Mining Sensor-Based Data Affecting Journalists' Professional Identities

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Introduction

In 2016, during the fourth CNoW workshop, Burt Swanson alerted our community, almost all IS researchers, that nearly any new technology and any newly available data source at the workplace changes the nature of work in knowledge work disciplines and demanded sector- and technology-specific studies. With this research, we follow his quest as we study a specific type of newly available data, sensor-based data, and its impact on journalists' professional identities resulting from changes in their work practices.

As past research investigated what drives redefinitions of professional identities (Chreim et al., 2007), it pointed to promotion and resistance strategies in response to the integration of new technologies in daily work routines (Nelson and Irwin, 2014; Petriglieri, 2011). More specifically, it investigated changes of professional identities when processing historical, static data (Diakopoulos, 2019; Stein et al., 2013; Strich et al., 2021). As sensor-based data has gained importance in journalism (Coombs et al., 2020; Loebbecke and Boboschko, 2020), we explore how *mining sensor-based data* may change knowledge-intensive practices and *professional identities* in *journalism*.

Sensor-based data is collected via sensors without direct human input in the data collection. Well-known examples include weather data, air pollution data, and data gained from sensors swallowed by humans or animals. Mining sensor-based data include the processes of collecting, statistically and algorithmically analyzing, and interpreting such data (Monteiro and Parmiggiani, 2019). It supports journalists in searching and assessing information prior to publication and thus nurtures opportunities for investigative journalism via exploring patterns and facilitating a scientific approach to seek the 'truth' (Diakopoulos, 2019).

We consider *journalists* to be professionals trained to follow journalistic standards in the processes of content production (Diakopoulos, 2019). *Professional identities* are rooted in psychology, the concept of 'identity' implies a cognitive construct that answers the question to perceptions of 'Who am I?' (Hogg, 2001). They determine how professionals define themselves according to their membership of a profession embedded in societal norms and values on the one hand and their work roles on the other hand (Chreim et al., 2007; Stets and Burke, 2000). They are relevant on role-based and social levels (Nelson and Irwin, 2014: Stets and Burke, 2000). Journalists' role-based identities relate to their work routines

to be challenged by amateur content creators and distributors (Shirky, 2008). Their social identities reflect democracy-relevant information services (Diakopoulos, 2019).

Research Model

Drawing on the literature from technology-driven changes of professional identities (Nelson and Irwin, 2014; Stein et al., 2013; Strich et al., 2021), we investigate how mining sensor-based data changes journalists' professional identities (Loebbecke and Boboschko, 2022). We are interested in how (1) the complexities of mining sensor-based data (Strich et al., 2021) and (2) journalists' absorptive capacities – i.e., the ability to transform knowledge generated from a system into business value, innovativeness, and competitiveness (Cohen and Leventhal, 1990; Zahra and George, 2002) – moderate the effect. To this aim, we develop three research hypotheses:

To some degree, mining sensor-based data allows for partially automating tasks and thus releasing journalists' cognitive capabilities for other journalistic practices (Strich et al., 2021). However, Mikalsen and Monteiro (2021) propose that journalists need to engage in 'cooking' sensor-based data for making implicit information explicit and thus enhancing content production. As long as journalists select where to place sensors and which algorithms to deploy for harvesting them, humans determine the content production boundaries. Similarly, Diakopoulos (2019) states that journalists are indispensable 'behind the curtain' to check the newsworthiness of an insight. Hence, we hypothesize:

H1: Mining sensor-based data affects journalists' professional identities.

Zahra and George (2002) claim that complex methodologies and philosophies underlying data mining may hinder the successful assimilation of external information and consequently its transformation and exploitation. When processes become more complex, journalists need longer time for decrypting information, which likely leads to lower performance. Following the literature on effort expectancies of using a recently introduced system (Strich et al. 2021), complexities may increase journalists' resistance to put effort in thoroughly making sense of the insights drawn from sensor-based data. Hence, we hypothesize:

H2: The complexity of mining sensor-based data negatively moderates the impact of mining sensor-based data on journalists' professional identities.

