

The Sociotechnical Life of a Shapeshifting Technology: The Bike Lift *Trampe* in Trondheim

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Abstract

This article explores the idea that technologies may be considered shapeshifting as they move between and are domesticated in different social worlds. We employ a material-semiotic approach with a domestication and social worlds framework to study the case of *Trampe*, a bicycle lift built in Trondheim, Norway, in 1993. The study is based on interviews, observation, documents, and news media analysis. We show how the lift shifted shape: although originally intended as bicycling infrastructure, it became domesticated as a tourist attraction in the social world of tourists, and a symbol of the city's efforts to stimulate cycling in the social world of

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the local government. Trampe has remained the only bike lift in the world and would have been closed long ago due to maintenance costs, but its shapeshifting qualities have prolonged its sociotechnical life after its functional abilities were no longer sufficient. Our study suggests that more attention should be paid to these shapeshifting dynamics when analyzing technologies and their sociotechnical lives. Combining domestication theory with a social worlds perspective helps identify these shapeshifting features.

Keywords

shapeshifting technology, bicycle lift, bicycle infrastructure, domestication, social worlds, sociotechnical life

The concept of “social shaping of technology” is a basic idea in STS along with “social construction” or just “construction” of technology (Bijker 1997; Latour 2005; MacKenzie and Wajcman 1985; Pinch and Bijker 1987). The classic case studies that applied and demonstrated this approach focused on the development of single artifacts, usually studying design controversies and their outcomes. The shaping or construction processes were social and concerned with the artifact’s design or material appearance. The authors of these case studies argued that artifacts attained their final shape when design controversies ended by reaching closure (Pinch and Bijker 1987) or moving from a “hot” to a “cold” situation (Latour 1987).

In the decades since this foundational work was published, this view of technologies has been modified by a greater concern with users’ agency and their enculturation of technologies through sensemaking and the development of use practices, thus extending the understanding of technology as well as the involved shaping processes (Bijker 2010; Oudshoorn and Pinch 2003; Sørensen and Williams 2002). For example, domestication theory (Berker et al. 2006; Hartmann 2023) and social learning theory (Sørensen 1996; Williams, Stewart, and Slack 2005) highlight how the meaning of and the engagement with a given technology may change substantially, making the idea of closure challenging. The interpretation and practices afforded by a specific artifact may be diverse and dynamic. For example, in the social world of drivers, cars are a convenient mode of transport, although with increasing environmental concerns. In the world of policymakers, cars have changed from vehicles of modernity to a challenge concerning land use and accidents. Such differences and changes make it

interesting and important to study the biography of technologies (Hyysalo, Pollock, and Williams 2019) or their *sociotechnical life*. We prefer the latter concept to emphasize our concern for their survival. This article analyzes the sociotechnical life of one technology—a bike lift—by investigating changes regarding this technology and its meaning and use when it moves in time and across social worlds.

Many, if not most, technologies inhabit several social worlds, such as homes, factories, policymaking, and so on. Social worlds are universes of discourses. This definition emphasizes collective sensemaking and practices (Clarke and Star 2008; Strauss 1978). Some implications of movements between localities that constitute social worlds are shown by De Laet and Mol's (2000) analysis of a hand water pump, the Zimbabwe Bush Pump, which they observe in several places and describe as "fluid;" it shifts identities when deployed at novel sites. In a different mode, Pinch and Trocco's (2002, 30) study of the Moog synthesizer emphasizes the shifting features of this artifact: "The synthesizer is something that can pass between different worlds, that can take on different meanings in these worlds and in the process transforms these worlds." Inspired by such scholarly work, we want to explore the potential shapeshifting features of technology that are related to changing interpretations and practices.

The consequences of technologies' combined temporal and spatial movements have not been studied much in STS. Analysis of temporal developments, mainly concerning physical design, has dominated. We propose the concept of shapeshifting technologies to amend this situation. For us, shapeshifting qualities are not inherent in a given technology, unlike the claimed shape-morphing properties of some new materials (Chaudhary et al. 2021). In principle, any technology may be shapeshifting. We must observe such qualities through empirical analysis, which this article demonstrates by exploring the dynamics of one technology—a bike lift—that inhabits several social worlds. We focus on changing sensemaking and user practices and the effects of such alterations on its sociotechnical life. How is the shapeshifting enacted? Have the shapeshifting qualities of the bike lift affected its popularity and length of life? Do they contribute to transforming the social worlds the lift has come to inhabit? Such analysis adds to the STS understanding of what happens to technologies and their social worlds after they are incorporated into society.

We pursue these issues by analyzing the design of and ensuing engagements with the bike lift *Trampe* by multiple publics. It was built in the Norwegian city of Trondheim in 1993 to facilitate bicycling in a city with hilly terrain. Trondheim is the third largest city in Norway, with 215,000

inhabitants, and hosts Norway's largest university. *Trampe* remains the only such lift globally and is thus an exotic case. There are bicycle elevators in other places (Suboticki and Sørensen 2021a), but as a bicycle technology, *Trampe* is unique (Matias and Virtudes 2019). It consists of an underground wire that drives a pedal, pushing bicyclists up the hill. Thus, technologically, it is different from regular (and more common) bicycle elevators (Fistola et al. 2018; Tralhao et al. 2015). As we show here, this uniqueness makes *Trampe* well-suited for studying shapeshifting processes and their implications.

