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Building the Future? Software Workers' Imaginaries of Technology

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Abstract: This article investigates an actor's perspective on digital capitalism. We study software workers' orientations towards their work by focusing on the social use value they attribute to it. The concept of use value allows us to examine the contradictions software workers might experience in digital capitalism. Drawing on the literature on the control of software workers and the New Spirit of Digital Capitalism, we identify hindrances to the workers' claims of a social use value and explore the imaginaries of technology which might form the basis for a critique or legitimation of digital capitalism. We find that software workers hold strong claims of a societal use value towards their work. While their ethos of good technology forms a strong foundation to critique hindrances they perceive in creating useful technology, imaginaries of technology as an autonomous force might delegitimise the workers' claims.

Keywords: software workers, digital capitalism, imaginaries of technology, Spirit of Capitalism, use value of work

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1. Introduction

This article investigates an actor's perspective on digital capitalism. There is a lot of research on the business model of digital capitalism (Pfeiffer 2022; Nachtwey and Staab 2016; Seidl 2023) and on its cultural basis: the Californian ideology and its Solutionist worldview (Barbrook and Cameron 2001; Nachtwey and Seidl 2023). There is also a growing field of research on tech workers (Dorschel 2022a; 2022b; Ziegler 2022; Daum 2021; Thompson 2019), which especially focuses on coders as a new social class and on their subjectivity understood as "cultural self-understandings, attitudes and motivations towards labour" (Dorschel 2022a, 295). Engaging with a strongly sub-

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ject-oriented perspective on work-related orientations, this paper expands this literature and investigates software workers'[1] interpretations of their experiences in digital capitalism. By examining the software workers' orientations towards their product and the way they interact with their work organisation and imaginaries of technology, we link a subject-oriented approach with the debates on digital capitalism and its ideology.

In the following, we will first elaborate the theoretical background of our empirical study, which is informed by Marx' concept of the use value of commodities. This concept allows us to closely examine subjective orientations towards one's work product in light of the contradictions of the capitalist organisation of labour. In order to contextualise the software workers' claims of the use value of their product, we also turn to the literature on the control of software work and the Spirit of Capitalism. From this engagement with the literature, we derive the analytical framework for analysing the software workers' orientations. After a brief presentation of our research methods, we present our findings regarding respondents' claims of the use value of their work product, hindrances they experience in fulfilling their claims and imaginaries underlying these claims. We find that different imaginaries of technology can either support forms of critique of digital capitalism or immunise digital capitalism against critique.

2. Theoretical Background

Software workers play an important role in digital capitalism. They work for companies creating software for the digitalisation of work in other sectors and that represent the vanguard of innovations in technology and work organisation (Holtgrewe 2014, 9). Thus, they hold "inscription power" (Dorschel 2022b, 1303) by producing software for others, all the while being subjected to control and ongoing restructuring of their work process. Agile work organisation is one example of transformations in the software world trickling down and spreading into other sectors and spheres of life (Daum 2021, 34) and becoming a broader organisational strategy (Pfeiffer, Nicklich and Sauer 2021, 2). As Seidl's definition of digital capitalism stresses, digitalisation "is both transformative of and driven by capitalism" (Seidl 2023, 2). Hence, we cannot understand the processes of digitalisation and capitalism as separate from each other (Seidl 2023, 3). Thus, this paper investigates software workers' orientations towards the product of their work in the context of both the capitalist organisation and control of their work and the cultural underpinnings of digital capitalism.

In the following, we will present three strands of literature that form the basis for our empirical investigation of software workers' claims of the use value of their work product. Studies of subjective claims towards work draw our attention to the use value of one's work product as a possible source of critique of alienating working conditions. Studies on marketisation and new forms of control of creative work hint at structural constraints to these claims. Studies of elite discourses in digital capitalism detect Solutionism, the belief in technological solutions to social problems, and direct our focus to software workers' imaginaries of technology and the critique or legitimation of digital capitalism they imply.

First of all, by studying subjective orientations at work, we follow the tradition of subject-oriented studies on work consciousness. These studies have highlighted that

[1] We use this term to investigate high-skilled tech workers in the software industry. The sample includes workers with different job descriptions who are, however, all involved in technological aspects of software development: nine software engineers, two software architects, two project leads, one data scientist, one solution manager, one cloud engineer and one software consultant.

workers are no mere product of the working conditions and discourses around work and that their orientations do not reflect neoliberal individualistic norms (Hürtgen and Voswinkel 2017, 114). Besides moral claims of justice which have come under threat in the context of precarisation (Menz 2021, Hürtgen and Voswinkel 2017), recent research finds other claims towards work: Menz identifies claims of rationality (2021, 133-134) as part of professional morality. Hardering highlights value conflicts around professional standards of the quality of work as one barrier to meaningful work experiences (2020a, 197).

