'Cambridge Moralica' - Towards an Ethical Framework for Social Media Analytics

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Abstract

En route to the unravelling of today's multiplicity of societal challenges, making sense of social data has become a crucial endeavour in Information Systems (IS) research. In this context, Social Media Analytics (SMA) has evolved to a promising field of data-driven approaches, guiding researchers in the process of collecting, analysing, and visualising social media data. However, the handling of such sensitive data requires careful ethical considerations to protect data subjects, online communities, and researchers. Hitherto, the field lacks consensus on how to safeguard ethical conduct throughout the research process. To address this shortcoming, this study proposes an extended version of a SMA framework by incorporating ethical reflection phases as an addition to methodical steps. Following a design science approach, existing ethics guidelines and expert interviews with SMA researchers and ethicists serve as the basis for redesigning the framework. It was eventually assessed through multiple rounds of evaluation in the form of focus group discussions and questionnaires with ethics board members and SMA experts. The extended framework, encompassing a total of five iterative ethical reflection phases, provides simplified ethical guidance for SMA researchers and facilitates the ethical self-examination of research projects involving social media data.

Keywords: social media analytics, research ethics, design science research.

1   Introduction

In the past decade, social media have become pervasive information systems (IS) that penetrate many areas of our lives. In 2020, social media platforms such as Instagram, Facebook, Twitter, or TikTok have been actively used by 3.81 billion users globally and this number is still growing (Statista, 2020). Users generate content, seek information, and interact on social media platforms. The resulting data presents valuable opportunities for companies, governments, and researchers to understand and interact with users (Kaplan & Haenlein, 2010; Wiener, Saunders, & Marabelli, 2020; Zeng, Chen, Lusch, & Li, 2010). The process of collecting, monitoring, analysing, summarising, and visualising social media data is referred to as Social Media Analytics (SMA; Zeng et al., 2010), which has evolved into a recognised research methodology in the IS discipline and beyond (Stieglitz, Mirbabaie, Ross, & Neuberger, 2018). At present, it is applied in various fields, such as disaster response

(Mirbabaie, Bunker, Stieglitz, Marx, & Ehnis, 2020), political communication (Anstead & O'Loughlin, 2015), or marketing (Misirlis & Vlachopoulou, 2018).

While SMA poses a plethora of potential benefits, it is also subject of an ethical debate. For example, the collection of personal data, often without informed consent, raises questions about the privacy rights of users, the publicness of data stemming from social media platforms, and whether agreeing to the terms and conditions of the platform is sufficient for using the data in research (Abbasi, Sarker, & Chiang, 2016; Marabelli & Markus, 2017; Ravn, Barnwell, & Barbosa Neves, 2019). These and other ethical issues in the context of social media data have not been sufficiently addressed in IS research (Marabelli & Markus, 2017). With the growing impact and utilisation of social media data, respecting ethical considerations in the SMA process becomes increasingly critical. This is not only reflected in different calls for more research in this domain (Marabelli & Markus, 2017; Taylor & Pagliari, 2018) but also in recently established legal requirements such as the General Data Protection Regulation (GDPR; European Parliament and European Council, 2018) and rigorous ethical assessment requirements on sides of financing boards and scientific journals.

Different communities such as the Association of Internet Researchers (AoIR), the Institute of Electrical and Electronics Engineers (IEEE), and the Association of Computing Machinery (ACM) have published ethical guidelines, which address separate elements of SMA research, for example the "Internet Research Ethics 3.0" (ACM, 2018; Franzke, Bechmann, Zimmer, Ess, & Association of Internet Researchers, 2020; IEEE, 2020). However, these fail to provide sufficient practical guidance for researchers within the specified SMA research process (see e.g. IEEE, 2020; Taylor & Pagliari, 2018) and navigating this diverse landscape of multidisciplinary patchwork remains challenging for SMA researchers. Ethical guidelines can be complex, too ambiguous for certain research projects, and their consideration time-consuming, which might explain their insufficient integration in SMA practices. Therefore, in this paper, we explore the following research question:

RQ: *How can ethical conduct be incorporated in the Social Media Analytics process?*

To answer this question, we follow the design science research (DSR) approach (Hevner, 2007; Hevner, March, Park, & Ram, 2004) to develop an extended version of an acquainted SMA framework (Stieglitz, Dang-Xuan, Bruns, & Neuberger, 2014; Stieglitz et al., 2018), which includes ethical reflections that iteratively attach to the process of conducting SMA research. Specifically, we adapt the three-cycle view of DSR. To establish our knowledge base and draft an initial version of the artefact, we turn to the state of the art of SMA research and existing ethical guidelines in adjacent fields, followed by a description of the application environment. Subsequently, we refine the framework based on twelve expert interviews with leading scholars in the fields of SMA and digital ethics. To evaluate the applicability of the final framework, we conducted two focus group discussions with SMA researchers and collected feedback from the initial round of experts, senior SMA researchers as well as members of university ethics boards.

Our study attempts to make both theoretical and practical contributions and is thus an example of applied ethics which seeks to give guidance on how SMA researchers can act normatively right (Beauchamp, 2008). The common values and norms of the specific group of SMA researchers forms the core interest of this study. First, we provide them with a refined framework of SMA research that incorporates ethical reflections at every stage of the research process, which closes the gap between practical implementation of SMA measures and

theoretical ethical considerations, which can create implications both on an individual and a societal level. As a result, our research mediates between two disjoined perspectives on SMA, that is, application and ethics, and equips SMA researchers with an applicable framework to facilitate ethical conduct throughout the SMA process.