Trampe was intended as a bicycle infrastructure to facilitate cycling. Bicycle studies usually focus on understanding how cycling can be facilitated as a sustainable form of mobility and the share of cyclists increased (Cox 2010) or how cycling infrastructures may shape cycling practices and behaviors (Tschöerner-Budde 2020; Tennøy, Tønnesen, and Gundersen 2019). Some studies do, however, show how cyclists can transform the built infrastructures through their practices (Barnfield and Plyushteva 2016; Latham and Wood 2015; Jungnickel and Aldred 2013) and how bicycling is mutually shaped by materiality and social relations (Ingeborgrud et al. 2024; Larsen and Christensen 2015; Vivanco 2013). How cycling infrastructures are developed, used, and understood is thus always rooted in complex social, cultural, political, and material contexts (Cox and Koglin 2020). In the case of *Trampe*, this includes the lift becoming a tourist attraction. In 2014, *The Guardian* mentioned *Trampe* as one of the ten weirdest forms of urban transport (Blason 2014), and CNN proclaimed it among the seven coolest ways to commute (Hinson 2015).

The following section further presents the article's theoretical approach. Then, we present a brief biography of *Trampe*, including the controversies involved, as a backdrop for the subsequent outline of the methods applied in the study. We then analyze how the lift has been domesticated in the social worlds identified in the biography, ending with a brief discussion of why *Trampe* has remained unique and a reflection on the implications of our study.

Theoretical Issues in the Analysis of Shapeshifting Technologies

A technology's sociotechnical life begins in its designers' social world, where it is made by assembling human and nonhuman actors (Latour 2005). To understand how this sociotechnical life unfolds, we must analyze the controversies involved, such as whether to design the technology and how to fund it, operate and maintain it, and use it. Such analysis

may involve actors in additional social worlds beyond those of the designers and users, such as local planners and politicians in the case of *Trampe*. How did these groups of actors engage with and interpret *Trampe*, and how did the engagement change over time and with movements between social worlds? Clearly, *Trampe* is a heterogeneous assemblage of cables, wheels, machines, electricity, news media, and people in various roles. Yet we analyze it as a technology because that is how it appears to its diverse publics. Moreover, we consider the shape of *Trampe* to include its overall meaning in addition to its physical shape. Thus, shape is a sociotechnical feature.

According to Callon (1987), the actor(s) taking the lead in constructing a technology must develop a scenario that describes an imagined, attractive future practice with the technology, to mobilize interests in and support for a given technological design such as *Trampe*. Thus, scenarios propose heterogeneous associations between technology, relevant social phenomena, and other actors' roles (Law and Callon 1988). The articulation of scenarios is also an effort to socialize the technology to provide meaning and suggestions for future practices (Sørensen 2023), thus bringing the technology out of its liminal design space to become incorporated into society (Suboticki and Sørensen 2021*b*). It is crucial to analyze the content of scenarios and to be concerned with their effectiveness in mobilizing support through attractive features, and their descriptions of how such scenarios may later change, which may in turn alter degrees of support for the technology in question. For example, in Norway, early investment in nuclear power development came because of a highly promissory discourse. By the 1970s, the original scenario was no longer considered appealing, and nuclear power was discarded as a future source of energy. At present a new scenario has been introduced. Now nuclear power is presented as more nature-friendly than wind power, and this promise may bring it out of liminality in Norway.

Furthermore, designers construct artifacts from a "script" for intended use. As Akrich (1992, 208) argues:

Designers thus define actors with specific tastes, competencies, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object. I will call the product of this work a "script."

Thus, she emphasizes that designers inscribe intended usage and make particular ways of utilizing the artifact appear preferable.

We employ domestication theory to analyze the sensemaking and practices related to *Trampe*. This theory emphasizes the agency of users as participants in shaping the meaning and use of artifacts (Ask and Sørensen 2019; Sørensen 2006). When technologies are domesticated, they are shaped in the context of use. Thus, domestication may potentially provide technologies with shapeshifting features. However, domestication theory does not question the importance of analyzing scripts—we will study the scripts expressed in the design of *Trampe*—but considers it vital not to assume that users must realize scripts and enact the designers’ intentions. Instead, “the active user” is at the core of our approach, focusing on context, sensemaking, social learning, and practice as essential elements in the analysis. Thus, like design, domestication involves reassembling human and nonhuman elements, making heterogeneous assemblages of, for example, links to other artifacts, other practices, and other people (Ask and Sørensen 2019). Accordingly, we expect the domestication of technology to result in diverse interpretations and practices because users may have different interests, perspectives, and competencies. Such diversity may be enhanced when the technology is domesticated in several social worlds.

Johannessen, Nordtug, and Haldar (2023) analyze technological domestication across multiple institutional settings, showing the need for coordination. When we study the domestication of an artifact in several social worlds, we may find instances of coordination, but above all, diversity and interaction. Sensemaking, practices, and social learning in one social world may influence but not necessarily shape these activities in another social world. Social worlds may not have distinct boundaries but interact (Clarke and Star 2008). Such interaction may make the artifact’s sociotechnical life more complex and robust. We analyze *Trampe* to learn about such processes, aiming to enrich domestication theory.

