, when Zeppelin's airships were dismissed from military service for their lack of effectiveness) or of liking the inherently militaristic character of weapons in order to support the project of developing the technology. This strategy gained more and more importance. Over the time, it seems the longer a stabilizations was not taking place, Zeppelin increased putting emphasis on other potential purposes. There is not a single event turning things around, much more it was a smooth transition from a military technology towards a more open concept. With the progress of time, Zeppelin's strategy of opening up became even more sophisticated. At first, Zeppelin offered, as referred to above, alternative means of using airships if not for aerial warfare. Over time, he almost entirely abandoned that way of speaking about his technology. More and more, Zeppelin moved away from associating his airships with a given application at all. Instead, a different leitmotif was created: the conquest of air is used - a much more open notion.

It is also worthwhile noting that this 'opening' is also a turning back to a more fundamental interpretation of the technology. As mentioned in chapter 6.1, 'progress' was a notion that was widely agreed on. So do the two fictional characters in the 'The Dirigible' poem (Figure 5). Turning away from specific expectations towards the technology enabled the technology to become accepted by many: it left more room to the individual imaginations of different actors. This opened up an entire new potential audience: it was a huge step towards embracing antimilitaristic sources of influence. Potential supporters that despised militaristic and imperialistic ambitions were given a reason to support the technology. The consequences of this adjustment become apparent when Zeppelin, this time at the German colonial society in Berlin (and just after the disassembly of his first prototype LZ-1) stepped back from these aggressive tones and instead referred to the entire mankind as the beneficiary of his invention (original quote: »[...] aber die Menschheit wird doch durch einen anderen Erlangen, was ich ihr bieten wollte.« [55, 10]). While still mentioning the airship's potential as a weapon, Zeppelin focused on the airship as a means of transport and stressed the multitude of purposes the airship could be used for (original quote: »Wie mannigfaltig sind die mit solchen Fahrzeugen zu lösenden Aufgaben [...]« [55, 14]). He tried to find a balance between patriotic and empathic language, mentioning the airship would be beneficial for science in general while still articulating his urge to supply his fatherland with the technology to its individual benefit (original quote:»[...] dem deutschen Vaterlande und der Wissenschaft im allgemeinen [...]« [55, 15]). This process of opening started early and proceeded gradually

until in the end Zeppelin did not even mention particular applications anymore. Applications were referred to very vaguely. Instead, the ability to fly, the 'conquest of the air' became the central theme of his argumentation. Even when vaguely referring to military purposes he added that those served to conserve peace. (original quote: »Mit froher Zuversicht darf das deutsche Volk demnach annehmen, daß es sich mit seiner hochherzigen Spende einen gangbaren Weg zur wahrhaftigen Eroberung des Luftmeeres aufgetan hat, daß es bald im Besitz von Luftschiffen sein wird, die zur Erhöhung der Wehrkraft und damit zur Erhaltung des Friedens beitragen und in mancherlei Weise dem Verkehr, der Erderforschung und allerlei Aufgaben der Kultur dienen« [59])

This behavior can be interpreted as a move towards what SCOT calls »redefinition of problem« [40, 427]: withdrawing from an interpretation that was too specific to be agreed upon by a sufficient number of people, Zeppelin turned towards a different facet of his invention. By promoting (or, again, as Pinch and Bijker would have said advertising) it not as a machine bound to a specific purpose, but as a means to achieve 'progress'. To develop an own interpretation of what progress looked like was thus left to the eye of the beholder. However, progress was something that (almost) anyone could agree upon as a goal worth while pursuing. And while the conflict that had prevented agreement before was not settled, it was »seen« [40, 427] as having disappeared.

6.2.2 *The tide turns – a wave of support and popularity in 1908*

In the process of stabilization that leaned onto this rephrasing, the year 1908, then, became a crucial time. It would eventually be seen as the breakthrough year for the zeppelin, though stabilization of a zeppelin-STI would still take until 1909 to occur. Having built his 4th prototype, Zeppelin was optimistic that the military would finally purchase two of his ships and reimburse him for his expenses thus far. After the tests with LZ-3, the military had eventually agreed to invest into Zeppelin's project and support him. Prerequisite for the purchase of LZ-3 and LZ-4 was, however, for one of the two ships to prove that it could travel 24 hours non-stop. Pleased with the first ascents of his new ship LZ-4, Zeppelin decided to go on a pre-test ride over Switzerland before the 24-hour-endurance test. This cruise was a first step towards the zeppelin's triumph. The unexpected appearance over Switzerland was subject to extensive reporting in newspapers. Moreover, international tourists spread the word not only in Switzerland but called for international attention. The unforeseen success – and especially the attention it caused internationally – caught the Germans' attention. Consequently, the entire country was expecting the endurance test curiously. While there were still quite some critical

voices, the zeppelin was taken seriously in terms of the potential it had unfolded over Switzerland. Criticism related to the potential and the opportunities that came along with the technology, which was already quite a contrast to the ridiculing comments that had not taken Zeppelin seriously.

When LZ-4 burnt to ashes near Echterdingen, the »epiphany« [6, 47] of the German people took its course. As already mentioned, the catastrophe transformed into a moment of triumph – the German people united through the donation to Zeppelin's benefit. As excited the crowds were to see the zeppelin, as devastated were they when they learned about LZ-4's accident. The Echterdingen crash was perceived not as an accident but a national tragedy. Strange enough for this to happen, people went even further in identifying with Zeppelin and his invention and financed his further activities by the spectacular Volksspende.

In the following months, the different perceptions of the zeppelin consolidated into great appreciation for it. Zeppelin undertook trips through the entire German Reich and was saluted by excited masses wherever he would travel. [42, 44 f.] Reinicke explores how Zeppelin used various long flights after the national donation to contribute to the excitement for his ships and talks about »the politics of the long trips« (original quote: »Die Politik der großen Fahrten«, [42, 43 ff.]). Those culminated in a trip to Berlin that can be interpreted as the last step missing for acceptance truly everywhere in the country. Even in Berlin, capital of Prussia and thus far away from his home turf (as for intra-German frictions, see the example of Wilhelm's quotes about Zeppelin in chapter 2), he was celebrated. Reinicke [42, 50] quotes a Berlin newspaper on Zeppelin's visit to Berlin (in one of his ships) on August 29th and 30th, 1909; »[...] huge crowds are standing in front of the hotel 'Kaiserhof' [...]. Again and again, Zeppelin has to show himself on the balcony. The excitement equals that of a national event.« (original quote: »Gewaltige Menschenmassen stehen vor dem Hotel "Kaiserhof" [...] Immer wieder muss sich Graf Zeppelin auf dem Balkon zeigen. Die Aufregung ist wie bei einem großen nationalen Ereignis.«) Reinicke also quotes Zeppelin Eckener stating this trip to be the final manifestation of the Zeppelin appreciation (original quote: »Mit dieser Fahrt [...] war der Ruhm des Zeppelinschiffs, [...] fest begründet.« Reinicke [42, 52] quotes this as to stem from Eckener (according to Reinicke [11, 232]. I was not able to find this quote in the original book as this one has only 183 pages. However, there are other similar accounts of Eckener, yet not fitting as perfectly. Thus I assume it to be a mistaken quote by Reinicke)). And while accidents remained common in the following years, these were not able to destroy the fascination and support for the zeppelin any more. [11, 170 ff.]

This moment can be interpreted as closure. Together with the fact that the military now accepted the technology and included it into the armed forces, the appreciation by the population of Berlin and the monarchy were a somewhat final step. When even in Berlin, the capital of the ever so critical Prussia, he was received with nothing but excitement, one can state the support for Zeppelin had become a predominant sentiment. The zeppelin was perceived as a national artifact and its first appearance over the nation's capital celebrated as a major event. While the previous argumentation has already pointed towards elements of stabilization processes as described by SCOT, it is now to be examined in more depth *how* this stabilization occurred exactly.

6.3 UNDERSTANDING THE FAST CHANGE IN THE ZEPPELIN PERCEPTION

Step three in the analysis is now searching for the reasons of this change in the perception of the zeppelin. While the Echterdingen crash was apparently the tipping point for the change in the perception of it, the reasons obviously lie deeper. As mentioned before, the sudden emergence of appreciation for it after the cruises over Switzerland and the 24-hour-test was all but self-evident.