According to Stahl (2012), normative IS research deals with four different areas: moral intuition, explicit morality, ethical theory, and meta-ethical reflections. Based on this classification, our research is located at the explicit morality level. This means that it goes beyond individual moral intuition (Kekes, 1986), which is the direct personal reaction if something is the right or wrong but instead defines the agreed moral values of SMA researchers and applies them to the different steps of their research process. This step forms the basis for the formation of ethical theories and meta-ethical reflections, which not only ask what action is right, but why a certain action is right and how it can be interpreted in the context of different ethical schools of thought.

The remainder of the paper is structured as follows. First, we give an insight into the methodology of the study, followed by the rigor cycle, which is based on the literature on SMA in IS and existing ethical guidelines. Subsequently, we present the rigor cycle, which explicates the application environment of the artefact. This will be followed by the artefact description, and the explanation of our evaluation methods and results. Conclusively, we present the final framework and discuss its implications, limitations, and provide suggestions for further research.

2   Methodology

The methodological basis of this study is grounded in the DSR approach popularised by Hevner (2007). It constitutes a paradigm that looks for innovative solutions of problems through the design of artefacts (Hevner et al., 2004), which can be of different nature. As depicted in figure 1, the approach includes three research cycles: the rigor, the relevance, and the design cycle.
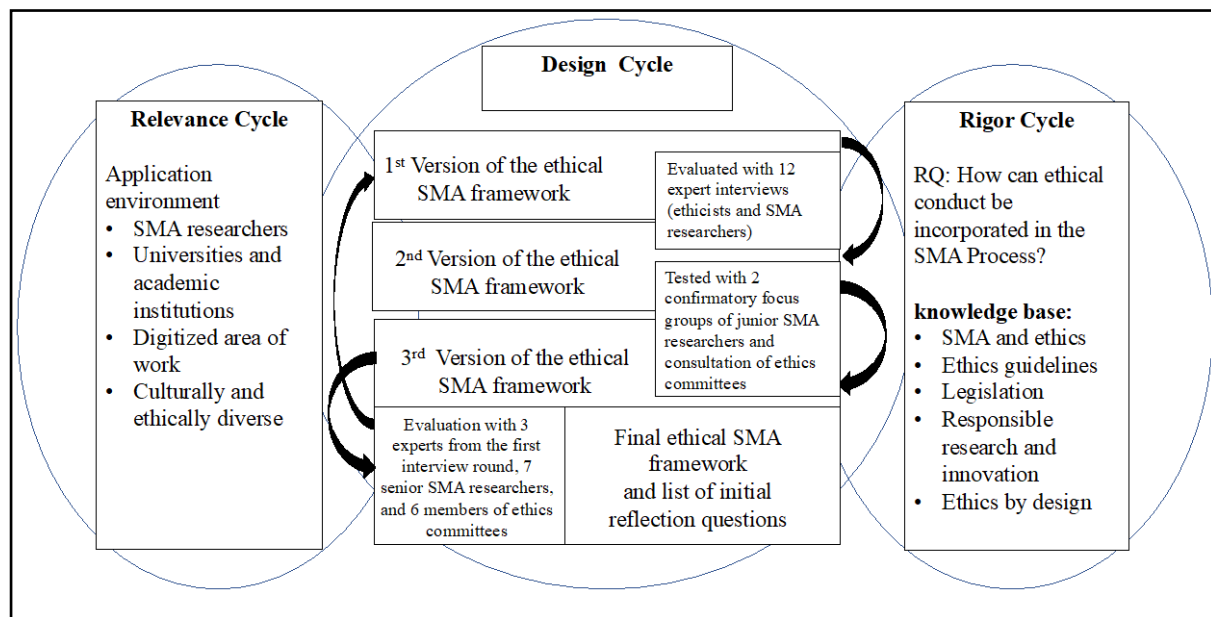

Figure 1. Ethical SMA framework development based on the DSR cycles by Hevner (2007)

The first cycle of DSR, the rigor cycle, gives an overview of the existing knowledge base, including the most relevant scientific theories and models, the state-of-the-art in the field and the description of existing artefacts and processes (Hevner, 2007). The SMA framework by Stieglitz et al. (2014;2018) forms our knowledge base, as it thoroughly summarizes the steps of the SMA research process. Further, we analysed the existing literature and guidelines for ethical research focussing on those relevant to SMA and big data analytics.

The relevance cycle, which will be addressed in the fourth section, provides the context of the DSR project by analysing the environment (actors, organisation, and technology) and formulates the main problem and resulting needs. In addition, it provides the criteria for the evaluation of the final artefact (Hevner, 2007).

The third and internal cycle of DSR is the design cycle. It is driven by the input from the rigor and relevance cycle and aims at designing, building, and evaluating the artefact. Overall, we turn to 'ethics by design' (d'Aquin et al., 2018) to provide us with design principles for the artefact as it suggests accompanying the entire research lifecycle with ethical questions and the anticipation of future implications. Specifically, our design cycle included four steps: 1) developing a first version of the framework based on the input from the rigor and relevance cycle, 2) the substantive evaluation of the first version with expert interviews with ethicists and SMA researchers, an 3) evaluation of the second version with two focus groups of SMA researchers focusing on the two acceptance criteria, and an 4) evaluation of the third version of the artefact based on feedback from researchers applying the framework to a recent SMA research project.

