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Algorithms as a platform for work: When work is entangled with an algorithm

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Introduction

Being the foundation of numerous services used by people on a daily basis, algorithms have become an omnipresent part of our lives. For instance, a popular travel website, TripAdvisor, uses an algorithm to calculate users' reviews of accommodations, landmarks and organized tours or activities in order to promote the highest-ranked travel options on its website. By this, Trip Advisor not only influences its users' future travel plans and eventually, their buying decisions, but also employees' work practices in hotels or agencies (W. Orlikowski & Scott, 2015). Yet, TripAdvisor is not an exception. Algorithms are at the core of almost any company in the digital platform economy. What is common for these proprietary algorithms is that the values and choices by which they operate are certainly not the result of any democratic process neither are these choices open. Nevertheless, they significantly participate in shaping the world we live in.

Uber is a typical example of businesses operating on algorithms. These companies act as platform labor intermediaries who have become actors in the temporary staffing industry (Doorn, 2017). Algorithms are the essence of these companies' platforms through which people in need of a certain service connect with people rendering this service. While the entrepreneurial workers who render the services available may not fully match with the notion of employment as traditionally conceived, they are essential for the services offered by the platform providers. Without them, the offered services would not be rendered and the algorithm would not hold any value in itself. The employees now find themselves entangled with the algorithms that scrutinizes their performance and organizes their work. Hence, we have defined that in this type of work *algorithms function as platforms for work* as they produce new and alter existing forms of employment.

In prior research, companies such as Uber has often been studied from the viewpoint of user experiences (Sundararajan 2014), employee rights (Redfearn 2016) or societal impacts (Martin 2016). Although algorithms are essential for the functioning of digital platforms, they have rarely been in the focus of prior studies related to work. Therefore, our research concentrates on studying the performance of work when it is entangled with algorithms. The aim of this research in progress is to identify the key concepts related to work which is entangled with algorithms and to develop a framework for studying this phenomenon. Hence, we pose the two following research questions, *(1) whose work is entangled with algorithms* and *(2) what are the characteristics of work which is founded on algorithms.*

Work and algorithms in a digital era

Although the traditional definition of work remains valid in many contexts, there are increasingly different forms of doing work (Okhyusen et al. 2013). The emergence of these new forms of work is driven by different factors, one of which is information technology and the rapid pace of digital innovations (Colbert et al. 2016). Some prior literature has considered technology in their study of work. This focus has however largely looked at the role of technology in cases like virtual work and as collaboration platforms or enablers of remote work (Watson-Manheim et al. 2007). In the emerging era of work, technology is opening up new forms of work and enabling different forms of work structures than we traditionally know. For example, concepts like the sharing economy, which are facilitated by algorithm-driven digital platforms, introduce a new form of work that is highly mediated by technology (Hamari et al. 2015). These new work forms leave at their wake a reconfiguration of work structures that become entangled with the algorithm's affordances.

While algorithms have existed for centuries, their sophistication has increased significantly during recent years (Steiner, 2012). Algorithms have taken over the stock-exchange, beaten the world's best players in Check, Poker (ibid.), and even in the ancient Chinese game of Go (Kahng & Lee, 2016). And according to many commentators, we haven't seen anything yet. Imaginaries of both utopian and dystopian futures abound in the literature where intelligent algorithms free us from repetitive and laborious duties (or from work altogether) or alternatively enslave us. In their essence, algorithms are mathematical theorems expressed in programming code (Introna, 2015). In their simplest form, algorithms can be expressed in a series of "IF…THEN...ELSE" conditions that produce an output based on provided input. In other words, they "are a set of step-by-step instructions to achieve a desired result in a finite number of moves. Algorithms act; they *do* things" (Orlikowski & Scott, 2015, p. 210, italics in original). In case of more complex algorithms, however, the general public is often excluded from the decisions concerning their design principles or functioning. They are invisible, inscrutable, and proprietary (Introna, 2015).

Yet, what is the role of human employees in this world of algorithms? Algorithms themselves are dead objects which need to be situated in the ebb and flow of organizational life. Already today, we live side by side with algorithms that occasionally surpass our capacities. In its principal, this is nothing new. We have used calculators for a very long time and most of us have done so without really understanding how their algorithms operate and what happens inside those black boxes of plastic. However, there is an important shift that is taking place in our relationship with algorithms. This shift is not so merely about the degree of involvement but about a qualitatively different form of relationship as we have to increasingly perform our work entangled with these pieces of software code.

An emerging form of work evolves around algorithms as a *platform* for work. For some work, already now, the algorithms are so profound that they are not merely used as tools but that work is entangled with these algorithms. We see glimpses of such relationships in

what Introna and Hayes (2011) describe as *imbrication*. They describe the reorganization of one of a teacher's key tasks – evaluating student assignments, and, especially, judging their originality. Increasingly, this task is not founded on teachers' judgement but on sophisticated algorithms that crawl through the web looking for signs of similarity between the students' assignments and what is already out there. While in their case the work itself is not founded on an algorithm, the specific task of determining the originality of students' assignments, making judgements and labeling those who plagiarize is founded on an algorithm. Similarly, Orlikowksi and Scott (2015) provide an insightful study of the reconfigurations brought about by algorithms in the hospitality sector. Through their close analysis, they revealed how the algorithm and materiality of an online hospitality service (TripAdvisor) "is entangled with a significant reconfiguration of interests and relations between hoteliers and travelers. As expectations and experiences are transformed, they can change power dynamics and economic control." (Orlikowski & Scott, 2015, p. 214). We thus, see a profound change in the work of these entrepreneur hoteliers and their employees whose performance is now exposed, analyzed, sorted, and evaluated openly through sociomaterial assemblages of algorithms and the customer crowd. But these algorithms are also known to increase opportunities for work-place surveillance and control that are both founded on the logics of (neo)capitalism (Zuboff, 2015). What we seem to lack from the literature is sensitivity to the issues and experiences of the workers that perform their work under such entangled relationships with algorithms.