A Short Biography of Trampe

The idea of building a bicycle lift in the medium-sized city of Trondheim was first articulated in 1992 by Jarle Wanvik, an engineer, inventor, and cycling enthusiast. His friend Erik Jølsgard, another cycling enthusiast and an employee of Norway’s National Public Roads Administration (NPRA), agreed that a scenario where bicyclists were pushed up steep hills was attractive. After some time searching for financial support to develop a prototype, Jølsgard received an inventor scholarship from the NPRA (Statens vegvesen Sør-Trøndelag 1993, 11) with a total cost

estimated at USD10,000. In January 1993, the NPRA signed a Research and Development contract with Wanvik's company, Design Management AS, to develop a bike lift. The lift was named *Trampe*, a Norwegian translation of "Thumper" from the film *Bambi* (Wanvik named all his inventions after Disney characters). Wanvik became CEO of the project, which the NPRA and Jølsgard would lead. Together with an electrical engineer, Magnar Wahl, and Svein Vodahl, the contact person for the Trondheim municipality, they constituted the so-called *Trampe* team. In addition, Stein Løvold, a mechanical engineer, assisted Wanvik on a freelance basis with construction drawings.

Inspired by surface-level ski lifts, they experimented with several design options. To ensure a safe and user-friendly start, they tried more than twenty versions of the carrier (Design Management 1993, 1). Ultimately, they chose a pedal that pushed cyclists' right foot uphill at a speed of 2 meters per second, with the pushing mechanism underground. Cyclists were required to buy a key card to use the lift.

In 1993, the construction of *Trampe* was officially approved (Fylkesmannen 1993; Taubanetilsynet 1993). It was to be built at Brubakken, a 130-meter-long hill with a 25-meter altitude (20 percent incline). The ski lift company Proteknikk AS delivered and installed the machinery and mechanical construction. Heating cables were placed under the pavement next to the lift to protect the machinery during winter, thus keeping the sidewalk ice-free.

While the *Trampe* scenario was attractive to the NPRA, it proved controversial to actors in other social worlds. Some politicians, citizens, and neighbors initially opposed the project, the latter because of the disturbance it might create. The local press responded negatively (Granviken 1993; Kjølsvik 1993a). It questioned the lift's usefulness. Could such public spending be justified?

On September 18, 1993, *Trampe* officially opened to the public in the presence of hundreds of people. However, many technical problems required constant care by the *Trampe* team. Heavy rainfall created trouble, leading to gravel in the tracks and cables that required frequent adjustment. Initially, the lift was supposed to be open throughout the year. Ultimately, it was decided to have it operational only from April to October because low temperatures impacted the pedal track, making use difficult and possibly unsafe.

Trampe was evaluated after two years, in line with the agreement between Trondheim municipality and the NPRA signed in 1993. The report described the lift favorably, stating that it was easy to use, that users wanted more such lifts in Trondheim, and that it had helped increase

cycling in its neighborhood (Asplan Viak 1996). A survey in 1995 showed that most users rated the lift favorably, with an average score of 4 to 5 on a 6-point scale (National Association of Cyclists 1996). The operation of the lift continued on the basis of these evaluations. By 2004, daily use varied between 100 and 450 cyclists (Design Management 2005, 2). The lift was considered thoroughly tested and ready to be copied, and the transport plan for Trondheim for 2006–2015 (Trondheim City Council 2007) suggested building more lifts.

In 2011, new EU safety rules required changes. Since getting safety clearance was an extensive bureaucratic procedure, the French Poma group, the second-largest ski-lift manufacturer in the world, was hired to undertake the required modifications with a total cost of approximately USD700,000 (Greener Trondheim 2013). The overall design remained the same. The most notable change for cyclists was the new footplate design, intended to prevent cars from driving across the pedal, and the pedal from hitting pedestrians. *Trampe* was renamed “CycloCable” in the process, but this name did not stick. The NPRA remained the owner, and *Trampe* re-opened for regular use in June 2013.

Yet its future appeared uncertain due to the increased use of electric bikes that seemingly made the lift superfluous. Recurring debates over ownership, funding, and the need for further upgrades were also challenging. Nevertheless, in 2021 the Trondheim City Council decided to assume ownership from the NPRA and to continue the lift due *Trampe*’s importance as a tourist attraction (Bråten 2021). The chief municipal officer recommended closing the lift only a year later, but the City Council decided it should be continued (Wallum 2021).

Trampe has received considerable international attention, and several interested parties have visited Trondheim to consider building similar lifts in their hometowns (Skjesol 1995). In 2009, Jølsgard of the NPRA wrote in a letter to an interested party (the Centre for the Advancement of Sustainability Living) that the *Trampe* team, the NPRA, and Trondheim municipality had received inquiries about the bike lift from about 80–90 cities in 40–50 different countries.¹ Despite this interest, *Trampe* remains the only one of its kind. As we shall see, this may have been vital to its survival.

Method

Actor-network theory emphasizes the role of both human and nonhuman actors. We have analyzed *Trampe* as a technology that is potentially a shape-shifting assemblage of material, semiotic, and practice properties. As

indicated in the biography, the lift design has been modified somewhat during its existence, but we expected the shapeshifting features to be semi-otic and practice-related. Thus, we focus on the human actors of the social worlds we explore.