3 Rigor Cycle – Literature Review

3.1 Social Media Analytics in Information Systems Research

The notion of SMA refers to an interdisciplinary approach to social data analysis that primarily takes a methodical standpoint. It combines a set of data-driven analysis techniques including the collection, analysis, and visualisation of social media data (Stieglitz et al., 2014, 2018). Incorporating the SMA approach adds significant innovative strength to the discipline of IS as it broadens data foundations, provides swift analysis of real-world phenomena and allows a higher-level perspective on collective online behaviour. In recent years, we could observe IS literature spawning resourceful studies using SMA in various fields such as disaster response (Mirbabaie et al., 2020), social movements (Tye, Leong, Tan, Tan, & Khoo, 2018), or political communication (Anstead & O'Loughlin, 2015). Specifically, SMA encompasses the tracking and scientific utilisation of large social media datasets. The approach envelopes a set of suitable methods to systematically analyse social media data. Stieglitz et al. (2018) divided this process in the work stages of (1) discovery, (2) tracking, (3) preparation, and (4) analysis. Figure 2 provides an overview of the SMA framework.
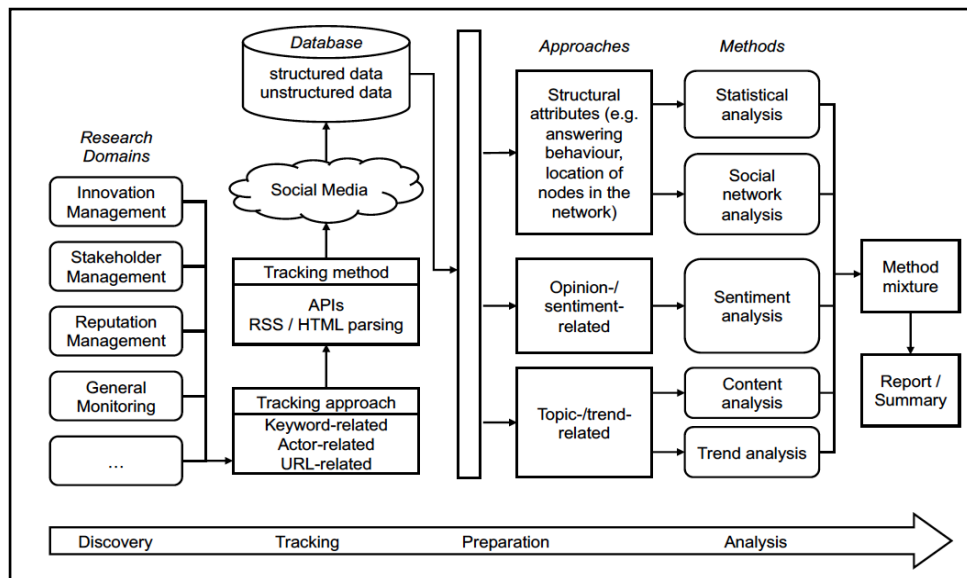
Figure 2. Social Media Analytics Framework, adapted from Stieglitz et al. (2018).

In this paper, we build on this SMA framework because it provides researchers with methodical guidelines to undergo an application-driven, replicable process of deploying social media as a data source for empirical research (Stieglitz et al., 2014). The framework was extended to cover challenges in event and topic detection, setting up a software architecture, and data visualisation and quality (Stieglitz et al., 2018). It constitutes a seminal aid to orientation for novice and experienced researchers, which, as of this writing, is mirrored in the combined citation count of 714 between the original version and its first extension. We carefully reviewed other SMA frameworks but found that they are either context-specific, e.g. enterprises (Lee, 2018), or focus on certain methodical approaches, e.g. machine learning (Jimenez-Marquez, Gonzalez-Carrasco, Lopez-Cuadrado, & Ruiz-Mezcua, 2019). More recently, scholars have advanced the field of SMA by testing the possibilities of data exploration and establishing social media as a viable data source for IS research. However, aside from its methodical value and high degree of applicability, the SMA framework by Stieglitz et al. (2014; 2018), or other related literature, have not yet sufficiently addressed ethics as an integral part of the SMA research process.

3.2   Ethical Issues of Social Media Analytics

Along with the application-oriented benefits of SMA, several ethical challenges emerge in the research process, for example related to the privacy of social media users and "identifying acceptable levels of intrusion" (Abbasi et al., 2016, p. 10), non-consensual experiments (Marabelli & Markus, 2017), and accounting for potential biases (Günther, Rezazade Mehrizi, Huysman, & Feldberg, 2017). Recent publications in IS highlight the shortage and importance of ethical considerations in big data analysis and SMA and called for more research in this domain (Abbasi et al., 2016; Marabelli & Markus, 2017; Taylor & Pagliari, 2018; Wiener et al., 2020). Thereby, data scientists are considered to play an important role as they translate data into knowledge and actionable insights, and function as "change agents" (Wiener et al., 2020, p. 77). However, prevalent practical frameworks describing the application of SMA (Stieglitz et al., 2014, 2018) do not broach the issue of ethics. Concurrently, existing ethical guidelines in this domain insufficiently capture the ethical challenges that emerge at different stages of the SMA research process (Taylor & Pagliari, 2018).

Due to its interdisciplinary and multi-method nature, SMA brings together several ethical discourses and disciplines such as Information Systems, Communication Technology and Computing ethics, Big Data ethics, and ethics of Artificial Intelligence. Hence, if SMA researchers seek ethical guidance, one option is reviewing existing ethical guidelines from these referential fields. In the following section we give an overview of ethical guidelines relevant to SMA.