In this context, Sarah Nies investigates 'work-content-related interests' in the usage of one's product and the impact and purpose of one's work (2021, 37). Instead of seeing these interests as leading to ever more self-exploitation (2021, 32-33), she stresses their critical potential. She contends that the engineers she studies are more interested in the content of their work and its impact on others and society than in self-fulfilment or other individual self-interests (Nies 2021, 36-38).

Nies' interpretation draws on Marx' identification of the "twofold aspect" (Marx 1987/1859, 290) of the commodity: the use value and exchange value. This distinction lies at the heart of Marx' labour theory of value and guides our study of software workers' orientation towards their work product. The use value depends on the physical properties of an object that grant satisfaction of human wants and needs. As a quantitative measure, the exchange value abstracts from the qualitative properties and use value of commodities and relates the value of one commodity to the value of another. In capitalism, the measure creating this equivalency between qualitatively different commodities is labour time (Marx 1987/1859, 290-293).

Nies sees this distinction as a cause of alienation: Creating an exchange value makes one indifferent to the content of one's work and thus alienates the worker from his product (Nies 2015, 28-29). However, Nies stresses that the worker might still hold an interest in the use value of the product, which can be in conflict with the entrepreneur's interest in its exchange value (Nies 2015, 30-31). Nies explores the critical potential of this contradiction between claims of the use value of work and management's interests in valorisation (Nies 2021, 28-29). This directs our research interest to how software workers perceive the use value of the technology they create.

In order to study the way software workers experience the pressures of valorisation in their work, we turn to the second strand of research on the control of creative work in digital capitalism. While capitalists always need to control their workers in order to make sure the labour power they purchased is exerted to their benefit, this control becomes more difficult in the realm of creative work. The software workers we interviewed perform creative labour as they create novel software solutions or adapt them to customers' needs. Hodgson and Briand emphasise the conflict of creative work with commercialisation and the difficulties for management control due to the unpredictability of its outcomes (2013, 311).

Various studies have pointed to the effects of agile work methods and marketisation on digital work. ÓRiain identifies the project deadline and technical specifications as a translation of market pressures into the work process (2010, 337-45). Barrett stresses the tension between the control exerted by time and market pressures and the necessary technical autonomy in software work (2005, 177-178). Even though agile methods started as a critique from software workers themselves (Beck et al. 2001), for Daum, they provide the means for the real subsumption of mental labour to capitalism (2021, 35). Agile methods include customer feedback from the beginning and incremental improvements of the software instead of delivering one tested version at the end of a project (Daum 2021, 31). Hodgson and Briand notice in their study on agile teams how

agility creates “a powerful ideological form of control” (2013, 322), as autonomy and emancipation are limited to the choice of tasks and work methods but not expanded to important decisions such as targets or resource allocation. Barrett shows how hybrid strategies of direct control and responsible autonomy, as Friedman (1977) described it, uphold the myth of creative and autonomous magicians (Barrett 2001, 32). In sum, this research points to two mechanisms of agile work methods: It translates market imperatives into work and motivates work by veiling hierarchies. This research raises the question of how workers perceive different forms of control as furthering or hindering the creation of use value in their work.

The third strand of literature we build our study on is the research on the Spirit of Capitalism. This literature is based on the assumption that capitalism relies not only on formal modes of control but also depends on a cultural basis. Developing Weber’s proposition that the rise of capitalism relies on an ethos motivating actors and legitimating their actions (Weber 2016/1904-1905; Nachtwey and Seidl 2023), Boltanski and Chiapello (2005) argue that capitalism is in constant need of legitimation to uphold participation in this otherwise irrational and unfair system. The two authors study management literature and track changes in the normative order of capitalism over time. Their study provides evidence for a new, project-based order. This analysis includes a dynamic conception of the orders of worth supporting capitalism, as capitalism constantly faces critique and needs to change or incorporate this critique in order to survive. Drawing on this theory and analyses of the culture of Silicon Valley (Turner 2008; Barbrook and Cameron 2001), Nachtwey and Seidl (2023) find a new normative order in the speech of tech elites: the Solutionist ethic. This ethic justifies the activities of tech firms by equating economic success with the solving of humanity’s problems. The term ‘Solutionism’ was coined especially by Evgeny Morozov and does not only describe the belief in technological fixes to social problems but also criticises a misidentification of complex social problems as “neatly defined” and “easily optimized” (2013: 6). A Solutionist ethic thus strongly builds on a certain conceptualisation of technology, its characteristics and its role within society. Since the theories on the Spirit of Capitalism study elite discourses, we know little about whether Solutionism resonates with subjective work orientations. Thus, we study the software workers’ imaginaries of technology, which might shape how workers conceptualise the use value of the technology they create and thus further contribute to a legitimation or critique of digital capitalism.