6.3.1 *The Conquest of Air as unifying Momentum*

As mentioned in section 6.2.1, Zeppelin had changed the subject of the discourse about his invention. Over the time, the term 'conquest of the air' became a common expression for what it was that should be achieved by airships and planes. Once Zeppelin recognized the potential public support after the crash, he advertised a 'national donation'. In an appeal for support [58], Zeppelin spoke only about the »conquest of the air« (original quote: »Eroberung des Luftmeeres«). His personal vision of a weapon is mentioned only in passive form when he claims the airship capable of securing peace by improving military defense. In turn, by emphasizing the meaning of his technology as a vehicle and especially as a »tool for cultural tasks« (original quote: »Dass es [das deutsche Volk, Anm. T.K.] bald im Besitz von Luftschiffen sein wird, die zur Erhöhung der Wehrkraft und damit zur Erhaltung des Friedens beitragen. Und in mancherlei Weise dem Verkehr, der Erderforschung und mancherlei Aufgaben der Kulturen dienen.« [58, 00:40]).

This notion, sounding odd in its English translation, has distinct meaning in this discourse. In its original German phrasing it comes very close to common formulations of the time in the left spectrum that depicted human flight, the conquest of air or airships in particular as a „cultural progress“ (original quote: »Kulturfortschritt«, com-

pare Warneken [50] as well as Sandt, quoted above). Also, I want to point to the poem 'The Dirigible' (Figure 5) again: although not even concerned with the issue, the positive character of progress is not questioned by either of the positions. It is the question of what the apparent progress is to be used for that causes friction between the two protagonists. Moving back from his personal opinion towards a position that was broadly shared was a clever move by Zeppelin. It has at least to be suspected that this opening of the discourse has been pursued by Zeppelin consciously: the 24-hour test he had attempted to had formally failed. Thus, after the crash at Echterdingen, Zeppelin and his project once again faced ruin. In other words he needed any support he could get. As the acknowledgement for his achievements and the formal recognition of the 24 hour test being successful despite the crash [11, 164] came only some time later (and most likely mainly under the pressure of the public mood), Zeppelin must have felt like running out of options after the crash.

»At Echterdingen, the trajectory of government commissions, military evaluations, and preliminary funding had finally come to an end. AS he inspected the wreckage, there was no reason for the seventy-year-old Graf [Zeppelin, T.K.] to expect to continue his life's work.« [16, 14]

Desperation, however, lasted only a very short timespan: within hours of the Echterdingen crash, it became apparent that Zeppelin's flight along the Rhine had deeply touched people. Within short time, people started donating money. While the accounts about the actual start of the donation vary, its extent is beyond dispute. Within 24 hours after the crash, the financial losses due to the loss of LZ-4 were overcompensated. When Zeppelin returned to Friedrichshafen after the crash, his assistant Eckener welcomed him with congratulations. When Zeppelin reacted surprised, Eckener informed him that the beginning donations had already reached hundreds of thousands of Marks (original quote: »Ich begrüßte den Grafen [...] mit den Worten: "Ich gratuliere, Exzellenz!" Er schaute mich verdutzt an; als ich ihm dann aber sagte, daß bereits während der Nacht mehrere Hunderttausend Mark als Spende für einen Neubau eingegangen seien [...] « [12, 24 f.]) The public attention Zeppelin had tried to attract for years was there at once. The press covered the event abundantly. The crash was not referred to as a failure, but as a national tragedy. Zeppelin was very aware of the opportunity he faced. Having tried to create a compassionate mood for his invention in the public before, he knew about the potential this situation brought along. Likewise, he knew about the challenges that were still to face. In an address to the general public released as a gramophone recording (that was made available to the general public by printing it in newspapers [53, 129 f.]), Zeppelin did something that can only be called smart in retrospect. Although the survival of his company and even a considerable strengthening

of it were already apparent, Zeppelin asked for further contribution. In turn, he endowed the technology to the people. Explicitly, he mentions the meaning of the public contributions for his success and the continuation of his project as well as the prosperity the German nation achieved through it - and thereby through its own will for action. Thereby, he made his project everyone's. As his technology had just proven reliable and imaginations about the great future of the airship reached a climax, this gift was greatly appreciated.

Here, we can observe how - contrary to what is proposed as the common way by SCOT [2, 283] - a new STI emerged. The prospect of producing and owning a precious and potentially powerful technological artifact as a nation fired people's imagination. All of a sudden, their new, commonly shared imaginary of a German zeppelin to bring 'progress' into the world made them all one giant relevant social group. Instead of being separated by social status or political affiliations, people literally stood side-by-side chanting »Deutschland, Deutschland über alles [...]«. That way, the zeppelin had become a means of unification for the German people that all of a sudden developed strong nationalist sentiments. The notion that STI »encode and reinforce particular conceptions of what a nation stands for« [27, 120] could not be more fitting. In this moment, 'Germany' stood for a strong community that was capable of pulling together and making unique achievements.

Zeppelin aptly used the damaged self-confidence of the young empire: Equipping the German masses with the feeling of holding a worldwide admired technology in their hands and repeatedly praising the great achievement of their united efforts, he created a mood that was precisely what people desired - the torn national pride of those days was a fertile soil for the seed Zeppelin planted. While the monetary difficulties Zeppelin had faced had already been history, this step of symbolically handing back the feeling of 'owning' the technology created a protective impulse. This protection through the public proved very valuable: While the general public was in plain excitement about Zeppelin's airships all of a sudden, the mood in the Berlin government circles had not turned just as quickly. Especially the military was all but convinced and had its own interpretation of what had been shown by the events: »The zeppelin's intended military purchasers, whose main condition, an uninterrupted twenty-four-hour flight, had not been met, agreed that the disaster revealed the rigid airship's inability to adverse weather.« [16, 15]

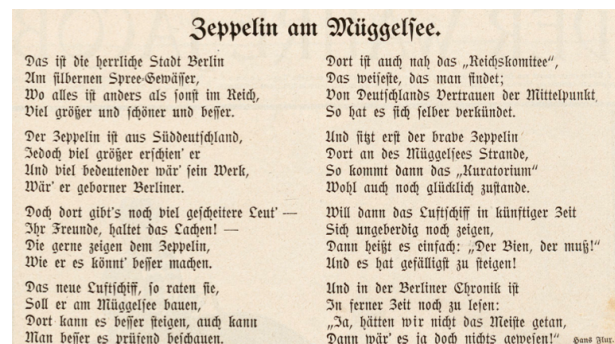


Figure 9: Poem: 'Zeppelin at Müggelsee'

Only when it became apparent that the zeppelin craze was not a flash-in-the-pan, the Prussian government ceased its resistance against Zeppelin - yet more for inner-political reasons than out of conviction. As the excitement for Zeppelin could not be contained, other ways of treating it had to be found. Hence, the government finally came to the conclusion to accept Zeppelin's attempt as successful and release the funds he had been promised in case of a successful flight of 24 hours. Also, the military bought LZ-3 and ordered a further airship, LZ-5. Having demonstrated good will towards Zeppelin, the government then tried to re-gain control over the situation. The government had tried to get hold of the »Volksspende« by trying to control the use of funds. The Prussian crown prince proposed the installation of a board that was to be called 'Reichskomitee' to oversee the use of the immense funds. The so-called 'national donation' for Zeppelin had raised over 6 million marks that were now in the lone possession of Zeppelin. It was thus proposed that a board should oversee the spending of those funds in the best possible way. Zeppelin was able to fight this motion off. An important role was played by the public - an uproar went through the empire; »News of the crown prince's Reichskomitee [...] loosed a storm of indignant criticism throughout Germany that revealed a defiant, unexpectedly republican opposition. [...] What was so „beautiful, glorious“ about the Volksspende, the correspondent asserted, was that rich and poor gave money „without being asked“. In their spontaneous gesture, the German people had shown „confidence in their own power.« [16, 33 - the parenthesis mark citations from the liberal newspapers Bremen Nachrichten by Fritzsche] Zeppelin's capability to use this to his favor [11, 163] interfered with the Prussian ambitions and left Zeppelin and his authority over the funds independent. So when the emperor and the Prussian government (Eckener speaks of »Berliner Kreise«, »Berlin circles« in opposition to »manche Kreise Süddeutschlands«, »certain circles in southern Germany« [11, 163]) failed to make the Zeppelin craze an element of their influence, they at least took the lead to profit from acting in favor of the popular mood. It was perceived as if now that the people had saved the airship project, the Prussian government wanted to take over control - which was seen as an offense. The poem »Zeppelin am Müggelsee« (Figure 9, Müggelsee is a lake in Berlin where, as this poem jokingly claims, Zeppelin should move his operations to, another reference to frictions between Prussia and southern Germany), published in 'Der Wahre Jacob' satirizes the Prussian administration's behavior; claiming how the Berlin 'committee' wants to move the zeppelin production to Berlin in order to being able to observe it better and to apply their "wisdom" to it. The author concludes by predicting the history books would once state without the crucial Prussian support, the zeppelin would never have come into being.

This episode, in turn, emphasizes the reciprocity of influence between 'technical' and 'social', how »technology is socially shaped and society is technically shaped« [2, 288]: The unity the zeppelin had caused in the first place would now, in turn be of help for it. When the Prussian government tried to pocket the control and sovereignty over the zeppelin, the social structure it had created and regarded it has its own protected Zeppelin to lose his invention to 'the Prussians'.