3.3   Ethical Guidelines and Codes of Conduct applicable to SMA

Scholarship in the field of research ethics guidelines concerning the Internet, big data and SMA, ranges from various associations from within academia, such as the AoIR (Ess & Association of Internet Researchers, 2002; Franzke et al., 2020; Markham, Buchanan, & Association of Internet Researchers, 2012), the ACM (ACM, 2018), the research code of conduct of the AIS (AIS, 2014) to guidelines of professional organisations like the US-based IEEE (IEEE, 2020). A high-level overview of their codes of conduct and guidelines is provided in Table 1. Each of these guidelines or codes of conduct covers some aspects which are relevant to SMA researchers, such as data privacy.

Guidelines	Focus
Association of Computing Machinery (ACM): *Code of Ethics and Professional Conduct (2018)*	Principles and responsibilities to inspire and guide ethical conduct (e.g., avoid harm, respect privacy) of all computing professionals (e.g., practitioners, instructors, students).
Association of Internet Researchers (AoIR): *Ethical Decision-Making and Internet research: Recommendations from the AoIR ethics working committee (v.1: 2002; v.2: 2012; v.3: 2019)*	Recommendations designed to support and inform those responsible (e.g., researchers, ethicists, students, organizations, or academic societies) for making decisions about the ethics of Internet research (e.g., rights and expectations of human subjects for autonomy, privacy, and informed consent).
Association for Information Systems (AIS): *Code of Research Conduct (2014)*	Requirements, recommendations, and advice for conducting research and publishing in IS (e.g., give priority to public interest when designing or implementing new IS).
IEEE: *Code of Ethics (2020)*	Principles of ethical and professional conduct in the context of emerging technologies (e.g., disclose limitations).

Table 1. Overview of guidelines and codes of conduct applicable to SMA.

The broad emergence of ethics guidelines indicates a high demand for practical guidance which brings together theoretically derived ethical concerns but also the everyday experience of researchers and practitioners (Stahl, Timmermans, & Mittelstadt, 2016). Besides hands-on guidance, additional meta studies on the role of ethics guidelines also address the guidelines' shortcomings (Hagendorff, 2020; Jobin, Ienca, & Vayena, 2019; Mittelstadt, 2019). Due to the abundance of guidelines and research on ethical questions, SMA researchers face the challenge to identify those ethical questions, which are relevant for their specific research process.

To design our artefact, we draw on the meta concept of "ethics by design", which understands ethical research not as a binary decision before the start of a research project, but rather as a continuous iterative process. Ethics by design, which evolved from the concept of "privacy by design", suggests an accompaniment of the research lifecycle by asking ethical questions and anticipating its implications for society (d'Aquin et al., 2018). Even though an emergence of tentative research and guidelines related to the field of SMA can be observed, however, guidance that focuses on the specificities of the SMA research process has not been provided so far. To address this shortcoming, our paper will proceed with the specific challenges and

requirements of academic SMA research, which informs the relevance cycle of our DSR approach.

4 Relevance Cycle – Institutional Challenges of Ethical SMA Research

The purpose of this section is to highlight involved actors, organizational, and technological structures, as well as problems and opportunities of our research (Hevner, 2007). This helps to determine the application context of the artefact and requirements that need to be considered.

The application environment of this study is academia. The potential users of the artefact, which aims to provide ethical guidance throughout the entire SMA research process are researchers of different disciplines, experience levels, ranging from undergraduate students to full professors, resulting in (a) *discipline disparities*. SMA is applied by researchers from social sciences and computer sciences such as information systems. However, each discipline approaches social media with different research questions and varying methods, which evoke distinct ethical problems. Consequently, the way SMA is applied and understood may significantly differ. While researchers from computational sciences are equipped with sophisticated methods for the analysis of social media data, they are often less concerned with methodological underpinnings and theoretical models, which researchers from social science employ to make sense out of social media data (Stieglitz et al., 2018; Tinati, Phillipe, Pope, Carr, & Halford, 2014).

Academia has an international orientation, despite cultural differences and contrasting trends of serving national priorities and operating in an international setting (Guri-Rosenblit, 2015), while maintaining its core objectives of teaching, research, and community/business partnerships (Whitchurch, 2012). This (b) *cultural pluralism* in academia may lead to ethical pluralism, which affects the ethical choices made in the SMA research process (Hongladarom, 2017). The acceptance of scientific quality standards oftentimes collides with the high pressure to succeed and publish in academia, colloquially known as the (c) *"publish or perish"* culture (Wiener et al., 2018). This tension sparks a lot of ethical questions regarding the validity of SMA research and the implications of research for academia, the industry, and society. Additionally, academia is witnessing an ongoing discourse about open-access culture, involving an enhancement of research data management (open data) to benefit the community and the individual researcher (Stieglitz et al., 2020). Although improved collaboration and knowledge sharing may entail benefits and opportunities from an ethical point of view, it also sparks issues regarding the privacy protection of users in social media datasets, which keeps SMA researchers stuck in a dilemma.