These three theoretical approaches inform our analysis of software workers’ orientations towards their work product. First, we ask how software workers conceptualise the use value of their work product. Then, we turn to the hindrances they see in fulfilling these claims within their work organisation. Thirdly, we investigate how software workers imagine technology and how they interpret technology’s role in society. This informs us about their professional ethos, which might form the basis for critique or legitimation of digital capitalism. By analysing these three aspects of the orientation of software workers towards their work product, we aim to answer the following research questions: How do software workers make sense of their work and their role in society in light of the contradictions of their work process? And how do their orientations relate to a critique or legitimisation of digital capitalism?

3. Data and Methods

As a part of the larger research project *Digital Alienation and Appropriation of Work* conducted in Germany and Switzerland, we interviewed 17 software workers in both countries. The interviewees were recruited online between June 2020 and August

2021 according to the principles of qualitative, theoretical sampling to achieve maximum contrast (Kelle and Kluge 1999, 44-46). The sample includes five female and 12 male software workers between the ages of 27 and 58.[2] The interviews were mostly conducted online through video call software due to the COVID-19 pandemic.

The semi-structured interviews (Hopf 1995, 177-178) focused on the respondents' everyday work experiences, their evaluation of their work, and the meaning of work for them and society. We conducted the analysis in two steps: In the first round, we conducted descriptive case analyses focusing on the main topics of the interviews in order to identify sufferings and coping strategies, norms and values and definitions of work and technology. In the second step, we performed an in-depth linguistic analysis of selected segments of the interviews. We directed the analytical attention to the segments in which the software workers spoke about the quality of their product and the meaning of their work for society.

The analysis adhered to the principles of Jan Kruse's *integrative basic procedure* (2015), which builds on a thorough linguistically informed description of the material. For the purposes of this study, we focused on agency and metaphors (Lakoff and Johnson 1980). Building on detailed case analyses, we searched for patterns and overarching motives throughout the interviews by contrasting and comparing (Kelle and Kluge 1999, 75-76). These steps connect to the principles of abductive analysis (Tavory and Timmermans 2014; Timmermans and Tavory 2022; Yuill 2017), which focuses on finding surprising aspects of the data in order to extract patterns, similarities and differences (Tavory and Timmermans 2014, 125-126) to create a dialogue between theories and the data for theory construction.

4. Analysis[3]

In the following, we will present our analysis of the respondents' interpretations and orientations of their work focusing on the claims of a social use value of work, the hindrances to fulfil these and the imaginaries of technology and its role in society. The way people imagine technology's role in society is an important aspect of their professional ethos and of how the contradictions between their claims and the work organisation they experience are translated into a critique of capitalism or rationalised and legitimised by imaginaries of technology.

4.1. Claims of the Use Value of Work

Generally, we find that the respondents do not merely seek self-fulfilment and a pleasant work experience in their job, even though this is an important aspect of work for software workers.[4] Confirming Nies' point, we find a strong orientation towards the social use value of the software workers' product in the interviews. They conceptualise the use value of their work on two different levels: as a use value for society at large, technological progress and all of humanity or as a use value for individual others. Some

[2] The gender imbalance reflects the male dominance of the field. Even though we attempted to over-represent female software workers to capture more contrast, we believe that this was further complicated by child-care responsibilities during the COVID-19 pandemic, which might have disproportionately been taken on by women.

[3] The quotes marked with a (*) have been translated from the German transcripts to English. All quotes were corrected and simplified for better understanding.

[4] This orientation towards fun and interesting tasks is epitomised by one statement about the meaning of work: "*If I didn't have this job, I would have to provide riddles for myself, I'd be pretty bored*." (Daniel*)

interviewees also actively reject the notion of work having a greater meaning. The following section takes a closer look at these different ways of relating to the social use value of one's work.