The brief biography above indicates the lift's presence in several social worlds. We explored the four that appeared most prominent: the designers (the *Trampe* team), the cyclists, the tourists, and the local government. The social world of the neighbors became vague after *Trampe* was built and is therefore not analyzed. Inspired by Law (2004), we tried to capture the messiness of the development and domestication of *Trampe* in these four social worlds by using a combination of methods that we adapted to the different sites. We conducted 10 in-depth, semi-structured interviews to analyze the social worlds of the designers and the local government.² Historical information was checked against and supplemented by analysis of archival material.³ We used newspapers to identify key controversies surrounding *Trampe* and, above all, as a source of information about the social world of the local government.⁴

We explored the social worlds of the cyclists and the tourists through short on-site interviews and participant observation around the bike lift. We observed *Trampe* 23 times between May and July 2017 and conducted brief interviews with lift users, non-users, onlookers, those who tried but failed, neighbors, and nearby café-owners. Each visit lasted about 2–3 hours. We took detailed notes from both the observations and the short interviews. When we decided to make a short educational movie about the bike lift (Ingeborgrud et al. 2018), we did additional interviews and observations that were video recorded.

In the following, we analyze the domestication of *Trampe*, emphasizing the sensemaking and the practices in the four above-mentioned social worlds. We begin with the designers'—the *Trampe* team's world—where we describe the lift's design, construction, and subsequent domestication. We then discuss why *Trampe* has remained unique since no similar lifts have been built. Ultimately, we discuss the effect of *Trampe*'s shapeshifting features on the lift's sociotechnical life.

The Trampe Team

For its designers, *Trampe* was initially simply a machine to transport cyclists uphill. The main design goal was to develop a user-friendly technology to facilitate biking up some of the steepest roads in Trondheim. Thus, the first scenario and script were quite simple. As Wanvik explained to us:

I was looking for a way to solve that [topographical problem]. You must make something that is not dangerous, that's not in the way of traffic, that can be crossed over, and not the least, that's easy to use. And it shouldn't cost too much. Then, I came up with the idea that we could be pushed uphill while still seated on our bikes without being fastened or attached to the lift.

This scenario proved attractive to the NPRA, which became the initial supporter. As we shall see, it also sufficed to enroll bicyclists. However, the designers also wanted to bring the seemingly more skeptical Trondheim City Council onboard by extending the scenario to include, first, that the construction would be paid for by the NPRA and, second, the argument that the lift could make people shift from car use to bicycling. The *Trampe* team suggested the slogan "to push the motorist out of the car and gently up the hills on a bike" [Norwegian original: "å dytte bilisten ut av bilen og forsiktig opp bakkene på en sykkel"]. The lift should make cycling more appealing as a mundane and easy means of transport rather than as a workout, Jølsgard argued:

[In Norway], the dominant motive for cycling is exercise. Everything should have a training effect. But if you ask Danes, Germans, French, Dutch, and so on, "Why do you bike?" they will say that it's because it's a simple, individual, and affordable means of transport....So, there is something about throwing the old myths away: that people need to sweat and exercise while biking.

Experiments were the primary initial practice in the social world of the *Trampe* team. A late fall night in 1992, they tried a hanger that pulled the cyclist up a steep hill and realized that a pushing lift was a better idea. Initially, the whole project was hush-hush because Wanvik wanted to patent the technology. They also had to consider safety precautions, for instance other vehicles should be able to pass by and the lift should not be too visible.

The decision to build *Trampe* at a steep hill called Brubakken, close to the city center, was made because the NPRA and planners in Trondheim municipality believed that this location in a popular part of the city would provide good PR, with many people observing the technology. Initially, they were criticized for picking this site because few people cycled there. Jølsgard said they wanted to see if the lift would be used. Wanvik confirmed that the location choice was not coincidental as they thought *Trampe* would become an attraction to the citizens and inspire them to cycle. Thus, already

at an early stage, some of the lift's shapeshifting qualities were recognized, its move between being an instrumental and an affective object.

Moreover, *Trampe* became an object of care for the designers because it required a lot of maintenance. After the initial design, they domesticated the lift through a practice of repair. Wanvik recalled that in the beginning, he could be called during his vacation when something went wrong. Thus, he and his closest collaborators could not be away simultaneously since they had to be prepared for frequent breakdowns. Wahl, the electrical engineer on the *Trampe* team, reminisced.

Yes, oh my God, yes. We almost lived at the lift because something was constantly wrong with it. I and Jarle [Wanvik] were responsible for the service, and every time something happened, we called each other to see who would check it out. We had some friendly disagreements regarding which part of the system was to blame for the frequent stops: the mechanics (Jarle) or the electronics (me).

He summarized the situation as problematic:

We saw the mistakes. We saw all the weaknesses. They had to be dealt with, but it was always bits and pieces, and after a few years, we should have rebuilt the lift and done a complete renovation, starting from nothing. After a while, there was too much patchwork.

Thus, their sensemaking of *Trampe* came to include its technological vulnerability. In addition, the designers recognized that the bike lift could be challenging to use, although most cyclists managed. *Trampe* was a construction with potential consequences for pedestrians and cars, which limited the options for user-friendliness for bicyclists. Wahl continued:

We have solved the problems gradually, and I think we have come as close as possible to making the lift user-friendly without compromising security. An essential part of the development was the aesthetics and the adaption to the surroundings. We think we have succeeded in making it almost invisible in traffic.