The (d) *technological infrastructures* available to SMA researchers differ tremendously as they highly depend on the financial resources of each institution and on the technology access in the respective country (boyd & Crawford, 2012; Cruz-Jesus, Vicente, Bacao, & Oliveira, 2016). Generally, however, academia can be considered a digitised area of work. The target group of this study, researchers who conduct SMA, work with their computer and complete most of their work digitally. Their media competence may vary depending on their area of expertise, which may result in different abilities to evaluate the ethical hurdles linked to the technological components of SMA, such as machine learning algorithms supporting the data analysis (boyd & Crawford, 2012; Stieglitz et al., 2018).

Additionally, there are (e) *regulatory differences*, for example between international academic partners, exemplified by authorities creating a disparity in ensuring compliance with certain ethical standards. In 2018, the GDPR - a binding law in the European Union - converted ethical challenges, especially regarding the protection of data and research subjects, into hard law (European Parliament and European Council, 2018). The GDPR lately influenced the debate on research ethics and is relevant for all entities which deal with data collection, analysis, and storage in countries of the European Union. From these and the arguments presented prior in the rigor cycle, we derive two acceptance criteria which should be met in the evaluation of the artefact:

1. **Awareness for ethics:** the artefact encourages or extends ethical reflection throughout the SMA research process for a diverse group of researchers

2. **Applicability of the artefact:** the artefact is a useful tool for SMA researchers

Based on the reviewed knowledge base (section 3: rigor cycle) and the identified application environment and acceptance criteria (section 4: relevance cycle) we derive the initial version of the artefact in the first design cycle (section 5).

5 Design Cycle - Artefact Description

The initial artefact was composed of the SMA framework (Stieglitz et al., 2014, 2018) and five additional ethical reflection stages highlighting relevant ethical considerations in each step of the SMA process. These stages were derived from ethical guidelines and scholarship originating in research fields referential to SMA (e.g., Table 1). The first version of the artefact is depicted in figure 3.
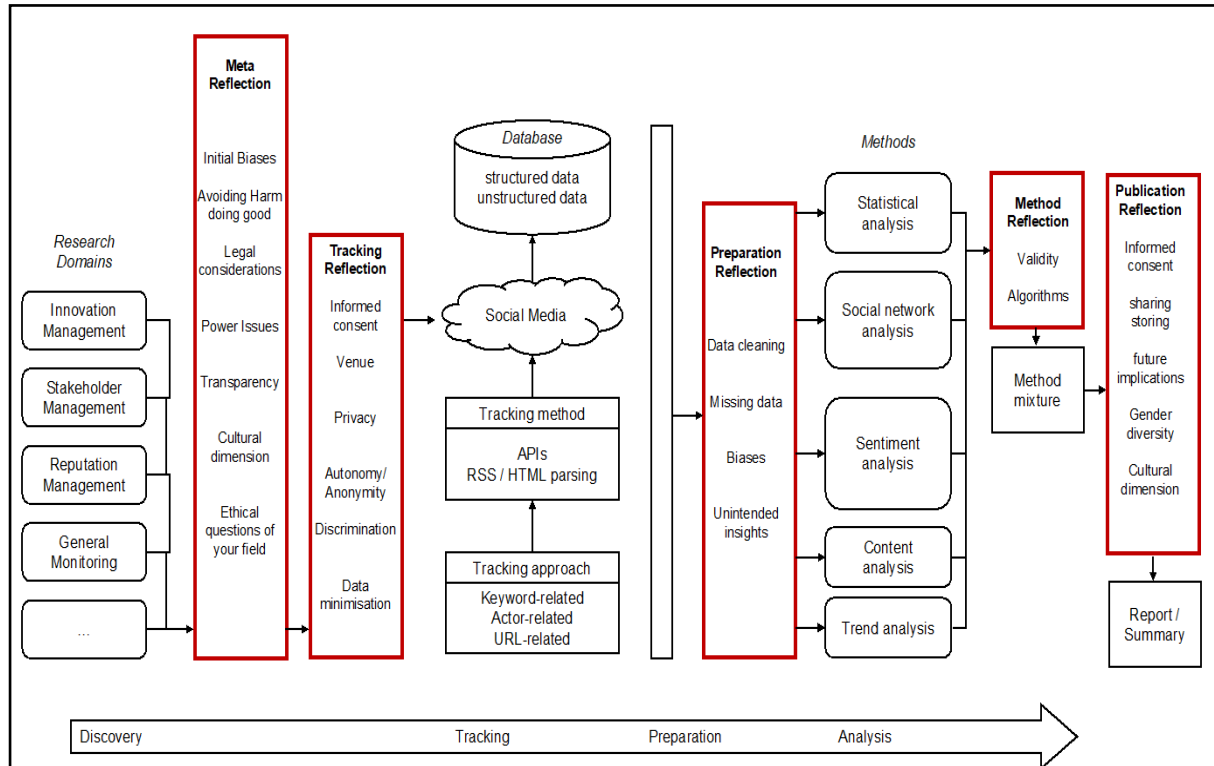

Figure 3. Initial artefact with adaptations to the framework highlighted.

If the initial idea or research design is unethical, following ethics guidelines later does not solve the initial issue. Thus, the **meta reflection stage** covers necessary theoretical and ethical

overtones of SMA research including initial biases, avoiding harm - doing good, legal considerations, power issues, transparency, cultural dimension, and ethical questions of your field which accompany and guide the entire research process.