4.1.1. Use for Society at Large

Speaking about the use value of their work, respondents at times refer to society, nature or humanity as abstract entities benefiting from their work. Technological progress then appears as necessary for the progress of society, for welfare and prosperity and for the development towards a more sustainable economy:

> "And I do believe that it allows for many people to live together, to have enough food […] and that it makes a contribution." (Thomas*)

The orientation towards humanity or society is based on an abstract understanding of work as related to society and on a positive notion of (technological) progress. Seeing this abstract form of a use value for society also entails a claim of building something that lasts and that benefits a large number of people. Accordingly, if the products are never used or only benefit a very limited number of people, the respondents question the use value of their work.

This orientation towards a greater good builds on norms and values that are not purely economical, yet do not necessarily stand in contrast with economic criteria. While some stress the use of their products by governments or public services, drawing the picture of a greater good outside of the economic sphere, many also express "believing in the mission" of their company or increasing economic efficiency through their products. This implies a concept of the economy as a force of good, which creates welfare, and of companies as political and social actors with a mission to better society. This contains elements of the Solutionist ideals of technology as a solution for social problems. However, our respondents do not adhere to the strong belief in the inherent value of technology per se.

We detect this more critical view in another way of perceiving one's work as a contribution to a greater social good: imagining one's role as an expert, translator, and a bridge between society and technology. This can entail an understanding of technology carrying not only benefits but also risks for society. In this sense, Leo sees it as a contribution to society that he tries

> "to achieve the balance and that technology doesn't have to be employed everywhere." (Leo*)

Another way to conceptualise this role as a translator is by stressing societal norms and values one inscribes onto technology, for instance by ensuring data security. This motif stresses the political character of technology and the software workers' privileged role as experts in the field rather than the inherent benefits of technology that Solutionism assumes.

However, not all respondents share this concern for the social use value of their work: We find respondents who downplay or outright refute the notion that their work has an impact on society. This can represent a rejection either of Solutionist claims to change the world through technology or the moralistic claims to a meaning of work for society in general. Some see themselves modestly as cogs in the machine who cannot claim that their small contribution changes the world. Others believe that work is not the sphere in which they can "*combat world hunger*" (Tina*). Sometimes, this rejection

stems from a sceptic view on the greater good of economic developments, such as automation. Other times, the respondents stress that they seek a social impact outside of work. However, none of the respondents are completely indifferent towards the quality or the impact of their work. Even when they downplay their impact, most respondents stress that they would not do a job that was harmful to society, for example in the weapons industry. This still positions them as moral actors:

> "It is important to me is that it doesn't necessarily destroy the planet or put other lives at risk, but for me right now, I'm not a strong idealist, who has to see a super deep meaning in her work." (Tamara*)

4.1.2. Creating Use Value for Individual Others

A slightly different concept of the use value of work is more concretely aimed at other individuals. Doing something good is then understood as helping others, customers or colleagues, which reveals a strong social orientation. The software workers often explicitly mark creating use value for others as something that reaches beyond the economic sphere: Their work can create a cheerful event among colleagues, make someone "*smile*" (Damian*) or be about not letting others down. This orientation towards others provides motivation to do the job well. The engineering ethos of efficiency guides this idea of a use value for others. While perfection beyond a certain point does not translate into extra profits in the software industry, this orientation is still often very compatible with the companies' interests, for instance when it motivates doing extra hours to fix a bug for someone.

However, the implied values of reciprocity, trust and altruism for some contradict or seem incompatible with economic motivations. One respondent explicitly criticises that acts of altruism are sometimes a part of the performance evaluation. This seems "*weird*" (Judith*) to her, as she stresses that performance evaluation is not her motivation to help colleagues. This shows that she perceives a contradiction between social orientations and economic valorisation and control processes, which in her eyes devalue or threaten her acts of immediate kindness.

4.2. Hindrances

Having explained the claims software workers make regarding the use value for society at large or for other individuals, we can turn to the way in which respondents experience and interpret constraints and pressures of the digital economy, which make it harder for them to perceive their work as useful. These include time pressures, market pressures, irrationalities in their work process and contradictions between technological ideals and digital capitalism.