Thus, the social world of the designers was transformed by the lift. Without *Trampe*, there would not have been such a social world. The lift required a lot from the designers, significantly impacting their everyday lives. They mainly intended *Trampe* to stimulate biking as a mode of transport, scripting the use as an act of balance on a small pedal uphill. It was also an object of

pride, affection, and care for them. To what extent were these views reflected in the cyclists' domestication of the lift?

The Cyclists

Membership in the social world of cyclists included those who could use the lift, not only those who used it. Thus, we also needed to study the domestication by non-users. At first, users had to be over 15 years old for safety reasons. *Trampe* should not be a toy but a technology for adults. However, they soon reduced the age limit, and it became evident that those who best mastered the technology were 10–15-year-olds. Cyclist users became a diverse group, including five-year-old children and people over 80 mastering the technology.

Not all users were cyclists. Some people even used *Trampe* with strollers and skateboards. In 1998, one woman with a stroller was photographed and interviewed in the main newspaper in Trondheim, saying she could not understand how she managed before without the lift. She found the lift perfect and called it an ingenious idea: "It is part of our everyday life in the family, and we love it. *Trampe* is a special thing, I have not seen anything alike anywhere in the world" (Hegvold 1998). She added that it was fun when tourists watched her using the lift, even though she probably was part of a hundred Japanese home videos, as she put it.

Still, the primary group of users was cyclists. When in operation, hundreds of cyclists use *Trampe* daily (Design Management 2005; Greener Trondheim 2013). Our observations confirmed this. In most cases, these were cyclists for whom *Trampe* was on their way to work or home. The practice of being lifted was mundane and followed the designers' script. These users recognized the lift as an integral and beneficial part of cycling infrastructure and thus supported this aspect of the *Trampe* team's scenario. However, some cyclists claimed they used it reluctantly, apologizing for not being sportier and biking up the hill.

All the interviewed cyclists were aware of the attention they might get. Whenever they approached the lift, often between a few and a couple of dozens of onlookers huddled up to watch and film. While some expressed being tired of being part of the spectacle, others found it fun and saw it as part of a performance. They were okay with demonstrating how the lift worked and being filmed and shared on social media. This experience was also a part of their domestication. One cyclist described enthusiastically: "It [*Trampe*] is the Little Mermaid of Trondheim, a part of the Trondheim package. It is like being on the red carpet in Cannes when using it." A

man in his thirties said this was the fun part of using *Trampe* and that he felt like “a tourist magnet” when riding up the hill. Another man in his sixties had even learned when the cruise boat tourists would come to see the lift, to be ready to show it to them. He had also let some tourists try *Trampe* with his bicycle. A man in his fifties found the tourists beneficial, believing they probably shared pictures of the lift, thus making Trondheim a more popular traveling destination.

The biggest challenge for cyclists with the lift was learning how to use it. During our observations, we often saw people falling off, showing that it was hard for the legs and challenging to keep the balance. Cyclists had to learn to keep their right foot steady while being pushed uphill. This task became more challenging with the 2013 version, which only offered a thin piece of metal to balance on, in contrast to the broader plate of the earlier version. Learning to use *Trampe* was described as scary but also something to master. Most cyclists had to try several times before getting all the way uphill. However, the cyclists we interviewed agreed that use became simpler once one acquired the necessary skills. They described it as learning to bike: “Once you’ve mastered it, you don’t have to use a lot of effort anymore.” Another cyclist remarked that:

This is definitely not a technology that tourists can easily use. You must live in the area and have used it several times. It is like learning to swim—suddenly, you know how to, but you must try many times.

Nevertheless, many interviewees said they had tried unsuccessfully and became non-users. A woman in her thirties said she had planned to try several times, and once, she even pressed the start button but resigned. She called herself a bit of a sissy and laughed. She mostly biked up the hill, claiming this was the fastest way to get up. Another woman in her forties walked up the hill with her bike, saying she used *Trampe* a lot before when the pedal was broader, but now she could not make it anymore, at least not with shopping bags. She said the line during rush hour was another reason for not using it. A man about thirty years old also found it faster to bike up the hill on his way home, saying that the updated version of the lift was less fun than the old one.

Thus, many non-users found *Trampe* too challenging or unnecessary, meaning sensemaking was ambiguous in the social world of cyclists. Few perceived *Trampe* enthusiastically as significant to their biking practice or their outlook on cycling; instead, it was a technology that some used to be pushed uphill and found that could offer some fun. Moreover, many

enjoyed being part of *Trampe* as a public theatre that attracted tourists. In this social world, the lift was a useful or not-so-helpful cycling instrument, an object of getting attention, and a tourist attraction, but not a technology that stimulated cycling. In this manner, the building of the bike lift had transformed the social world of the cyclists. To what extent did the tourists' domestication of *Trampe* mirror that of the cyclists, and how was their social world impacted?

The Tourists

Not long after its installation, *Trampe* started to gain attention from interested onlookers (Beverfjord 1998), and its popularity has continued to grow since (Åldstedt 2008; Rolfsen 2004). In 2017, the tourist information office "Visit Trondheim" described it as the second most prominent tourist attraction in Trondheim, only preceded by the medieval Nidaros Cathedral. They expected it to attract over 100,000 visitors per year, included *Trampe* in Trondheim's promotional material, and advised tourists to visit the lift. It had also become part of regular sightseeing routes.