6.3.2 *Meanwhile in Germany: two different imaginaries in the making*

The success of his discourse-opening strategy had a very vitalizing effect on Zeppelin's endeavor. It enabled Zeppelin to benefit from two other assemblage processes that had been running parallel to his efforts of establishing his airship - and would then become stepping stones for the zeppelin's success.

The first one was about aviation in general: aviation, meaning all kinds of human flight, was the technological frontier at the turn of the century. Considered an old dream of mankind, first successful attempts to beat gravity triggered great efforts to make it repeat- and controllable. Balloons were the first technology enabling flight (at least in the European context of the late 18th/early 19th century.) Only decades after the Montgolfier brothers' first ascents were first heavier-than-air attempts successful. At the turn of the 20th century, heavier than air flying machines, then called aeroplanes, were just at the point of becoming reliable apparatuses. Nevertheless, those machines were still just gliders. The first powered flight was (so the common narrative) not achieved until 1903 when the Wright brothers flew first at Kitty Hawk, North Carolina. Flight, thus was the greatest challenge to be solved by technology in the near future of the time. There were, however, ups and downs in the perception of this challenge. By the turn of the century it was already considered feasible - which did not mean it could be achieved *easily*. The struggle to actually do it cost a lot of the initial public attention in the first years of the 20th century: »All across the continent, the initial flicker of public interest in flight had given way to disappointment and boredom. Figures acknowledged today as major pioneers, such as Otto Lilienthal and Clément Ader, were at the time mostly known for their failures, and their work attracted but a few thousand believers.« [9, 25] Zeppelin's attempts to raise funds through a public donation and a lottery fell in 1903 right into the time of this public fatigue - in this context it is better explicable why it went so poorly. It was after 1903 that the public interest in flight began to grow again: the Wright brothers had achieved a milestone in controlled powered flight and nourished dreams of human flight. In the following years, aeroplanes became more and more powerful and reliable. Soon, the Wrights were competed by several European pioneers who were able to build powered

flyers themselves. The success stories in relation to those flyers stimulated the perception of flight and led to a revitalization of peoples' fascination for the subject. After 1903, the technologies of heavier-than-air flight soon became sophisticated enough to work with some reliability. Thus, flight did not vanish anymore and became a constant phenomenon that evolved and produced news and records more or less constantly, thereby ensuring the public's curiosity remained active.

A second perception that had been in motion was the self-understanding of Germany as a nation. After its unification in the German Reich in 1871, in the late 1890s Germany began to fancy a „place in the sun“ [16, 35], meaning it developed ambitions to become a colonial power. Yet these ambitions brought along great trouble. The developments in this context were able to shake the German national unity (as far as it existed in the first place) hard. Germany had begun to build up of a fleet that was meant to being able to at least challenge the British. This project, which had been pursued at huge costs turned out to be doomed to fail in the first decade of the 20th century. Thus German ambitions had to be adjusted to far less ambitious goals while still costing enormous amounts of money. Meanwhile, foreign policies had gotten a mess for the sake of this armament: In order to justify the fleet build-up, German politicians increasingly depicted the British as an opponent that one would have to face in war. This rhetoric, primarily intended to summon support by German citizens, damaged the formerly good relations to Britain (Emperor Wilhelm II. was a grandchild of Queen Victoria). When Russia and France resisted German advances after the change for the worse in German-British relations, it appeared as if enemies surrounded Germany. Moreover, apparently the enemies would even unite: King Edward of England was received in Paris friendlier than any English potentate before him, which qualified as a worrisome act for many Germans and the political climate became chilly. As de Syon puts it nicely: »This resounding slap in the face came in response to Germany's ongoing naval armament program, which threatened Britain's dominance of the seas. Old uniforms were dusted off, and while sabers were not yet being rattled, they were being polished - and the count [Zeppelin, T.K.] was intent to forging an entirely new one.« [9, 31] Finally Emperor Wilhelm II managed to make things even worse than they already were in October of 1908. Having unwillingly provoked France already during the Moroccan Crisis in 1906, he stumbled into what has been known as the Daily-Telegraph-Affair: in an interview that was published in the English newspaper Daily Telegraph, Wilhelm managed to upset virtually anyone. Claiming he belonged to a minority of anglophiles in Germany both managed to stoke British fear of the German armament campaign and to fall into his own government's back that had campaigned rather anti-British

as mentioned above. Further, about his positions and influences during the Boer War were both able to further estrange France and Russia and be taken as presumptuousness by the British. The consequences of the public uproar reached as far as demanding the emperor's resignation and the von Bülow government stepping down.

To sum it up, in 1908 Germany pretty much faced the disenchantment of its imperial phantasies - the prior rather stable imaginary of Germany as an imperial power had gotten severe cracks. And to top it all, it gave the impression to the inside as to the outside that its leaders were incompetent and inconsiderate.

The combination was hard on Germans' patriotism and self-esteem. One might go as far as to state that the national unity of Germany that had developed since the foundation of the German empire in 1871 was on a way of de-stabilizing itself again. Eckener's judgement comes to a similar evaluation without even considering the Daily-Telegraph-Affair. In his opinion events before 1908, particularly the Moroccan crisis had already been enough to devastate the German people. Trying to contextualizing the zeppelin enthusiasm and appreciating it, he does acknowledge that in order for people to get swept away like the Germans did in 1908 the situation has to be unbearable (original quote: » Aber von solchen begeisterten Ideen und Stimmungen werden die Völker immer nur dann fortgerissen, wenn die Zustände unhaltbar und unerträglich geworden sind. [...] das deutsche Volk fühlte sich [...] in seiner Existenz bedroht. Da wurde ihm des Zeppelin-Schiff [...] zu einer Art Symbol der nationalen Einheit und der deutschen Leistungsfähigkeit, die ein moralisches Recht auf einen "Platz in der Sonne" zu begründen schien.« [12, 26])

Tying into Zeising's comment about the time not having been right before [53, 110, cited above], these two developments show exactly how the change in strategy in combination with the course of history paid out for Zeppelin. While just a couple of years before neither had aerial transportation seemed imaginable nor was Germany in need of a new military technology, all of a sudden both came true. Thereby, Zeppelin's sudden success in the summer of 1908 hit the zeitgeist precisely. In the meantime, a problem for which the zeppelin seemed to fit had opened up by the setbacks of Tirpitz' naval efforts and the insensitive foreign policies.

Figure 10 shows an attempt to visualize this development. Inspired by a visualization by Felt [14, Figure1, 19], it attempts to connect the entanglements of those three imaginaries – the two just mentioned and the one of the zeppelin with a temporal dimension. In that study, Felt concludes that

»First, observing the debates, it seems that [...] experiences have merged into a shared sociotechnical imaginary, allowing participants to imagine a role for themselves [...] Second, the analysis shows that it would be wrong to as-

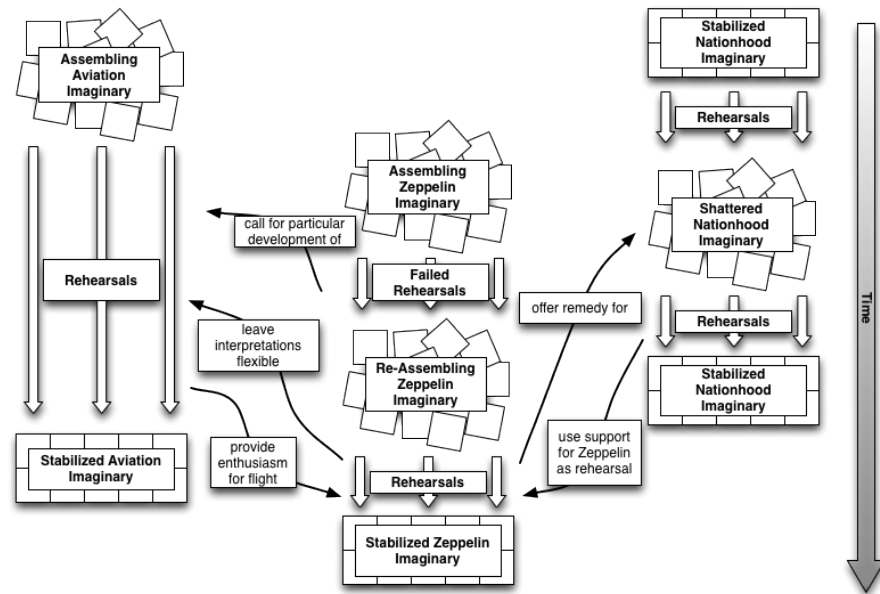


Figure 10: Intertwined assembly processes

sume that these two technological experiences were used to simply directly parallel them with [a third one, T.K] [...] Third, it shows how deeply pre-existing sociotechnical imaginaries matter when new technologies enter a national territory. Such shared imaginaries manage to create a feeling of collectivity – a “we”-experience – with a shared technopolitical history and common reference frames needing no further explanation. And even if it is questioned and counter arguments are put forward, it remains astonishing robust.« [14, 10 ff.]