4.2.1. Time Pressures

Most software workers complain about time pressures in an ever more stressful and short product cycle. Especially those who have been on the job for a longer period of time, diagnose an acceleration of both technological developments and product releases. The following statement laments this ongoing escalation:

> "You always think it can't get any worse but it gets worse every time. (laughs) So twenty years ago it was different from now. (laughs) It's just ever tighter cycles, less and less people who have to do more and more." (Tina*)

The respondents report many ways in which this affects them. Firstly, they point out that the speed of technological development and agile work methods means that they have to adapt to new technologies and shift between projects quickly. They describe this as tiresome and obstructive to immersion in coding and concentration. Software workers are required to respond immediately to customer demands, which further fragments the workday. Secondly, they perceive the short cycles as endangering their professional ethos. Time pressures lead to less time available to stay up-to-date on technological developments or to perfect the product. Thus, the software workers might feel forced to deliver products that are not up to their own quality standards. They feel like they have to tinker with the software instead of being able to plan and build it thoroughly. Thirdly, the interviewees' accounts suggest that time constraints also affect the software workers' own work processes: Short and tight cycles make it impossible to update the companies' own technology or processes. The fast and flexible production of technology also entails ever-changing teams in projects. This might lead to frustrations with the initial social and infrastructural groundwork necessary every time. The short technological cycles can lastly lead to frustrations, as one's work can become superfluous when the company decides to shift to different technological products. The product that a software worker had offered and prepared for a customer might not be in the portfolio anymore by the time it is finished. Generally, the acceleration of technological developments challenges claims that the interviewees hold regarding the use value of technology, as the workers feel that time pressures not only worsen their work experience but also the efficiency and quality of their product.

4.2.2. Market Pressures

Time pressures are in part a result of market pressures, as they arise from attempts to keep the labour costs for a product as low as possible and to deliver a product quickly and efficiently in a competitive environment. Yet, market pressures and the market's logic also translate into the software workers' everyday work experience in other ways. The pressure from customers to create a cheap product limits the available time and effort one can put into the software. According to one software worker who consults customers, the economic pressure leads to a downward spiral: The demand for cheap products negatively affects the quality, which then leads to less and less willingness to pay large amounts for the products. Here, the use value for the customer is diminished more and more as the concerns for the costs and customer expectations prevail. Another problem amplifying the time pressure is a lack of resources especially for consultants and architects. They rely on other workers to write the code for their projects but cannot find anyone available to do the job. This leads to what a respondent calls "*negative stress*" (Thomas*): A tight deadline is accompanied by external challenges such as insecurity regarding the availability of necessary resources. Thus, the interviews suggest that market pressures and understaffing aggravate time pressures as they limit the software workers' agency to do their jobs as they believe they should.

A second aspect of market pressure that surfaces in the interviews is that respondents claim that the profit orientation of their firm hinders innovations. Innovations do not lead to immediate measurable economic value and require a lot of resources initially, which makes them hard to argue for vis-à-vis the company:

> "Innovation is always welcome, but innovation brings surplus value a lot later […]. Especially in the initial phase, it's only resources and at least then you can achieve something quickly. But after that to reach a point where there is surplus

> value, basically a return on investment, that takes a long time, it's hard to bridge that." (Leo*)

This statement not only shows how the respondents' future-oriented drive to create a use value is blocked but ultimately also puts capitalism's ability to enable the innovations it relies on into doubt. Many respondents share ideas for innovations in their work process and in the firm but are not given the time to create them.

Even though respondents complain about the market pressures and time pressures of their work, they seem resigned and perceive this as something unchangeable. One respondent complains there is always too much to do but assumes that "*it's like that everywhere*" (Judith*). She seems to see no alternative to her stressful work organisation.

4.2.3. Irrationalities of Work Organisation

Other hindrances to experiencing one's own work as creating a use value result from the characteristics of the capitalist management of work. Some grievances regard the companies and their management directly. Respondents recount instances of bad management, which makes their jobs harder. Sudden and far-reaching decisions, for instance about the software used in the firm, greatly impact how the respondents work. Here, frequent changes can obliterate their work results and lead to feelings of insecurity and powerlessness. These feelings are intensified by the fact that the software workers do not always seem to have a grasp on firm strategies. One respondent complains that many projects are left unfinished, which makes her work feel useless and like a waste of time. She is unsure whether this is bad management or a necessary strategic move. By acknowledging this might be necessary for the company's economic interests, she puts into question the legitimacy of this claim of a more beneficial use of her own time.