Thus, the social world of tourists in Trondheim changed following the construction of the bike lift, which added an attraction to the list of entertaining sites. This change was reinforced by tourism professionals who have socialized *Trampe* as a unique and fun tourist attraction. Accordingly, the tourist office has been regularly contacted by journalists or TV producers from outside Norway who were interested in reporting about the lift. We interviewed a press manager who had worked at the office for fourteen years, and she said that she did not know how *Trampe* became so famous [she just laughed a bit at the question]. Then, she mentioned that Innovation Norway, the government's agency for supporting innovation and industrial development, had promoted the lift internationally. For example, Jeremy Head, a journalist for *Times Travel*, had contacted the tourist office in Trondheim via Innovation Norway. He authored an article that reached a large audience (Head 2016).

According to an internal evaluation, the lift already attracted substantial international attention in its first ten years of operation, for example, from *Lonely Planet* and *Discovery Channel* (Design Management 2005, 2). Jølsgard of the NPRA said he often had met people who knew about *Trampe* at conferences and urban planning events. Nevertheless, this attention had come as a surprise: "No, none of us had any idea about that. We were idealists, in the sense that we intended [the bike lift] to make it attractive to bike....It's really great though." *Trampe* has continued to attract a steady group of travelers. How did the tourists domesticate the lift?

During our observation period, we interviewed several tourists. Many said that they “just wanted to see it.” Some had watched videos of the lift and wanted to observe it in person. A man in his fifties said he had never seen such a thing before and described *Trampe* as “an adventure” when trying to use it (and falling off). Many visitors who did not wish to try using the lift found it fun to watch others. Most tourists described the lift as an exciting and entertaining oddity. If the lift was not working (which happened frequently) or did not have users, they just read the instructions and studied the lift’s appearance. When cyclists used it, onlookers usually approached to see how it worked and took photos and videos of cyclists going uphill. They sometimes also asked cyclists questions or made comments and uttered encouraging sounds. In this way, they engaged with the lift.

The tourists primarily domesticated *Trampe* as an entertaining attraction. The ensuing practice was viewing, maybe taking pictures or videos, and in a few cases, trying to use it. Their sensemaking emphasized the uniqueness of the lift, not least the fun of watching cyclists using it (or trying to). Thus, the domestication of *Trampe* in the social worlds of tourists and cyclists interacted in an amplifying manner. As we learned above, many cyclists appreciated tourists’ attention, which added to their experience with the lift. At the same time, the cyclists made *Trampe* more entertaining for the tourists. What about domestication in the local government’s social world?

The Local Government

Initially, the designers hoped they could get funding from a local program for sustainable transport. The City Council decided against this. Some of the politicians called the bike lift idea silly and a luxury. Local planning professionals joined in. Instead, they wanted to expand the city’s cycling network. To some of the public, investing in a lift for cyclists was controversial. For example, the project was criticized for being prioritized over making safe school roads for children outside the city (Kjølsvik 1993b). Another newspaper article quoted a survey that found that 60 percent of Trondheim citizens did not favor the lift, but young men with higher education were supportive (Granviken 1993).

Some local politicians said they wanted to stop the project, claiming not to have been adequately informed. However, the NPRA sent information about the *Trampe* project to all households in Trondheim in May 1992. An editorial in the largest local newspaper (Amdahl and Flikke 1993) characterized the political game of *Trampe* as a comedy, with the engaged local

politicians being far too late when trying to stop the project just a month before the opening. The other local newspaper claimed considerable political enthusiasm for *Trampe* (Rasmussen 1993). Probably, the fact that the National Public Road Administration (NPRÅ) funded the project made local politicians more positive.

When *Trampe* was opened, the Mayor of Trondheim participated, which signaled political support. As mentioned earlier, to influence the local government's domestication, the *Trampe* team argued that cycling was essential to a sustainable transport program and that a bike lift could stimulate people to shift from cars to bicycles. Despite some initial skepticism, this effort proved successful. For example, early on, some local planners began to see *Trampe* as having symbolic value to the city. Vodahl, the contact person between the municipality and the *Trampe* team, claimed that he had been positively inclined toward the lift from the start because he considered it a promotional project for Trondheim as a city for cyclists. "It's a signal that we invest in cycling. Here we do different things; we build cycling fields, cycling roads, pedestrian and cycling roads, and we promote cycling even with a bike lift." In the interview, Vodahl concluded that *Trampe* worked well as a signal project and mentioned a cycling conference they organized in 1998, *Velo Borealis*, as an occasion where *Trampe* played a part. In 2008, the idea of bike lifts made its way into the transport plan of the local government, which stated an intention to build more such lifts (Trondheim City Council 2011).

Thus, when *Trampe* was relaunched in 2013, there was little political opposition. Its domestication had been modified, above all the sensemaking. According to a local urban planner we interviewed, the most significant change was the recognition of the lift's tourist market value. It had become a significant attraction and no longer just a machine that pushed cyclists up a hill.

According to the same planner, the lift had also contributed to Trondheim's international reputation. The online newspaper *The Active Times* ranked Trondheim as the sixth-best bicycle city in the world (Sandberg 2013). Moreover, he argued that the relative importance of such sensemaking was increasing as the growing use of e-bikes diminished the functional value of the lift:

The symbolic value is increasingly important because it tells people that we're staking on cycling. It is a way to tell the city's inhabitants that we can do many things—also a bike lift.