Initial biases are based on the need to reflect on personal and technical biases that relate to one's socio-demographic or cultural background or the expected results. What are my personal expectations of my research and how they influence the research design? Who might be missing or silent in the proposed research design (e.g., elders who do not use social media)? (Chen, Zheng, & Ceran, 2016). Overall, researchers should strive to magnify the public good (ACM, 2018; Ess & Association of Internet Researchers, 2002). Thus, the subcategory *avoiding harm - doing good* was included to encourage researchers to reflect on who benefits from their research: I, my discipline, or the society as a whole? How could possible harm be avoided and how can the researcher give something back to the researched communities (ACM, 2018; AIS, 2014)? Ethics and law are highly interwoven; hence, the subcategory of *legal considerations* was added. For example, many ethical issues surrounding individual data rights are covered by the GDPR (Safari, 2016) which is binding law in the European Union. Hence, SMA researchers should be aware of the legal frameworks which apply to their research and potentially discuss these with collaborators from other judicial areas (Ess & Association of Internet Researchers, 2002). Besides binding laws, SMA researchers are confronted with the terms and conditions of the social media platforms. These often restrict (automatic) data collection (Lomborg & Bechmann, 2014) and thereby limit possible research designs and outcomes of SMA (Bruns, 2019; Møller & Bechmann, 2019). This tension is referred to as *power issues* and researchers should reflect on how these have shaped the research design. Other power issues can occur between third-party funding institutions or between researchers and research subjects, especially when researching more vulnerable groups (Leurs, 2017). The value of *transparency* is very prevalent in most ethics guidelines (Jobin et al., 2019) and is becoming increasingly important in research (e.g., open data initiatives). Thereby, a challenging question for SMA researchers is how much access into social media datasets is acceptable without violating individual privacy (Abbasi et al., 2016). SMA researchers should consider how they can operationalise transparency in their research, for example by obtaining strong informed consent agreements. The importance of the so-called *cultural dimension* for ethical reflection has been stressed by the AoIR ever since (Franzke et al., 2020). Conducting Internet research, especially in social media, involves crossing cultural boundaries, norms, practices, and beliefs. Individual versus relational concepts of selfhood cause the necessity for individual or more relational consents (Ess, 2005). Internet Research Ethics is "grown from the local source, meaning that the [ethical] vocabulary comes from the traditional and intellectual source of the culture in which a particular researcher is working" (Hongladarom, 2017, p. 161). Lastly, each field of research follows its own code of conduct. With the subcategory *ethical questions of your field* we aim to encourage and provide room for an open and ongoing dialogue with the ethical guidelines of one's faculty or institute.

The **tracking reflection stage** covers *informed consent*, issues related to the *venue* of research, *privacy*, *autonomy & anonymity*, *discrimination*, and *data minimisation*. While research has shown that *informed consent* might be difficult to obtain in big data research before data tracking (van Schie, Westra, & Schäfer, 2017), the question remains of how to inform subjects about their data being used for research purposes. How can research be conducted so that autonomy of

the user is protected?[1] The subcategory *venue* is derived from the necessity of context-sensitive research (Ess & Association of Internet Researchers, 2002, p.1) and refers to the characteristics of the researched social media platform and subjects. Specifically, the type and sensitivity of the communities, actions, and interactions under study but also the expectations of the individuals (e.g., regarding the publicity of their content) evoked by the platform (Ess & Association of Internet Researchers, 2002). For example, despite having signed the terms and conditions, users might not expect that data from a seemingly more private venue (e.g., a Telegram channel) can be accessed by third parties. *Privacy*, too, is a dominant norm in ethics guidelines and refers to the right to control data about oneself (Mittelstadt, 2017). Thereby, a privacy paradox can be observed. People share a lot of personal information online - despite valuing privacy - which might be due to a lack of awareness that this information is entirely public (Adjerid, Peer, & Acquisti, 2018). Moreover, classifying individuals into ad hoc groups based on (behavioural) social media data (e.g., likely a voter of a political party) to inform algorithmic decision-making might lead to violations of group privacy (Mittelstadt, 2017). Which steps can be taken by SMA researchers to protect individual and group privacy? Protecting users' *autonomy & anonymity* requires researchers to reflect on whether applied social media interventions or analysis methods could be manipulative or invasive. A negative example which might have harmed research subjects is an experiment by Facebook which altered the timeline to show more positive/negative content to users to investigate emotional contagion (Jouhki, Lauk, Penttinen, Sormanen, & Uskali, 2016). Further, ethical issues might arise if analysis methods are used to infer sensitive information or make predictions about individuals based on social media data, for example whether someone is likely to become depressed (Laacke, Mueller, Schomerus, & Salloch, 2021). Social media data is rarely representative of the researched community (e.g., due to silent or missing actors) and derived insights might lead to *discrimination* of individuals or groups (O'Neil, 2016). SMA researchers should reflect on who will be represented in the tracked data and how that might influence possible results and the generalisability of their research. Lastly, *data minimisation* is not only a principle of the GDPR but might also reduce ethical risks (Franzke et al., 2020). While big data sets are crucial for some types of analyses, researchers should try to minimise collected data. For example, by using specific timeframes and keywords, or sharing and reusing data (Møller & Bechmann, 2019).