4.2.4. Contradictions between Technological Ideals and Digital Capitalism

Besides the contradictions between market pressures and the requirements of innovations, there are other ways in which technological ideals and the structures of digital capitalism clash for the respondents. Negative experiences also stem from a perception of the way their work is organised countering their ethos of efficiency (Thompson 2019, 117-120) and of avoidance of redundancy. This engineering ethos clashes with the logic of competition in the software industry, which creates incompatible technological ecosystems and redundant offers of proprietary solutions. In this context, one respondent claims that technology is too fragmented:

> "I think what is a challenge at the moment is fragmentation of technology. In the sense that you have a lot of small cloud things that are not compatible with each other and then you have to integrate them. This is stupid. […] I think it's a bad direction to go." (Frank)

For Frank, the idea of an efficient technological solution is undermined by the diversification that capitalist competition brings about. Besides the inefficiency of incompatible technology, Emil further complains that his innovations have less of a use value for society because of the redundancies due to competition in capitalism:

> "there is also like competitors, so like, it's not as meaningful as if we would impact the whole area […]. […] This is a tool that is actually not really needed in

> the market, because there are tools out there which all are doing the job, it feels like it's just not as meaningful as if I were to create a tool that is not covered yet." (Emil)

Here, he conjures up the image of creating a real novelty. He complains that his software is offered on one platform while he "*believes in a multiplatform solution*" (Emil). Many other respondents share a preference towards open-source technology. Proprietary software in a competitive environment thus limits the use value of software work: The respondents create knowledge and a product that might be redundant, not open to users and other developers, and incompatible with other technologies.

Another way in which the capitalist organisation of one's work hinders the perception of a social use value is the limited and short-term orientation some respondents ascribe to companies. One respondent explicitly calls out that the horizon of his work is "*limited to the moment or the near future*" (Sebastian*). He also criticises the limited orientation towards the company's profit and voices a claim to work for the greater good:

> "A firm limits itself somehow more to the use that something has for the firm itself, but we should maybe also concentrate more on the use for all of society and for us as a community and that is less present in our firm." (Sebastian*)

These critiques point to the inefficiencies and irrationalities of the capitalist organisation of work, which contradict the software workers' ideals and norms of how to benefit society at large and further technological development. The logic of capitalist organisation that the respondents observe stands in contrast to ideals of technology and its long-term benefits for all. However, even when the respondents criticise the irrationalities, the economic demands sometimes appear as unchangeable rules. One respondent speaks about how his product reduces work for others. "*And then we get more work, but that's how it works."* (Frank) This implies a resignation to the irrationalities of the economic world.

4.3. Imaginaries of Technology

In this last section of the analysis, we try to identify ways in which respondents imagine technology, its development and its role in society. This adds a background to the respondents' claims of a social use value of their work and the hindrances they perceive towards actualising this claim. These three imaginary meanings of technology and its development in the future structure software workers' interpretations and orientations at work. We argue that the different ways of perceiving technology provide resources to either form a basis on which the voiced grievances can result in a (direct or indirect) critique of capitalism, weaken the legitimacy of the voiced claims or serve as legitimation for capitalism. We identify three main ways in which respondents imagine technology: as an autonomous force, as a tool and as a world of its own.

4.3.1. Autonomous Technology

First of all, software workers often describe the development of technology as something inevitable that determines society. We find metaphors, which make technological development appear as something inevitable, or even metaphors of technology as a biological organism. Within this concept, technological progress appears as an auton-

omous process that cannot be stopped. Even the software workers sometimes describe having little to no agency over this process. From this perspective, criticising technological development makes no sense, as David's comparison expresses:

> "I can criticise that the sun goes up in the morning, but that doesn't change anything." (David*)

Technological development appears to be fueled by human nature, which always strives to "*make things better and faster*" (Tamara*). Within a biological metaphor of evolution and environment, society has to evolve with the accelerating evolution of technology:

> "Like, the tech will evolve as usual, it will go faster and faster and society will change, which is not so sure in which direction and how." (Emil)

Vis-à-vis the development of technology as an autonomous process or even as a force of nature, the respondents see society, the companies and themselves in a reactive role, having to keep up and evolve to stay up-to-date. This makes society and humanity the object instead of the driver of technological development and ascribes transformational power to technology in the entire social sphere. This also weakens the claims of better working conditions, as the constant changes in the software industry are a legitimation for the stress at work:

> "Yeah, it's just the way it is. [...] IT […] became a little bit of a stress-profession generally." (Hannes*)

These statements naturalise the current state of technological development in a capitalist setting and leave no room for possible alternative ways of organising it. Granting technology this autonomy might be the framework within which claims of a social use value are delegitimised. Whether this technological progress is seen as a positive force or not, social agency is reduced to reactions to technology.