All of these three points can be traced to the zeppelin case: People could indeed merge experiences of their excitement for flight as well as the prospect to do their country a service into an active role of using what they had encountered as a starting point for support for Zeppelin. As mentioned above, it was not so much one interpretation, one STI to become dominant but a new one emerging. This new imaginary, however did not come from nowhere, either. It developed out of preexisting ones that were used as stepping stones for a new development. Hence it was crucial for Zeppelin to allow that cross-referenc between STIs by stepping back from his particular depiction of the artifact put into use. By acknowledging his airships to be more than just a weapon and everyone to develop his or her own interpretation of what the zeppelin should mean for him or her, he allowed for such entanglements to happen. Further, all three STIs depicted above are not running parallel but with each other: the progress of flight somewhere outside Germany would emphasize the national need to equalize that progress as a nation. Vice versa, the capability to sup-

port the development of the zeppelin in such a powerful way would reflect on the other two imaginaries and so on. In consequence, then, a strong social cohesion in form of a new nationalist sentiment established and was strong enough to bear the setbacks to come after it – namely the crashes of DELAG-ships in the following years after 1908. Agreeing with SCOT, after the stabilization, the zeppelin's perception was not easy to be shaken up. As the zeppelin had become such a strong symbol not only for technological progress but for the independence of the German people from their monarchy, it was not easily abandoned.

6.3.3 *The Peoples' Emperor*

The breakthrough of his invention was not without consequence for Zeppelin's personal life and reputation. From one day to another, he was no more subject to ridicule but a popular hero. Not only was the motion of installing a committee considered sleazy against the public, but as dishonorable towards Zeppelin. Zeppelin became a person of enormous popularity, especially with the general public, leading to him being called the peoples' emperor (original quote: »Volkskaiser«, [18, 250]). His popularity in the public is nicely shown by the appreciation by the Prussian authorities. As mentioned above, Zeppelin was, called the greatest German of the century and he was decorated with the »black eagles's medal«, (»Schwarzer Adlerorden«). However, he was not (as expected) made a prince. The explanation is simple: Wilhelm was most likely afraid of Zeppelin's popularity [42, 122] - and was likely right to be so. In many aspects, Zeppelin incorporated values that people actually expected to find in the emperor. His noble descent came to play a huge role here: Zeppelin, from an ancient noble lineage, was a rather conservative figure. Zeppelin is referenced as having stated nobility was duty and understanding himself as a man of honor (original quote: »Das Privileg des Adels besteht darin, daß er das Gefühl der Pflicht gegenüber dem Gemeinwohl in besonders starkem Maße haben muß.« and »So wurde er [Zeppelin, T.K.] [...] als "wahrer Edelmann" geschätzt.« cited by Mienert [38, 113 and 124]). Obviously being persistent, calm, determined and modest, for many he was a model aristocrat. This picture became meaningful in contrast to Wilhelm II; Wilhelm's political misfortune was notorious and reached an unprecedented climax during the Daily Telegraph affair in late 1908. Zeppelin seemed a matching part for the shortcomings of the emperor. His popularity eventually reached a point where Zeppelin had to calm people himself in order not to destroy his restored reputation by threatening the emperor's position.[42, 176 ff.]. Reinicke goes as far as to compare the support movement for Zeppelin with revolutions in other countries. He argues that differently from masses storming the Bastille in 1789, for example, the events in

Echterdingen created the movement that unified Germans into one people and created a true national sentiment (similarly, yet only as a side note, Eckener compares the zeppelin enthusiasm with the French revolution [12, 26]. For this perspective speaks the fact that the German national anthem (»Das Lied der Deutschen«) came in fashion just in these days. Its famous first verses »Deutschland, Deutschland über alles« were sung spontaneously over and over again by thousands of spectators [18, 238 ff.] – instead of the national anthem back then, »Heil dir im Siegerkranz« which does not focus on the nation but in praising the emperor. It is even mentioned that »Das Lied der Deutschen« was used as a personal anthem for Zeppelin. »Das Lied der Deutschen« was later made national anthem in the Weimar republic and serves this purpose (nowadays with a different text - only verse 3 is sung today, verse one (»Deutschland, Deutschland über alles«) is forbidden due to its misuse during the Third Reich) until today.

As shown above, Zeppelin was well aware of his popularity and knew very well to use it for his own good in his struggles against the Prussian administration. It would be wrong, however, to conclude he was taking sides from this behavior. Zeppelin saw himself as an aristocrat and was far from fraternizing too much with the working class. While Warneken [50, 79] writes about »divided loyalties« of workers between the social democratic subculture and evolving nationalism uniting under the otherwise unpopular Wilhelminian system, the same is certainly true for Zeppelin. From early on, Zeppelin targeted the people's attention through specific coverage by mass media and used an exclusive publisher to do so. The publications of the Scherl group were the ones that covered Zeppelin's first attempts from early on with the greatest effort as well as optimism. While more serious papers such as the Frankfurter Zeitung and its lead correspondent at Lake Constance at the time (Hugo Eckener) remained skeptic, the Scherl yellow press publications were reporting excitedly. [53, 75 f.] Zeppelin was well aware of that and even initiated a partnership with Scherl promoting mutual benefits by trading exclusive information and access to his project for guaranteed media coverage. [53, 77] However when accused of taking advantage of the lower classes support, he replied to a Prussian officer that this was true and a pity, yet he saw himself as forced to do so as long as the state would not listen to him (original quote: »[...]als einer der von Berlin aus kommandierenden Offiziere einmal eine leise Anspielung machte, dass der Graf Zeppelin "sich von der Stimmung der törichten Volksmenge tragen lasse", da meinte er unmutsvoll: "Ich muß es mir leider gefallen lassen, solange die Herren in Berlin so wenig Verständnis und Einsicht zeigen"« [11, 154 f.]). As an employer he is described as caring as well as demanding and authoritative, with a patriarchic habit towards his working force [42, 160

f.]. In 1894 already he had made some notes in his diary concerning the growing tensions between entrepreneurs and working class. He took a rather conservative position stating that rebellions should be reacted to with hardness. [11, 135]. When striking workers in the airship dockyard appealed to him in 1910, Zeppelin showed little understanding for their demands. Quite the opposite was actually the case - he expressed disappointment about the worker's attempt to hold up their employer. These episodes depict the influence of his noble lineage once more. Much like a manorial lord, while he was a caring employer, his expectations in loyalty and allegiance were high. In this context, his turning towards the entire people in hope for help for his project is to be evaluated; especially his despicable comment quoted above should not be overrated. While appearing arrogant at first (and it might have been meant that way), it might also have been meant in a way that would fit better to Zeppelin's interpretation of higher social status coming along with a bigger responsibility. If this was the case and Zeppelin was serious when talking about pursuing his project for the well-being of his fatherland - it could also be meant in a different way: he might have felt it a pity he was relying on the general public as he did not perceive it their duty to enforce such project. This way the remark could refer to the necessity for the working class to do what the upper classes could or would notes do hence being an appreciation more than a notion of arrogance.

6.4 THE MOOD CHANGED

One other reason for Zeppelin's sudden success that I have not really mentioned so far is an obvious: all of a sudden, his technology appeared to work. Working in this context means that LZ-4s flights in the summer of 1908 - the test ride over Switzerland as well as the 24-hour test ride were much different than the flights of prior prototypes. They were longer and went over greater distances than Zeppelin had travelled with his airships before. Especially the tour over Switzerland made the vision of the zeppelin technology as a reliable instrument appearing realistic. Before that, his prototypes all suffered from technical problems and a lack of power that made them very vulnerable to the elements. With the several hundred-kilometer trip over Switzerland, the potential of Zeppelin's machine as visible for the first time. While my work concentrates on other factors of the technology's increasing popularity, this factor is certainly important. Not only was it a prerequisite of any imagination becoming real for the technology to work and the airship to fly steadily; it was also a great facilitator of envisioning in the first place. While of course the technology to be working is not a sufficient reason for it to be popular and supported (we would be speaking technological determinism, then), it surely helped. »Disappearance« of a »problem« is

not bound to, but can consist of technological progress. While the increased performance that was demonstrated by LZ-4 in comparison to its predecessors did not necessarily cause excitement, it took one argument from Zeppelin's critics.