Strich et al. (2021) find that understanding and assimilating the advantages of mining sensor-based data, its boundaries, and relevant ethical concerns likely enhance journalists' professional identities. Zahra and George (2002) indicate the importance of sufficient absorptive capacities for successfully assimilating insights from mining sensor-based data (also Cohen and Leventhal, 1990). Joshi et al. (2010) point out how visualization features embedded in systems providing sensor-based data analyses help navigating through the 'data jungle'. Similarly, Wu et al. (2020) argue that visualization features facilitate

interactive, multifaceted interpretations of data-driven insights. According to Diakopoulos (2019) alerts drawn from real-time analyses of sensor-based data make it easier for journalists to find and trace newsworthy information. In this line of argument, journalists' absorptive capacities may enhance their control of content production and thereby strengthen their professional identities. Hence, we hypothesize:

H3: Journalists' absorptive capacities positively moderate the impact of mining sensor-based data on journalists' professional identities.

The research model in Figure 1 depicts the three hypotheses.

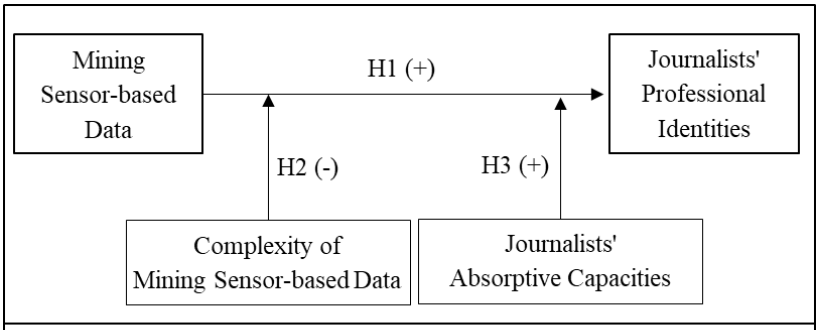

Figure 1. Research Model

Next Steps, Limitations, and Expected Contributions

We have started collecting the data via a cross-sectional survey. Next, we will test the three hypotheses using a regression analysis and a moderation analysis. Testing the model raises challenges with respect to measurement and operationalization. Almost indefinite conceptualizations underline the subjective nature of the 'identity', 'knowledge', and 'journalism' concepts (Almklov et al., 2014; Diakopoulos, 2019). Epistemic uncertainties may result from noisy, incomplete, inaccurate, or inconsistent data (Monteiro and Parmiggiani, 2019). This demands particular emphasis on validity and reliability checks.

With our work on how mining sensor-based data affects professional identities in journalism, we pursue three aims:

1. We aim at *contributing to the identity research in IS* and hope to enhance the theoretical and practical understanding of how to interact and work with systems that use sensor-based data – especially in journalistic work places.

2. We aim at *expanding the spectrum of IS investigations to journalism*, which – in IS research – is a neglected industry that increasingly faces disruptions (Diakopoulos, 2019). As researchers and practitioners still struggle to develop strategies for economically sustainable journalism (Coombs et al., 2020), we hope to contribute to the discussion on replacement concerns resulting from the increasing deployment of sensor-based data (Frey and Osborne, 2017; Loebbecke and Picot, 2015) on the one hand and the efficiency and quality relevant potentials on the other hand.

3. By investigating how mining sensor-based data transforms journalism practice, we aim at complementing the steadily progressing *research on data-driven epistemological changes and developments* (Alaimo and Kallinikos, 2022; Monteiro and Parmiggiani, 2019).

While sensor-based technologies evolve quickly, we consider mining sensor-based data in journalism a thought-provoking topic. Hence, we hope to foster scientific, ideally interdisciplinary, investigations on how it impacts work routines, business models, and professional identities in journalism, and thereby help securing journalists' recognition and professional well-being in society – crucial for keeping our democracies alive.

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