4.3.2. Technology as a Tool

The second concept of technology we identify is that of technology as a tool. The respondents disenchant myths of software being "*magic*" (Frank) and compare software to tools such as "*hammers*" (Hannes*) or "*ploughs*" (Frank). Within this view, software workers have a humble concept of their work: They merely create the infrastructure for others and mirror the processes of customer businesses to build a tool that fits their requirements.

Thought of as a tool, software lends itself to good as well as bad purposes. This leads to the belief that software workers need a "*moral compass*" (Damian*) for their work and that they hold a position of responsibility to contribute to a "*balance*" (Leo*) in the deployment of technology. It also includes the call for political regulation of technology:

> "So it is becoming more and more important that government has a clear vision, how do we as a society want to allow modern technologies to change our life and how not." (Tamara*)

This perspective on technology rejects Solutionism's view of genius tech entrepreneurs changing the world. Seeing technology as a mere tool can form the basis for a strong

professional ethos though. Beyond the ideal of efficiency, this ethos for some respondents includes concerns for the social effects of technology and a call for morality and political debates at work. However, this view can also detach work from the political sphere and delegate personal responsibility for a broader societal use value to other social actors.

4.3.3. Technology as its Own World

The third imaginary present in the interviews is that of technology as its own world. Software workers sometimes use metaphors of a world or universe to describe technology, which implies different rules, a different language and barriers between the worlds. This is connected to an imaginary of immersion into software work:

> "You can imagine little worlds of software, which is what I find great. Because it's always like a little universe that you are inside of. And I can move inside it." (David*)

This immersion grants software workers a privileged position, as they are the gatekeepers to the technological world. When in contact with customers, they have to "*translate*" between the technological world and the world of the customer. They work "*on the edge of where the user and the machine meet*" (Frank). Within their firms, sales departments are conceptualised as a different world. This shows how different and irreconcilable the economic and technological requirements seem to the respondents.

This view on technology emphasises its own logic, which is different from that of the economy or society at large. This can form the foundation for a (functional) critique of capitalism arising from the experiences of capitalist inefficiencies and the contradictions between market pressures and the logic of technological innovation. However, it might also weaken the legitimacy of the critique of time pressures, as it creates the imaginary of a separate technological sphere, which, similarly to the image of autonomous technology, might legitimise technology's impact on work in digital capitalism.

4.4. Discussion

This analysis of the claims of social use value, the hindrances in fulfilling them and the imaginaries of technology brought several aspects to the fore:

- The respondents hold strong claims towards work that are connected to the use value of their work. They thus position themselves as moral actors with a social orientation. While this can imply working for a greater, societal good, some focus on the use value for the people in their immediate environment. Besides a strong professional ethos, the claims of a social use value are sometimes based on altruistic values. Of course, these claims of a social use value exist alongside more individualistic orientations towards a good work experience.
- The economic pressures and resulting time pressures make it difficult for the respondents to adhere to their own quality standards. This hints at a new form of alienation, resulting not from a lack of autonomy but from "a gap between professional ethics and economic requirements" (Hardering 2020b, 48). Limited resources and the capitalist logic of competition are also named as hindrances to creating a use value for society at large. However, we find different expressions of these contradictory experiences. At times, respondents clearly name and criticise the economic dynamics that cause these experiences. But they also often describe these experiences as an inherent characteristic of the economy or the technological field. We

thus turned to the imaginaries of technology in order to better understand how these experiences might relate to critique and why some claims might not seem legitimate in the first place.

- We identify three metaphorical conceptions of technology in the interviews: Technology as a natural force, as a tool and as its own world. These imply different conceptions of human and social agency vis-à-vis technology, of technology's usefulness and thus of the legitimacy of claims of the use value of work. Viewing technology as a natural force strongly limits society's and the software workers' agency and might naturalise the constraints of digital capitalism as inevitable consequences of how technology works. The imaginary of technology as a tool separates production from application and thus allows for a critical view on technology's impact on society. Negotiating technology's uses and impacts on society is then a political task. While this implies democratic principles, it might limit the legitimacy of a claim to positively impact society through work by attributing conflicts about technology's beneficial use to the political sphere and outside of work. The imaginary of technology as its own world also grants technology a certain autonomy and makes the respondents responsible gatekeepers to this world. This perspective can be the basis for a critique of economic imperatives as they are construed as external forces contradicting technological requirements. Here, the software workers might become the ambassadors for technological ideals they cherish and protect against economic dynamics.