Also, the societal climate towards flight had turned. After the Wright brothers' maiden flight in 1903, the issue re-gained attention and confidence. The aeroplane developed relatively fast. The dirigible, however, took slower steps. Nevertheless both developments tied up with the aggressive German foreign politics: soon after the emergence of powered aeroplanes, the English Channel crossing became the most ambitious goal for European pioneers of flight. The British newspaper *'Daily Mail'* offered a prize for the first to achieve this goal, triggering a race of various inventors for the money, which was eventually won by French Louis Blériot. The English Channel was thus not reserved to German ideas of flights - it was a universal idea that Britain's eternal strategic advantage of its insular location would soon undergo changes. On the airship side, however, things had not moved just as quickly: due to the greater complexity of building prototypes, fewer pioneers did actually try. In Germany, the discourse was two-sided: the first one was whether airships had great potential in the first place. The second one was which type of airship would be the best one. There were three major designs, rigid, semi-rigid and non-rigid airships, all advertised by their inventors as the best solution. Zeppelin thus faced harsh competition and saw himself as frequently discriminated against in comparison to his competitors due to the resentments of the government against his person. De Syon gives a very comprehensive summary of this discourse [9]. In summary, one can state that Zeppelin „won“ the dispute simply by becoming so popular. And while his competitors, especially Parseval, did have some success in constructing and selling airships of their types, no one could even come close to the meaning the Zeppelin designs attained. All of them, however, profited from French pioneers: While the start of the French Lebaudy-airship in 1903 was seen with calm, by 1906 a perceived »airship gap« De Syon [9, 30] with France led to increasing support for German airship builders - along with the developments in foreign politics, the government did not want to risk the enemy to make advances it might not be able to compensate. This perceived airship gap in combination with the lack of success of the naval armament led to a slow change in politics shifting some attention and funds towards airship construction.

Further, Zeppelin's public relations work was orchestrated very well in the summer of 1908. The first ascents of LZ-4 had already been covered by newspapers. Then the Swiss cruise surprised not only Switzerland, but also the world. As this trip had not been announced, there were no expectations towards the machine and the unexpected success was reacted to just as amazed. The trip was a me-

dia event in multiple perspectives as it offered a multitude of exciting features. First of all, its performance was, measured by contemporary standards, impressive (e.g. [5, 32]) Second, it was the first time an airship or a plane crossed a national border - moreover unannounced, which led to Swiss protests. Third, it led over the Alps, which were considered very difficult terrain to fly over. And last but not least, flying over Swiss spa towns was interpreted as a message to the international high society that was gathered there and sending a message all around the world. For all these reasons, the trip over Switzerland was reflected as a sensation in contemporary newspapers. Zeppelin not only became nationally respected, but internationally known within a day.

Accounts by author Emil Sandt whom I mentioned above did their part. He had been taken on board by Zeppelin for the Swiss cruise and delivered enthusiastic representations of the trip. Even more so, the German public looked forward excitedly to the 24-hour test. Finally, it was perceived, they were all to see the great German inventor and his work. Consequently, the awareness for Zeppelin's project was as high as it could possibly be when the test in August of 1908 finally arrived. Consequently, on August 4th, 1908 all of Germany was spellbound by the attempted 24 hour endurance test. »Old-timers compared the patriotic hoopla to the excitement that had accompanied the declaration of war against France in the summer of 1870. The two, three, and even four daily editions put out by metropolitan newspapers at the time narrated the unfolding drama in the breathless prose that suited the brash new century [...] As the zeppelin approached - appearing over jubilant crowds [...] - as many as a quarter of a million Germans streamed into Mainz [...]« [16,

9]. Even more emotional are accounts in the newspaper „Schwäbischer Merkur“ from Stuttgart, Capital of Württemberg: »The streets filled up, people clambered onto rooftops. And one waits, patiently waits for another hour! And then after the long silence, the crowd cries out. [...] a silver, glimmering, wondrous entity appears. [...] One feels its power; we are overcome by a nervous trembling as we follow the flight of the ship in the air. As only with the greatest artistic experiences, we feel ourselves uplifted. Some people rejoice, others weep.« (cited and translated by Fritzsche [16, 13]) And last but not least, it has to be said that an aspect of the sudden success of Zeppelin and the great support he received after the Echterdingen crash were not even his merit. Partly, Zeppelin seems to have



Figure 11: 'The national donation for Zeppelin'

been *tertius gaudens* of an entirely different conflict; the inner political frictions that were at play at the time between large proportions of the German people and the Prussian government in Berlin may very well have been Zeppelin's cause independently from people's favor for it. The title page from *Simplicissimus* seen above (Figure 11) is a very nice illustration for this motion: While clearly connected with Zeppelin and his airships, the conflict it depicts is one in which Zeppelin does not even take part, standing with the back to the scene. It is a conflict between the German people, depicted by the common depiction as the German Michel, and the Prussian administration depicted by a uniformed man looking a lot like emperor Wilhelm II. Yet it seems not Zeppelin is the one the depicted Wilhelm steals from, but the people are the "victims". Zeppelin stands nearby not seeming to be too involved, it is the other two parties that are the focus of this depiction of the conflict. In the time during and shortly after the *Volksspende*, the self confidence about the common achievement of raising such great funds grew into a significant pride - and by symbolically giving the technology back to the people, Zeppelin had even strengthened this feeling of ownership and accomplishment. Hence the zeppelin was seen as an artifact that was commonly owned and had been created „bottom up.“ The correspondent of the *Bremer Nachrichten* cited above by Fritzsche [16, 34] is further cited »Those „at the top“ simply never understand, the doctor [the correspondent, T.K.] concluded, that „it works without them too, if the people want.« A Frankfurt newspaper is cited as »its message was loud and clear: „Berlin: Hands off“.« [16, 34] and the further, »the influential Schwäbischer Merkur honored the spontaneous patriotism and resolution of zeppelin enthusiasts and noted that the subscription had taken place without „help from above.“ Germans want to feel „self-reliant“ in their patriotic activity, the editors concluded.« (ibd.) This self-reliance had been achieved through the reciprocal exchange of money and in turn the symbolic reception of the airship. The airship had thereby become a token for the aptitude of people to act apart from or even against the Prussian government. »For them, the zeppelin became a national treasure that was far more appealing and better suited to Germany's industrious burghers than the Hohenzollern crown or the Prussian army. The immense public excitement [...] celebrated not only the imposing technical accomplishments of the zeppelin but also the construction of a heart-felt and popular nationalism. Zeppelin enthusiasm served the grand idea of a nation in which all social classes were reconciled.« [16, 11] Fritzsche gives lots of credit to the zeppelin here. One could also argue that these motions of a bottom-up movement were partly independent from Zeppelin and his dirigibles: Some modern commentators interpret them as a revolutionary tendency that had been lacking in Germany to this point. Reinicke even goes as far as speaking of the Zeppelin craze

and the related events as being for Germany what the storm of the Bastille had been for France - a uniting common experience of the people exercising power. And while the comparison with the storm on the Bastille may sound somewhat bit far-fetched, similar but less elevated interpretations are quite common. One, for example, is the perception that the Zeppelin craze was one first event of German jingoism that would find its continuation in the excitement with which Germans went into World War 1 and lay the corner stone of the Nazis populist appeal. In this context, the zeppelin enthusiasm can be seen as the proverbial final straw as well as the stage existing frictions between the Prussian monarchy and the people were acted upon.

An aspect of all these momentums that is very important as it is a unifying momentum in all of them is their orientation towards the future: the subduing of the air as a form of cultural progress (whether interpreted as an opportunity to serve as a weapon or to serve peaceful tasks) as well as the praise for Zeppelin and the conflict of the people and the monarchy all show a pursuit of a different future. It is not so much the immediate impact the zeppelin is expected to have, but the changes it is hoped to initiate that people appeal to. While the notion 'progress' is itself oriented towards the future, the societal frictions coming to light in both the adoration for Zeppelin as well as the skepticism against the emperor and the stress on the independence of the national donation from government influences called for a new bourgeois self-esteem. Interestingly, those different meanings the airship took and different functions the engagement for it fulfilled could all be described as different interpretations in terms of Bijker's interpretative flexibility. However, they all can also be seen as »collectively imagined forms of social life and social order reflected in the design and fulfillment of [...] scientific and/or technological projects.« [27, 120]– thus fulfilling the criteria of being a STI. Moreover, the entirety of national aspirations the zeppelin triggered meet the second feature Jasanoff described as feature characteristic of a STI. Having been compared to the storm on the Bastille in 1789 appeared far-fetched. Most certainly, however, the zeppelin was able to »encode and reinforce particular conceptions of what a nation stands for«. [27]

Part III

DISCUSSION AND RESULTS

RESULTS & CONCLUSION

In this last chapter, I will summarize my findings and conclude on whether or not I am able to answer the research questions which to answer I began this thesis for. Furthermore, as mentioned above, I will reflect on the theoretic approaches I used and both what they contributed to my research and if my research has implications for their further use and development.