The **preparation reflection stage** entails *data cleaning*, *biases*, and *unintended ins*ights. Social media data can be of low quality or 'noisy' (Stieglitz et al., 2018), for example due to colloquial language, typos, and emoticons. Thus, unstructured data such as tweets often require extensive *data cleaning* prior to analysis. The cleaning decisions typically reflect the researcher's value judgements of the data which can influence the subsequent analysis and results. Thus, researchers should reflect on their motivation and expectations when cleaning social media data and consider its impact. For example, how does removing data affect obtained results or minority representation (Franzke et al., 2020)? *Biases* during the preparation phase refer to incomplete or inherently biased data sets provided by social media platforms and other data providers (Bruns, 2019; Møller & Bechmann, 2019). Which procedures are employed by the platform, are these transparently reported, and was the obtained data set examined for inherent biases? Conducting big data driven research, such as SMA, can lead to *unintended insights* about user (groups) which were not of primary interest to the researcher. If these

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[1] A helpful approach at this point might be stages of consent by Porter (McKee & Porter, 2009)

insights touch on sensitive areas (e.g., hate speech, cyberbullying, disinformation), researchers might have a responsibility to act for example by informing authorities to avoid harm (European Commission, 2018, p. 14).

The **method reflection stage** involves the aspects *validity* and *algorithms*. As in every research project, the validity of applied SMA methods should be ensured. Thus, methods should not be chosen habitually but selected based on their ability to accurately measure the aspects relevant to the research question (Burton-Jones, 2009). The use of *algorithms*, for example in the form of supervised or unsupervised machine learning approaches to identify patterns or clusters in the data set, entails several ethical hurdles (Franzke et al., 2020; IEEE, 2020). Major concerns involve possible algorithmic biases, which are closely linked to biases in the training data (Johnson, 2020) and discrimination, as well as the black box problem, which is related to the question of algorithmic explainability, accountability, and traceability (Martin, 2019; Mittelstadt, Allo, Taddeo, Wachter, & Floridi, 2016). Do I understand the functionality of the algorithm, and can I explain the results? Who is responsible for potential harm resulting from the use of this algorithm? Am I aware of the limitations, such as the shortcomings of Natural Language Processing approaches for detecting sarcasm and irony, which can influence the results of a sentiment analysis (Eke, Norman, Liyana Shuib, & Nweke, 2020)?

The **publication reflection stage** comprises the ethical considerations *informed consent*, *sharing & storing* of data, *gender diversity*, *cultural dimensions*, and *future implications*. As already mentioned in the tracking reflection, *informed consent* is essential for protecting the privacy of research subjects in SMA. If informed consent cannot be obtained prior to data tracking, another approach is to ask for informed consent of those subjects whose accounts or content are analysed or mentioned in the paper prior to publication (Franzke et al., 2020). Studies show that users are only slightly concerned regarding the use of their social media data for academic research but they do expect to be asked for their consent (Williams, Burnap, & Sloan, 2017). When publishing SMA research, *sharing & storing* of data becomes relevant as SMA researchers need to evaluate how to store and share data while complying with legal and ethical considerations. While research grant providers often require an open access publishing of results and data sets, and researchers increasingly see the advantages of open data, this principle collides with the terms and conditions of social media platforms like Twitter and might lead to re-identification of research subjects (Stieglitz et al., 2020; Twitter, 2020). Furthermore, SMA researchers should reflect on *gender diversity* and *cultural dimensions* of their analysis and results prior to publication. The SMA researcher should be aware that social media platforms often do only display a minor part of society, which not always include diverse gender and cultural backgrounds. Thus, findings are often not generalizable to society and SMA researchers should consider and *report the limitations of their data and analysis* (Zook et al., 2017). Lastly, the future implications refer to possible consequences of SMA research. This point is closely related to the idea of avoiding harm - doing good in the meta reflection stage. What effect might my analysis have on the individuals and groups involved in the study, and on society? The awareness that my research has future implications is tied to the idea of RRI (Stahl, 2013) and the approach of ethics by design (d'Aquin et al., 2018), but is also an integral part of ethical guidelines for example reflected in the principles of the ACM (ACM, 2018).

6   Design Cycle - Evaluation Methods

6.1   Round 1 - Expert Interviews

The first version of the framework was evaluated with twelve interviews conducted with experts in digital ethics and SMA research on the professorial level. The selection criteria included expertise in the use of SMA or expertise in related ethical questions, and diversity in terms of cultural background and gender. Table 2 provides an overview of the interviewees.

ID	Job title (gender)	Research discipline	Area of expertise	Country	Length
R1	Professor (f)	IS	SMA and public communication	NOR	1h 03m
R2	Researcher (f)	Ethics	Ethics and digital media	GER	1h 07m
R3	Professor (m)	Media Studies	Ethics and computational technologies	NOR	30m
R4	Professor (m)	Digital media studies	SMA on online communities	AUS	1h 14m
R5	Professor (m)	IS	SMA of social media crisis communication	NOR	1h 14m
R6	Professor (m)	Ethics	Information Ethics	USA	46m
R7	Professor (f)	Communication Science	SMA of online social phenomena	BRA	33m
R8	Professor (f)	Communication Science	SMA on virtual communities	BRA	29m
R9	Professor (f)	Computer Science	Natural Language Processing and Information Retrieval	NL	1h 08m
R10	Professor (m)	IS	SMA of social media crisis communication	GER	1h 02m
R11	Professor (f)	Ethics	Media and Information Ethics	GER	42m
R12	Professor (m)	Ethics	Digital Ethics	UK	55m

Table 2. Overview of the interviewed experts.

The semi-structured interviews took place via Skype, Zoom, or Google Hangouts between May and August 2020. All participants provided their informed consent to record and analyse their interviews. The data was analysed and stored within one research institution.