First of all, these findings support Nies' (2021) theory: Software workers hold strong claims of a broader use value of their work. For these workers, these claims are closely connected to a rationalist or functionalist critique of capitalism, which sometimes hampers technology's potential. While these claims are often compatible with the firms' interests, they might also oppose valorisation strategies. Hence, claims of a social use value could bear an emancipatory potential for a critique of digital capitalism.

However, we find that these claims are sometimes not a strong basis for critique, as respondents seem resigned to the status quo and unable to see alternatives on the horizon. This ties our research about social use value to Menz's (2021) theory on the delegitimation of claims towards work. Menz mostly attributes the erosion of expectations and the legitimacy of claims to a "deterioration of working and living conditions" (2021, 140). In the context of software workers, we must turn to other contexts of meaning, which outline horizons of legitimacy in this regard: imaginaries of technology and its role in society. Within digital capitalism, imaginaries of technology will shape what workers can perceive as legitimate claims towards their work. Imaginaries that make technology appear as an unstoppable force beyond human agency then delegitimise claims to software work.

This relates our research to the literature on Solutionism (Nachtwey and Seidl 2023). We find little evidence of a strong belief in the inherent good of technological disruption as a legitimation of digital capitalism in our sample. We instead find a more diverse set of metaphorical concepts of technology that might either delegitimise the claims of a social use value of work or transform the contradictory work experiences into a critique of capitalism. There are two forms in which the respondents' claims are delegitimised: in the economic and the technological realm. First, market logics in software work seem so pervasive that some respondents resign vis-à-vis the pressures in their jobs and the futility of their products' use value within the logic of capitalist organization of work. This confirms Menz's conclusion that while the normative claims of the use value of work remain intact, their scope, addressees and expectations of their fulfilment are reduced (Menz 2021, 142-143). Secondly, when technology is seen as an

unstoppable force, expectations of realising one's professional ethos might be weakened further. In a world ruled by a natural technological force, companies must simply adapt and adhere to technology's rules. Even when respondents criticise company strategies, these are excused by technological forces beyond their control. This is connected to the agile dispositif (Daum 2021) and its veiling of power structures (Barrett 2001): The attributed characteristics of technology veil agency and explain the need for the economy to quickly adapt and swiftly react. Technology then serves as an explanation for a lack of agency at work. Here, the digital and capitalist dynamics seem intertwined in the order of legitimacy of digital capitalism. This interpretation is supported by the very few instances of respondents mentioning acts of protest or being a union member. In cases of strong discontent with their workplace, software workers seem to rather choose to exit the organization than seek change. However, imaginaries of technology and its characteristics can also result in a strong professional ethos. This can be the basis for claims, especially to a rational organisation of the creation of technology and the full use of technology's potential. This can support the critique of proprietary technology and competitive capitalist organisation of innovation work and thus of digital capitalism as a whole.

5. Conclusions

These results further our understanding of the culture of digital capitalism and work experiences within it and point out potentials for and limits of a critique of digital capitalism. Our analysis did not aim at creating a typology or finding direct causal links between different interpretations of technology and work experiences. We rather extract concepts of technology from our metaphorical analysis and theorise how these might relate to different interpretations of the contradictions of claims towards work and their limitations. We find that imaginaries of technology might be an important resource for the subjective interpretation of work in digital capitalism and might serve as a basis for critique or a delegitimation of claims towards one's work. We can show how technology and economic constraints work together to provide a basis for the legitimacy of the status quo and to delegitimise critique. At the same time, we find strong claims that workers hold and sources for a critique of digital capitalism. This adds to the discussion on Solutionism: Neither do technological imaginaries necessarily support capitalism nor do technological utopias necessarily lead to an emancipatory critique of capitalism.

However, our study has some limitations. Our in-depth analysis is limited to 17 software workers, broadly from the field of work-related software. While we achieved maximum contrast within this field (e.g. in age, gender and company size), software workers working at digital platforms, military industry or the public sector might have different orientations. The study also does not provide a basis for assertions about the causal mechanisms between imaginaries of technology and potentials for critique. Thus, it remains unclear to what extent the orientations result from experiences related to technology or to capitalism and marketisation. This calls for more comparative research considering historical developments or other fields beyond software work. The interview study also widely ignores how critique might be voiced, for instance through unionisation or protests. More research on different types of tech workers more closely investigating the expressions of critique is still needed. Further studies might also shed light on how the claims of the social use value of work relate to other claims such as a good work experience or social justice and which of these orientations is most important for the way in which software workers legitimise or critique digital capitalism. In general, studying subjective work orientations and imaginaries of technology proved to

be a promising field to better our understanding of the legitimation and critique of digital capitalism.

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