7.1 FINDINGS

First of all, it became apparent which great influence the public relations work Zeppelin did had on the perception of his technology as well as its development. While the 'socialness' of technology development was mostly limited to contributing funds, the importance of this inherently social function can as was shown not be stressed enough. The creation of public attention was one major factor on the process of technological development in this case. In this context it could be shown how timing and orchestration of this process played a major role for it to show the desired effects. When talking about the 'socialness' being limited to contributing funds, however, this is not meant to belittle the influence of social dynamics on the development of the zeppelin. Much more it is meant to say it did not pose a social influence in the engineering or the construction of the artifact. Instead, there was a lively and lengthy debate about whether or not to support count Zeppelin and his project and its potential consequences.

This debate was not only initiated but also somewhat controlled by Zeppelin. In a number of ways he addressed different forms of the public - often through talks he gave to potential supporters of his ambitions. In these talks, he adjusted the emphasis on different features of his dirigibles to the (sub)public he addressed. In front of the colonial society, for example, he stressed the potential to communicate with overseas location at previously unimaginable speed. Thereby, he encouraged these audiences to develop their own visions of what the zeppelin could facilitate and serve for according what they considered important. However, those specific STI sometimes caused troubles: As shown in chapter 6.1, when narrowing the potential application down to certain applications, different groups might disagree whether that particular feature or potential application was to be embraced or despised.

As these conflicts emerged, what might have been a step to closure (the framing as a weapon system that both the left and conservatives shared) turned out to form a conflict that would prevent closure in the question whether or not to support Zeppelin. Too crucial were the values the STI carried along: implicate assumptions about peaceful or aggressive foreign politics, to name the example I used in chapter 6.1.

Since this stabilization attempt had proven unfruitful, Zeppelin changed his tactic. He took one step back and left the application of his technology open. Not carrying along certain conceptions of foreign politics, the STIs related to the zeppelin were now about progress and innovation, values that were more broadly to be agreed on as it remained open for the individual to envision what 'progress' entailed in particular.

This second attempt to promote the dirigible was much more successful. As the analysis has shown, the concept of rehearsals by Felt that was introduced in the theory chapter has proven valuable here. The history of the zeppelin shows nicely how a STI is not simply there or appears out of the blue. Much more, it forms in a stabilization process that is realized by social events Felt calls rehearsals. As the analysis has shown, the transfer of experiences from different rehearsals and the connectedness of different STI were a crucial step in the zeppelin development; the reaction and continuation of the STI about aviation and German nationhood were crucial elements for the zeppelin to be perceived as an appreciated technology.

In the zeppelin case, rehearsals were numerous. There were talks given by Zeppelin, press coverage, appeals by Zeppelin to the public and so forth. As I was able to show in my analysis, it took Zeppelin years and multiple rounds of rehearsals to adapt the image he gave his invention to what would find broad acceptance in the public. The comparison of early attempts to establish a stabilized perception with the later successful ones in 1908 additionally revealed how sensitive such a construction process to the right timing.

It was that combination of unique features of both SCOT and STI - the precise distinction of social groups as recipients of Zeppelin's promotion effort and the richness of what an imagination about technology includes - that made the combination of those two approaches so valuable.

Several factors in this stabilization are of particular concern for someone interested in the social construction of technology. First of all, it is extremely interesting to see to which degree the public interest in the technology depended on 'business cycles': While the interest in the zeppelin was great in 1900, Zeppelin's appeal in 1903 created almost no interest at all - and in 1908 when flying and its imaginations experienced a new boom public attention was stronger than ever. This shows nicely how technological innovations have their time and can just as well find no resonance because of bad timing.

From the technological side, the development of the zeppelin could have gone much faster. Between the attempts in 1903 and 1908, the technology had not changed a whole lot. What had changed and facilitated a new opportunity was the public interest in it. When the preparation of several rounds of rehearsals and the political and societal conditions were in unison, the *STI* related to the airship could relate to people's perceived needs (as well as the respective visions and *STI*) eventually worked in Zeppelin's favor.

Second, *STI* proved to be a very valuable concept to deal with the zeppelin and the national sentiments related to it. Indeed, the rehearsals of the zeppelin worked mostly through visions about what the airship could once become. Jasanoff's intention of opening up social concerns about technology to considerations about possible futures contributes to the understanding of the phenomenon. After all, one has to note that the first real breakthrough for the zeppelin had been only in the immediate past of the Echterdingen crash; while Zeppelin had been promoting his project for many years, up to the summer of 1908 he had only very little to show. While lighter-than-air flight was apparently possible, his prototypes had also shown that it was very difficult to control. This control was first convincingly demonstrated by Zeppelin's cruise over Switzerland in 1908 – a kind of public proof in Latour's sense. Respectively, one has to admit that while Zeppelin's vision and narrative about his invention were at the time already quite old and known, the actual technological artifact that made his promises appear somewhat realistic was a very young one. Likewise was the entirely open conceptualization in the promotion of the technology and its focus on the normative notion progress instead of applications. And as it was still a long way to go (in the end the great zeppelins that came close to Zeppelin's dreams and expectations and are still remembered today needed another 20 years to develop), the support for his endeavor came at a technologically rather early point in time. To come back to the distinction made by Krajewski I cited above, the zeppelin was still a project, not yet a product. It was but the public support that allowed for Zeppelin to achieve the tipping of this crucial scale into the right direction. The newly-gained unity of people in the act of supporting Zeppelin and the demonstration of what a collective people was capable of then led to a very strong national sentiment. The apparent power to give such enormous impulses and the subsequent optimism for the future development of the zeppelin fired all sorts of imaginaries of how a bright and shining future was to look like.

In her seminal work on the relation of national identity and technology in France, Hecht came to similar conclusions concerning the national attributions of technology. She articulated that

"national-identity discourse is not about the past per se or about the present. It is about the future. National-identity

discourse constructs a bridge between mythologized past and coveted future. Nations and their supposedly essential characteristics are imagined through a telos, in which the future appears as the inevitable fulfillment of historically legitimate destiny." [20, 255]

Once we take the results of strong nationalistic sentiment in Germany in the 20th century into consideration, this notion of course gets a slightly different touch. While this thought is certainly not completely off, the classic question »Does Technology Drive History?« [46] should probably not be taken too seriously at that point - too many factors worked into that as to attribute too much to the zeppelin at this point.

It became visible through my study how important the framing of a new technology and the imaginaries of it can be for its reception in public spaces. Zeppelin's early attempts of marketing a new weapon system was met with little response. Opening up the conception of the zeppelin, the airship became a lot more agreeable. Thus from excluding anyone not particularly fond of the imagination of a new German weapon, through the shift to a technology that marked a progress for humankind and enabled the „conquest of air“ became very inclusive. As the notion of progress was a shared one at the time, anyone could join in on the zeppelin excitement. Which applications to expect from the technology once it was ready remained in the eye of the beholder thus leaving the opportunity to block out unfavorable imaginations and focus their own interpretation on their visions of what 'progress' should entail.

In the process of promoting the technology it became apparent how proficient this creation of an image was managed. However one can draw the conclusion that Zeppelin was apparently as much a talented spin-doctor as he was an inventor. The notion of the »heterogeneous engineer«, shortly introduced in chapter 4.4, seems all the more fitting now. Although Hughes [22, 58] explicitly mentions Zeppelin in the context along with Edison, the Wright brothers and others, to my knowledge this notion has not been worked on in the Zeppelin context before. Zeppelin was probably the most heterogeneous engineer imaginable - he didn't even really construct the airships. From early on, hired engineers did the actual engineering work for him. Zeppelin was the one having an idea and then driving its realization - he got out of the actual construction work shortly after the very initial thoughts and became designer, supervisor, manager, fundraiser, promoter and probably many things more. In short, he was much more a »system-« [34, 112] than an actual airship builder. Nevertheless, nowadays whenever something looking even slightly similar to a zeppelin is in view, people point at it and call it zeppelin (imagine a pointing at a Dell computer and calling it a Mac - people would most likely mock you for that). The zeppelin managed to culturally become *the* technological artifact people think of when encountering

all sorts of lighter-than-air vehicles that are not actually Zeppelins, but e.g. blimps. Even the modern Zeppelin NT, built by the Zeppelin company today, is not actually not a rigid-hull dirigible but a semi-rigid design, which at the time was Zeppelin's strongest competition. No one, however, would ever consider calling it anything but a zeppelin. Too iconic is its design.). While it is clear that not all agency that I attributed to him in this piece was actually himself, he certainly was the most central figure amongst all those who did these things with him. The same can be stated for the actions referred to in this work. While probably not all of it was accounted for by Zeppelin himself, he obviously managed well and knew how to make the right decisions.