Another interviewee, a communication professional in the local administration, emphasized that they used *Trampe* to advertise cycling to the

inhabitants when it re-opened in 2013. He was not directly involved with the lift but observed that it received much attention, which the municipality tried to exploit to make Trondheim's cycling commitment more visible:

After all, it contributes to making Trondheim's commitment to cycling visible. Although, in many ways, it is a curiosity. Obviously, it is helpful, but it's the only one in the world, so it gets much attention. In that sense...it shows that Trondheim is a city that invests in cycling. And I also think it creates a sense of pride within the city. And it's essential to get people to join in, supporting the transition to more environmentally friendly transport, and creating positivity and enthusiasm for it.

He also argued that *Trampe* had generated support for cycling:

Our goal is to get more people to cycle. It's not more complicated than that. Of course, the more attention cycling gets, the greater the chance it'll influence people to cycle. *Trampe* in itself...people don't start to cycle because of *Trampe*. But I think it creates a positive feeling.

There were plans to build bike lifts in Trondheim at five additional locations, but none of the interviewees believed this would happen. Vodahl said he never thought Trondheim needed more than one bike lift because *Trampe* was not an essential part of the cycling network. Jokingly, he argued that it was an advantage that Wanvik failed to transfer the bike lift construction to other cities. In this way, the lift continued to receive much attention. As a promotional technology, one bike lift suffices. However, as a confirmation of the lift's political support, the local government's *Bicycle strategy 2014–2025* presents *Trampe* as a success and suggests building three additional lifts (Miljøpakken 2014). A bicycle planner confirmed in 2023 that this proposal still was on the agenda but that there were no concrete plans due to the increasing use of e-bikes and the high maintenance costs of *Trampe*.⁵

In 2019, the NPRA asked Trondheim municipality to assume ownership of *Trampe* for free. They could no longer justify covering the substantial costs of maintaining the lift. The local administration hesitated, finding no room for the expenses in the budget. However, many City Council politicians expressed considerable enthusiasm for the lift as a cycling symbol and a tourist attraction (Skjesol 2021). Failing to find private economic support, in the end, the local government decided to grant the amount required for its technical division to maintain *Trampe* (Bråten 2021). Thus, its

domestication changed to include a practice of maintenance. Yet it was the positive sensemaking that was decisive to the survival of the lift. None of the politicians argued that *Trampe* was a silly luxury or a mistaken priority.

Still, a year later, the chief executive of the local administration proposed to close the lift due to the high maintenance costs. Nevertheless, the City Council decided to continue the operation and upgrade *Trampe*. One of the politicians argued that: “*Trampe* is a tourist magnet...It would be sad to close such a tourist magnet. Sometimes one must look beyond the expenditure” (Wallum 2022). Thus, the tourists’ domestication of the lift influenced its domestication by the local government, securing its survival at least for a few more years.

Why Trampe Survived But Did Not Spread

We have learned that the sociotechnical life of *Trampe* has been uncertain. On several occasions during the last 10–15 years, actors in the local administration have proposed to terminate the lift. It has survived mainly because of its domestication as a significant tourist attraction. Thus, its exotic position as the only one of its kind seems essential. This position is also paradoxical, given that many city planners and politicians worldwide have expressed considerable interest in *Trampe* and even visited Trondheim to see it, stating they were considering similar constructions. Why have no similar lifts been built in Trondheim or elsewhere?

We interviewed a planner from the city of Lillehammer, south of Trondheim and home of the 1994 Winter Olympics, who elaborated. In 2012, the local government of Lillehammer received economic support to explore the possibility of building its own bike lift. Its arguments emphasized the city’s hilly topography, the political support for cycling, and the expectation of more tourism. After a visit to Trondheim and contact with the French builder of the 2013 version of *Trampe*, the Poma group, the local government received an offer of NOK5 million (approximately USD450,000) to build a bike lift. However, they declined the offer in the end. The high maintenance costs were the main reason, in addition to the growing popularity of e-bikes. In addition, the lift was criticized as not universally accessible, and the local resistance to the project was substantial.

The actors in the *Trampe* team said they were not surprised that such bike lifts were not built in other cities. They concurred with the interviewed planner from Lillehammer and emphasized the size of the investments, the maintenance costs, the operational instability, and the growing popularity of e-bikes. Outside Trondheim, the sensemaking of building bike lifts

like *Trampe* was negative. The shape of the lift changed into something that was not considered sufficiently attractive, given the cost. This shaping of the bike lift as expensive and unreliable has contributed to *Trampe* remaining unique and thus its continued survival as a significant tourist attraction in Trondheim.

Still, the present bicycle plan for Trondheim municipality suggests that three more bike lifts may be built, but in 2023 there were no concrete plans to construct them. Also, in Trondheim, cost concerns prevent any new initiatives, but the municipality is trying to find ways to make *Trampe* more robust so it requires less maintenance. If new lifts were to be built, that would probably mean a return to the original shape, in which bike lifts are primarily part of the cycling infrastructure to encourage more people to bike rather than tourist attractions. Thus, the robustness of bike lifts' sociotechnical lives would hinge on their functional abilities and cost-effective maintenance.

In the end, we may see that the main opposition to building more bike lifts like *Trampe* comes from nonhuman actors. We have already observed the disruptive effects of e-bikes, which facilitate hill climbing. In addition, we could say that *Trampe* itself has constrained further diffusion due to the mechanical weaknesses that make the bike lift unreliable and expensive to maintain.