Planned Research Approach

In the empirical part of our research, we plan to study two different types of workers whose work is embedded with algorithms. The first type are the people who work as couriers for a German start-up company named Foodora. Foodora offers restaurants and their customers a food delivery service. Its business model unfolds around their algorithm which receives customers' food orders, informs the involved restaurant and picks a courier for delivery. Couriers are employed by Foodora, but use their own smartphone to accept orders and their own vehicle to deliver them. The second type are search engine optimizers (SEOs), who optimize websites to improve their Google search ranking. As such, their work targets at unravelling Google's page rank algorithm.

To conduct this study, we adopted an embedded case study research approach and opted for a qualitative research method involving the use of data collected from semi-structured interviews and observations of couriers' and SEOs' work in Finland. To triangulate our findings and to broaden our understanding of the studied phenomena in global scale, we aim to identify blogs and blog posts related to Foodora and SEOs.

Discussion and Potential Contributions

Our research focuses on work entangled with algorithms. This means, we are neither interested in work that is being (or has been) replaced by algorithms nor in work which is invested to design, develop or maintain algorithms but in the performance of work that is

entangled with algorithms. Conceptualizing algorithms as *platforms for work*, we started by identifying different stakeholders and analyzing their possible relationship to such algorithms. At this point of our research, we have identified five different groups of algorithm stakeholders, namely, (1) *algorithm owner*s, (2) *software developers*, (3) *third parties*, (4) *customers* or *end-users* and (5) *algorithm workers* (see Figure 1). Due to our research focus, the following discussion centers around the group of *algorithm workers*.
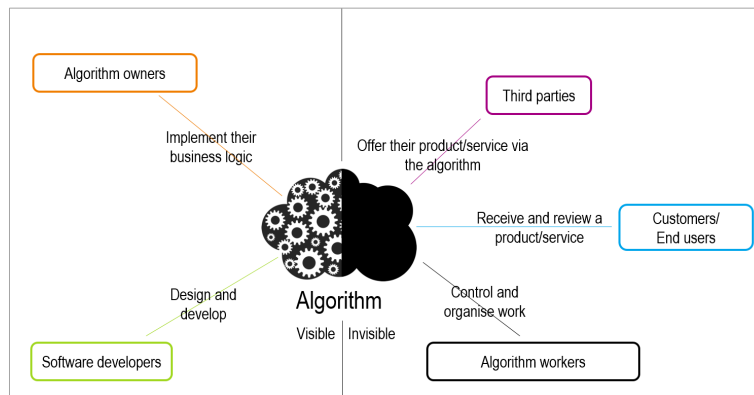

Figure 1: Algorithm stakeholders

For *algorithm workers*, we currently conceive two different relations of how work is entangled with algorithms:

1) *Algorithms as the target object of work* (e.g., SEOs) and
2) *Algorithms as the infrastructure for work* (e.g., delivery persons at Foodora).

Both relations have in common that work is entangled with algorithms while the logic of these algorithms is invisible to the algorithm workers. Furthermore, compared to software developers, their work does not constitute but is constituted by algorithms and they have little to none influence on their future development. However, while understanding an algorithm's logic is a pre-requisite in the first relation, it is not mandatory for the second relation. This can be demonstrated by two illustrative examples. The first example is *algorithms as the target object of work* in the case of SEOs targeting Google's page rank algorithm. At first, the logic behind Google's ranking is invisible to SEOs, but they try to render it visible as it is a pre-requisite for optimising websites for better rankings in Google search results. Thus, their work is targeted at unravelling Google's page rank algorithm. The second exemplifies *algorithms as the infrastructure for work* in the case of Foodora and their couriers. In this example, the algorithm constitutes the infrastructure for work as it receives customers' orders, picks a courier for each order and estimates a time of delivery. After delivery, it then evaluates workers' performance which influences their future order position. Therefore, some couriers try to render the algorithm's logic visible to partly take control of their work and/or work conditions (Petter, 2016; Töpfer, 2016).

Reflecting upon these examples, we conceive algorithms as being at the core of digital platforms and thus, the platform economy which continues to shake traditional industries.

While their logics are visible to algorithm owners and software developers, they are invisible to third parties, customers (or end-users) and algorithm workers. Thus, we conceive work entangled with algorithms as happening within the boundaries of visible and invisible leading to algorithm workers engaging in learning loops of "thesis-testing". By this, their understanding of the algorithms evolves.

From our preliminary observation, the following can be highlighted as foundational findings: a) Algorithms (will) play a crucial role in digital work b) Working happens in the boundary of visible/invisible aspects of algorithms. Therefore, our anticipated contribution lies in uncovering the essence of algorithms as a *platform for work* and unveiling the different implications this holds for our conceptualization of work. Additionally, we expect to contribute to knowledge with respect to the social and ethical implications that unfolds in the context of algorithms as a *platform for work* particularly for algorithm workers.

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