I want to mention one further issue that came up during my analysis. The influence of the inner-political conflicts in Germany at the time were a phenomenon that I was not aware of initially. While they are mentioned by all the chroniclers, they are not given much space as they would deflect attention from the zeppelin and Count Zeppelin himself. I do think, however, that the political climate provided an important part to the breakthrough of the zeppelin. After all the mood and the common feeling of dissatisfaction with the Prussian government and emperor Wilhelm II in particular seems to have been a fertile soil for the zeppelin enthusiasm. And not only that - one could even interpret the extent to which Zeppelin was supported as not so much an act of support for Zeppelin but primarily an act of protest against the Wilhelminian monarchy. From this perspective, the events I described gain an entirely new dimension: while those motivations and actors certainly do provide to the social construction of the technology, the social construction in this case is in this respect not really related to the technology itself.

In that sense the argument about the technology in question is just one arena to fight a conflict that had been latent before and is subsequently fought over a matter that is not necessarily its root but simply provides and opportunity for the conflict to become active. Thus, the support (in the zeppelin case most likely parts of it) is not necessarily to be accounted for as being directed for the particular technology but against its political adversaries. The zeppelin, in this angle, was parasitic (meant in Serres' way) to the political conflicts of the time. This dimension opens up the political implications technological artifacts carry along and that has, to my knowledge, not been touched a lot by SCOT. It became apparent rather late during my analysis. The possibility of the support for the zeppelin not necessarily being directed to the zeppelin but to the Prussian aristocracy came to my mind only when I reflected upon the nationalistic spirits of the time and the political consequences of Zeppelin's success. To my knowledge the STS field lacks an elaborate consideration of this aspect of technology development. Of course there are works that deal with

the relation between artifacts and politics, however I believe technological development as a by-product and arena of political conflict has not been dealt with explicitly.

The closest to that is the notion »Technopolitics« by Gabrielle Hecht [20, 19] - that moreover originates from the same areas of interest, the relation of national identity and technological conceptions. While her description that those as »strategic practice of designing or using technology to constitute, embody, or enact political goals« [20, 256] suggests a pretty good fit, I am not sure whether it really fits. I had a somewhat different impression of what (at least er famous case about nuclear energy in France) she was aiming at - in her case, the dispute was in a relatively closed environment.

She refers to the notion »technological system« by Hughes [23, 22] *inside* which those technopolitics unfold. [20, 257] This implies that there always has to be a technological 'center' of the conflict of sorts - in her example, the conflict would not have been able to take place in just any environment as the technology itself and the options it opened let the conflict emerge in the first place. Thereby, the technology is not, as in the zeppelin case, an arena for a conflict that was preexistent as such but the conflict emerged and had to be settled within the system. That is a crucial difference to the zeppelin case for which, I think, Hecht's notion is not an ideal fit.

Moreover, while the case Hecht describes was for sure political, the circles in which it was discussed seemed to be rather small to me: the 4000 to 6000 protesters she mentions [20, 284] do not quite compare to the masses involved in the zeppelin example. Moreover, I had the impression that Hecht's nuclear case was not as much about the invocation of a national identity. Neither was it such a profound statement of a different opinion concerning present conditions but more a negotiation and partial re-definition of nationhood. Maybe Eckener's bold comparison is right at this place: the French had already stormed the Bastille, they did not need »technopolitics« to serve as their unifying momentum.

This is, by the way, an aspect of my case that personally I liked very much: the zeppelin case involved the entire society and took everything from a somewhat 'bottom-up' perspective. I perceived most literature as somewhat 'top-down'; while of course in this discipline usually acknowledging social influences, often cases are described from the perspective of small, often elite groups, »framing the public as the problem« [14, 4] is somewhat common. Problem not in a dramatical sense but as a variable that is rather difficult to integrate but has to in some way. Whether the 'common people' are disassembling (and thereby de-scribing) 'fool-proof' lighting kits [1], discriminated against with bridges [52] or whose nationhood is redefined through elites' discourses about how their society's nuclear efforts [20] should look like: hardly are the concerns of those affected by a technology in

focus. Rather, they served as means to prove a point. I found it nice to being able to take a somewhat different angle, which of course lies in the historical narrative of my case.

7.2 REFLECTION ON THEORETICAL FRAMEWORKS

As mentioned in the initial theory section, I had looked for an opportunity to connect the established concept *SCOT* with the rather new concept of *STIs*. In my eyes, as can be seen in the previous section, this attempt was successful. The future-orientation of the hopes and expectations for which people supported Zeppelin and his airships has nicely shown how interpretations of a technology in a *SCOT*-sense can not only refer to actual and existing relations of problems and solutions but how these interpretations can also be a buy-in to in what a technology offers in terms of potential to solve problems and produce change.

Moreover, the inclusion of imaginations about the future entitle the interpretation not only to be oriented towards interests, as Jasanoff [26, 20] criticized but entail normative concepts about how the world should look like and what would be steps into the right direction. It resolves the criticism by Jasanoff that the conception of *closure* boiled down the stabilization process to a process of negotiation of social interest without regarding the inherent history of positions as those normative claims opinions about how the world should look like are of course inherently social and carry the history of its beholder. As the notion *STI* is not limited to an interpretation of the technological side of an artifact, but sees the artifact as part of a 'sociotechnical' entity, it embodies normative visions and imaginations about the world someone having a particularly *STI* shares. The example of the political left despising the zeppelin as a weapon system, for instance, embodied their imagination that *war* was a concept of the past that a 'progressive' human race should neglect in the first place thus designing weapons went contrary to this very basic conviction. Thus the application of *STI* was both important and fruitful in the case at hand. It has proven a worthwhile addition to *SCOT* and opened levels of analysis previously out of reach. When oriented in such a way acting upon the interpretative flexibility of a technology does not only appear similar to but to actually be a *STI*. Thus *STIs* can be seen as one form which interpretative flexibility can take.

The entire study emphasized the value of Felt's efforts to shed light not only in the mere existence but the *emergence* of interpretations and imaginations, an intention that aims in into the same direction. Here, too, it can be stated that a convergence of the concept of *assemblages* Felt developed with *SCOT*'s concept of stabilization is one possibility to make observations. Especially, the introduction of the rehearsal level and thereby opening a space for analyzing the actual process

of *stabilizing* in new detail proved valuable. This was not really well articulated in SCOT and the concept provides additional framework for analysis.

Moreover, the rehearsal concept allows for the integration of previous experience into the construction of a particular STI: the consideration towards the zeppelin were of course based not just on the discourse about the airship, but included previous and contemporary discourses implicitly. This, too, is a way to include historic experiences and culture into the discourse about technologies and its stabilization: the experiences the public had made with the German fleet armament program, for example, contributed to social democrat fears of a new armament program directed to a fleet of military airships. These considerations would not make much sense without the other.

When stepping back a bit from the analysis I made and reflecting on the initial theoretical conception, an interesting observation can be made. What I mentioned to be a flaw of SCOT in chapter 4, the unidirectional approach of SCOT not mentioning the influence technology has on society can be resolved. When stepping away from the zeppelin as a singular artifact and looking at the entirety of the German society and its relation to the zeppelin, we can basically use nationhood as a frame and view the entirety as a »sociotechnical ensemble« [3] that was *co-produced* by society and technology. So Bijker's attempt to adapt SCOT to a new time was somewhat successful. The use of STI and the richness of description it carries has provided to that approximation by not only moving SCOT to a larger scale, from a single artifact to technological frames towards a sociotechnical ensemble but by providing more depth to the entire notion of what sociotechnical means. While sociotechnical imaginaries were developed for the particular perspective of looking on a *national* connotations of technology, I do not think the concept requires the national background. This background could, in my opinion be any element constituting a community, whether it is ethnicity, origin, or whatever more criteria for people to distinguish themselves from each other may be out there. This would allow for both the concept of STI to come to a broader set of applications as well as for SCOT. As the combination of the SCOT-methodology with STI has proven fruitful here, this might be a desirable step.

In retrospect, my theoretical conception has proven appropriate to my topic. It was both suited to bring clarity into my research question and itself profit from the case worked with it. Of course, STS has a wide repertoire of different possibilities of describing technology. When Law was cited talking of »system-builders« one of many descriptions other than simply calling it an 'artifact' appeared. His notion refers to the concept of *technological systems* by Thomas P. Hughes [23, 22], in whose regards the zeppelin would have been

a technological system that itself consisted of artifacts. Maybe even more prominent would have been a description of the development of and around the zeppelin as a *heterogeneous network*. ANT [34, 1] is a prominent approach in STS, and while having contemplated describing my case as a heterogeneous network around the zeppelin as a field of tensions between the people, the Prussian government and Zeppelin (inspired by the drawing in Figure 11), I decided not to do so. I found it more promising to use SCOT as I found it important to focus on the interaction between the technical and the social. Particularly, the concept of *interpretative flexibility* appeared a better fit to me than corresponding notions of *inscribing* and *describing* meaning in ANT [1, 208 f.]. Therefore, the clear conception in SCOT of how the social influences the technical through interpretations (or, as shown, through imaginaries) and the clear three-step methodology appeared to be better suited.