Conclusion: Shapeshifting Makes the Sociotechnical Life of Technologies More Robust

This article contributes to STS by introducing and exploring the concept of shapeshifting technologies, i.e., technologies that change meaning and practice when moving between social worlds. To this end, we have explored the sociotechnical life of *Trampe* by analyzing how it has been domesticated from when the bike lift was first built in 1993 until 2023, in the four main social worlds it inhabits: those of its designers, the cyclists, the tourists, and the local government. We have also investigated why no other cities have built a similar lift despite having expressed considerable interest, finding that investment and maintenance expenses alongside the growing popularity of e-bikes were significant.

As we have seen, *Trampe* is arguably an endangered technology; there have been several initiatives to close it down. Its main weaknesses are operational irregularities, costly maintenance, and the widespread use of e-bikes, making the lift less relevant as a biking infrastructure. Still, its sociotechnical life has proven robust due to its shapeshifting qualities; above all, its combined features as a bike lift, a signifier of Trondheim's bicycling

policy, and a prominent tourist attraction. Its unique quality as the only technology of its kind has been vital to its survival.

When *Trampe* moved between these four social worlds, it was shaped by them but also changed them in ways that demonstrate how the introduction and domestication of technology in social worlds intersect and interact. Its sociotechnical life began with the designers and the cyclists as a bike lift, scripted to require the ability to balance a bike uphill using a pedal, then moving into the local government as an instrument to promote cycling, and into the social world of tourists as an attraction to watch and photograph. When *Trampe* became an object of tourism, so did the cyclists using the lift: cyclists were no longer just people who biked, they also became entertainers. Similarly, in the social world of the local government, *Trampe* changed the understanding of what could make Trondheim attractive to tourists and demonstrated a commitment to improving cycling conditions. The four analyzed social worlds are distinct but overlapping discursive universes. They interacted to provide awareness of the domestication efforts within them. Moreover, the multiple shapes were not exclusive and enacted in response to different contexts. Thus, they did not render *Trampe* unclear in meaning, but allowed for diverse interpretations.

An important implication for STS is that analyzing the domestication of technology drawing on a social worlds perspective may offer new insights as a strategy to observe shapeshifting qualities. This differs from arguments put forward by Pinch and Trocco's (2002) and Johannessen, Nordtug, and Haldar (2023). The study of *Trampe* suggests that shapeshifting qualities may be essential for some technologies to remain in use, thus prolonging their sociotechnical life. Benefits to a single or maybe even two social worlds may be insufficient for implementation and subsequent survival. STS research could benefit from focusing more on the sociotechnical life of technologies to analyze their potential demise and what actors may do to extend their lives. When a shapeshifting technology provides diverse benefits to several discursive universes by affording multiple positive interpretations and practices, this situation may help its social embedding. Concerning existing technologies, shapeshifting qualities may provide for a continued sociotechnical life despite critical sensemaking in some social worlds. If shapeshifting qualities are reduced or disappear, the impact may be disruptive.

The framework of sociotechnical life and shapeshifting developed in this article is applicable to analyses of technologies other than *Trampe*. We invite such applications.

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Notes

1. "Information about the bicycle lift *Trampe*." Letter to the Centre for the Advancement of Sustainability Living from Erik Jølsgard. 2009. The NPRA archive.
2. We conducted semi-structured interviews with key actors in the social worlds of designers and the local government between May 19 and July 26, 2017. Interviewees included the four leading actors developing the lift: the inventor Jarle Wanvik; Erik Jølsgard, employed by the NPRA; Svein Bjørn Vodahl, employed in the Trondheim local administration; and the electrical engineer Magnar Wahl. In these interviews, we elicited recollections about how the idea of *Trampe* was concretized, the intended script of the lift, controversies

surrounding its construction, and the maintenance and daily running of the lift in its earliest period.

In addition, we interviewed an NPRA employee who was involved in the 2013 update of *Trampe*, the primary lift service operator, two representatives from the main tourist information office (Visit Trondheim), a tourist guide, and a Trondheim local administration employee. These six anonymized interviews focused on the maintenance and funding of the lift, and the importance of *Trampe* to the city. We also interviewed an employee in Lillehammer municipality about how other cities considered building similar bike lifts. The interviews were conducted next to the bike lift, in some respondents' offices, or at cafes. One was done by phone. They lasted approximately half to one hour and were recorded and transcribed verbatim.

3. The archival material was mainly collected from the NPRA. It consisted of 52 documents from 1993 to 2009. These included several applications to get permission to build the lift, formal contracts (for example between Wanvik's company Design Management A/S and the NPRA) with technical descriptions and financial estimates, yearly reports, operation and service agreements, several evaluations of the *Trampe* project, and letters from interested parties, nationally and internationally.
4. Newspaper articles were identified using the Norwegian University of Science and Technology NTNU library database from 1992 until 2002, and the media base Retriever articles between 2002 and 2019. The search words were "*Trampe*," "sykkelheis" (English: bicycle lift), and "cyclocable." The 2002-2023 search produced 139 unique hits across diverse media outlets, while the 1992-2002 search was done manually in key newspapers (*Adressavisen*, *Bergens Tidende*, and *Aftenposten*), resulting in 79 articles. We studied the articles using thematic analysis.
5. Local planner in Trondheim in an email to the authors, 3 October 2023.

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