REFLECTION, OUTLOOK AND CONCLUDING REMARKS

As a last piece in this thesis, I want to critically reflect on what was *not* achieved, respectively which new questions emerged from what I found out and give an outlook on how consecutive research could look like.

While this case study was able to accomplish quite a bit of what was hoped for, as any research it led to new questions and reached points where its approach was limited and could not bring further clarification.

One of those, and for me as the author the most apparent point is the agency in all the events I described. In this study, the actions taken by count Zeppelin are a central factor. I refer to him as a singular individual and attribute agency solely to him. Also, I assume conscious and willing actions in great parts. While I do have reasons for that and give sources that indicate these assumptions to be true, they remain assumptions. There are two assumptions in this context in particular that would benefit from profound scrutiny. First would be the agency of Zeppelin. Zeppelin did, of course, not act alone. At least after 1900, he had company and support by co-workers and aids. There were both technical staff as Theodor Kober, who actually constructed the first airships as well as administrative staff such as Hugo Eckener who helped Zeppelin to promote the technology and set up the institutional frame of his endeavor. Colsmann even refers to a „Round Table“ (original quote: »Tafelrunde«, [8, 25 ff.] which met every day for lunch and discussed all aspects of the technology. This points to what I referred to as Zeppelin as an individual having actually been the man himself and a group of advisors. As the only actual witnesses to write about that time, Colsmann and Eckener, do not talk about that in length, the issue remains opaque. For my thesis project, the point is not decisive and thus does no harm to my study. It is however an interesting point and additionally as my work remains imprecise at this point, I do not want to conceal it.

The second issue is the question for intentions. As much as for Zeppelin's agency, I assumed these actions I attributed to Zeppelin to have been taken deliberately. Again, there are good reasons to believe that: the facts that with Hugo Eckener he hired a journalist to become his closest advisor, the relations to Emil Sandt and the proficient „management“ of his public relations. Especially Eckener's role is very interesting as he gained importance over time and eventually became Zeppelin's successor. It can thus be assumed that it was

not entirely Zeppelin who managed the process but that what was attributed to Zeppelin in this piece of writing was at least in parts also other men's work. There are both accounts of Eckener being very influential and Zeppelin himself being involved deeply into the very details of his public relations accounts. The exact distribution of agency is probably not going to see the light of day. As a consequence, my work does not overcome the general limitations of dealing with events lying far in the past. At this point, a limitation in the sources used that I mentioned in the beginning shows its effect: the journals of Count Zeppelin are probably the only source one would likely find further indicators if the assumptions I made are correct or not. Until they are made available, however, these assumptions are the closest I could have gotten.

These issues are partly reflected on in the short take on the »heterogeneous engineer«, yet I think they would deserve further research. One might even attempt to integrate a scrutiny of the heterogeneous engineer Zeppelin with a comparative analysis on the two concepts of the heterogeneous engineer and the projector. The latter being a historic category that was, as mentioned, regarded with disdain, a take on the development from projecting to heterogeneous engineering (and maybe even its continuation in what nowadays is celebrated as 'entrepreneurship') with Zeppelin as a case might be promising.

An issue that I was not able to shed too much light on either was the personality and character of Zeppelin himself: while the existing literature is exclusively positive, I was unable to verify this perception. As my work as well as others' relies on biographies that are already available, it can again all be traced back to Eckener's glorifying narrative. During the research to this thesis, I at some point had the impression Zeppelin was actually pretty hostile towards the working class and his portrait required some adjustment. I had perceived critical expressions by Zeppelin himself as more severe than they may have actually been. As mentioned in the analysis, expressions appearing arrogant and presumptuous do not necessarily have to be meant as aggressive as they might be perceived today. With the background of contemporary society they may have been quite normal. It is probably safe to say Zeppelin was far from fraternizing with the working class - his noble lineage and upbringing would certainly have prevented that. His self-perception as someone of higher status does, however, not necessarily point to ignorance towards the working class but could as well be a perspective of responsibility. A clear interpretation is not possible on the grounds of the present material. This point, too, might benefit greatly from Zeppelin's journals. Only then could a critical evaluation of the very positive image of Zeppelin in the discourse be done.

Another question that remains unanswered is to what extent the social construction of the zeppelin by the German public was po-

litically motivated. While I was able to show that there certainly was some kind of influence, the question of *how much* of the support for Zeppelin was actually political and not really directed at the technological development but the Prussian monarchy has to be left unanswered. From a talk with the head of the Zeppelin Archives in Friedrichshafen, Barbara Waibel, I learned that there has not been a conclusive study containing detailed analyses about the actual donations, their amounts and the identities of their contributors – thus their political affiliations, etc. remain unknown, too. She mentioned it not being actually millions of very small donations but the majority of the funds coming from rather big donations. This does not lead to any conclusions and can at best serve as an indicator that for some, the issue was very serious. It indicates, however, that a detailed study about the actual Volksspende might be a rewarding endeavor.

Lastly I want to mention the sociology of expectation and the sociology of futures as two fields that were disregarded in this thesis despite their potential to contribute to it. These two strands of literature would be a rewarding addition to the materials that were included in this work. They would be able to contribute to the phenomenon of imaginaries and why they may motivate people to action and what expectations towards futures and the opportunity to change things for a better future there actually are. This motivational character of imaginations, hopes, dreams and visions has been taken for granted in this piece. Nevertheless it would certainly be interesting what people actually had in mind and what these particular imaginations consisted of. Progress, a notion I used for that, has been left a black box here that would be worth while opening. What was the 'Germanness' and the 'progress' people thought of? - particularly the latter was used with frequency just in the way it appeared in the historic discourse, yet it was never really asked what stood behind it. What actions did these conceptions trigger for what reason? These and others are questions one could answer in greater detail when integrating scientific literature about futures and expectations into research on this issue. For the complexity of this topic in relation to the scope of this thesis, however, this was not done in this place.

As mentioned above, the relatively new concept of *STIs* proved very valuable in this case study. The perspective of hopeful prospects could indeed be used to explain parts of the enthusiasm for Zeppelin and his invention. It proved especially worthwhile, as at the time, the zeppelin was still far from the functionality it was envisioned to have. Quite differently to the common *SCOT* perspective, it was not yet ready to solve any problems or facilitate great achievements. But already when the first steps were taken towards a reliable artifacts (as mentioned above, *LZ-4* and especially the cruise over Switzerland did mark a breakthrough in terms of reliability and stamina) people bought into the story - far from it fulfilling any of the prophecies

made by Zeppelin. As much as I hoped, my study could provide the concept with a bottom up approach: it became clear that quite contrary to the initial example by Jasanoff and Kim [27] the *STI* that stabilized was not coined by a national authority and then spread. Instead, the dominating imaginary started its stabilization in the minds of millions of citizens and reached closure through and ecstatic reception of Zeppelin in Berlin as well as the admission of it by the Prussian government acknowledging the successful development of the zeppelin and its use in military service.

Both the ambitions in terms of contributing to the historical case of the zeppelin as well as to some theories of *STS* were successful. Nevertheless, as usual, new questions emerged and an entire collection of starting points for consecutive research would be imaginable, as stated above. The zeppelin remains a fascinating technology about which books have been written yet not all stories have been told. Especially from an *STS*-perspective, it proved to be a very interesting subject for research.

Part IV

APPENDIX

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CURRICULUM VITÆ

PERSÖNLICHE DATEN

Geburtsdatum: 02.08.1985

Geburtsort: Heidelberg

Familienstand: ledig

Staatsangehörigkeit: Deutsch

Adresse: Neustiftgasse 16/1/35
A-1070 Wien



AUSBILDUNG

UNIVERSITÄT WIEN, 2010-2012

Science, Technology, Society

ZEPPELIN UNIVERSITY FRIEDRICHSHAFEN,
2007-2010

Abschluss: Bachelor of Arts, Corporate Management and Economics

Minors: Communication and Cultural Management, Public Management and Governance

Wissenschaftliche Hilfskraft am Lehrstuhl für Kulturtheorie und -analyse, Prof. Dirk Baecker, 2009-2010

GYMNASIUM BAMMENTAL, 1991-2004,

Abschluss: Abitur

AUSLANDSAUFENTHALTE

CONCEPCION, PARAGUAY

Schüleraustausch mit dem American Field Service 2001-2002

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, Massachusetts, USA

Auslandssemester WS 2011

SONSTIGES

HOTEL TRAUBE TONBACH, BAIERSBRONN, 2004-2007

Ausbildung zum Koch