The interview guidelines, which were slightly adapted for SMA researchers and ethicists respectively, consisted of six question blocks: The introductory questions aimed at evaluating the expertise and focus of the interviewees. The question blocks two-five asked for the ethical challenges and implications of each phase of the SMA research process. Then, the experts evaluated the extended framework, which was provided one week in advance. The experts were encouraged to add ethical implications or to propose changes. Lastly, the interviewees were asked for general comments and if the framework would be helpful for them and their research.

The transcription was conducted with the tool MaxQDA following Kuckartz' transcription guidelines for computer-aided content analysis (Kuckartz, 2016). The qualitative content analysis was conducted according to the rules of Mayring (2014). The category system was based on deductive codes, which were derived from the literature, for example *informed consent* and *privacy* are deductive codes, one category derived from the interview input, for example, is *protecting the researcher*. To ensure the reliability of the coding process, one out of twelve interviews was coded separately by two coders. Cohen's κ coefficient of 0.8 confirmed the agreement between the coders to be substantial (Landis & Koch, 1977).

6.2 Round 2 - Focus Groups

To evaluate the artefact with regards to the defined acceptance criteria of "Awareness for Ethics" and "Applicability of the Artefact", two confirmatory focus group discussions were conducted. According to Tremblay et al. (2010), focus groups can be used to refine and evaluate (IT) artefacts in DSR. Focus groups were chosen as the evaluation method because they allow the evaluation of the artefact in a realistic scenario and offer very rich qualitative interaction data. Morgan (1988) defines four to twelve participants as suitable. To keep the level of interaction high and to prevent "social loafing", we included four participants in each group (Tremblay et al., 2010). Corresponding to the application environment of the artefact, the participants were selected based on their experience with SMA and their general level of research expertise. As the artefact should effectively support researchers from different experience levels, the focus groups included PhD candidates and senior researchers. Table 3 provides an overview of the focus groups.

ID	Job title (gender)	Research Discipline	Area of expertise	Country
FG 1	**Focus Group 1**			
F1	PhD student (f)	Computer Science	SMA for health forums	NL
F2	Assistant professor (f)	IS	SMA for enterprise social networks	LIE
F3	PhD student (f)	IS	SMA for crisis communication	GER
F4	PhD student (m)	IS	SMA and AI ethics	GER
FG 2	**Focus Group 2**			
F5	PhD student (f)	IS	SMA for enterprise social networks	GER
F6	PhD student (f)	IS	SMA and VR educational contexts	GER
F7	PhD student (f)	IS	SMA for crisis communication	GER
F8	Post-doctoral researcher (m)	IS	SMA for crisis communication	AUS

Table 3. Overview of the focus group participants and their prescribed pseudonyms.

All participants provided their informed consent to record and analyse the discussion. Prior to the two confirmatory focus groups, a pilot focus group with six student assistants with experience in research and SMA was conducted via Google Hangouts to test and refine the guidelines and the procedure. The discussion (total of 60min) was structured as follows: After welcoming the participants and summarising the contents of the discussion, all participants were asked to introduce themselves briefly to establish a basic familiarity within the group. Afterwards, the following task was presented: The group was asked to imagine being a research team aiming to develop a research design to investigate the different actors who are involved in the discussion about COVID-19 on social media. Then, the group was invited to a virtual Google Jamboard where they were asked to write down a research design and the connected ethical considerations (15 minutes). As an inspiration for the different steps, the SMA framework by Stieglitz et. al (2014, 2018) was given.

Due to the challenging task of designing a research project in a team and the limited time, it was unlikely that participants would touch on all relevant ethical considerations included in the framework in the first round of discussion. Therefore, as an indication of the perceived importance and completeness of ethical considerations in the developed research design, we asked each participant separately to rate their agreement to the following two statements on a 5-point Likert scale: "Ethical considerations played an important role in the development of

the research design" and "I am confident that we discussed all ethical considerations that are relevant for SMA research" *(I don't agree (1) to I fully agree (5))*.

Afterwards, the extended SMA framework was explained by the moderator. Participants were then asked to discuss if and how they would refine their research design based on the extended SMA framework (15 minutes). After this discussion, another questionnaire was filled out individually by the participants, to avoid a social desirability bias. It included five questions, which aimed at evaluating the applicability of the framework. In the final 15 minutes, the participants were asked to jointly discuss the framework with a special focus on the evaluation criteria *"Awareness for Ethics"* and *"Applicability of the Artefact"*. The guidelines for the focus group discussions are included in the Appendix B.

We consider the first evaluation criterion to be fulfilled if the extended framework stimulates and extends the awareness of ethical considerations in the development of an SMA research design. We operationalised this by 1) comparing the ethical considerations mentioned in the first discussion supported by the original SMA framework (Stieglitz et al., 2014) with those mentioned in the second round of discussion supported by the proposed extended framework, and by 2) analysing statements on the extended framework during the discussion which support or challenge its capacity to stimulate and extend ethical awareness.

We consider the second evaluation criterion, "Applicability of the artefact", to be met if the extended framework is perceived as a useful and applicable tool by SMA researchers. We operationalised this criterion by 1) analysing the comments on and interactions with the extended framework during the discussion, 2) the direct feedback provided on the extended framework at the end of the focus group discussion, and 3) the private questionnaire ratings on the five statements assessing the applicability of the framework (see Appendix B).

The analysis of the focus group data was conducted according to the described approach for the analysis of focus group data in IS research by Nili et al. (2017). As this focus group was conducted virtually, non-verbal interaction data, which requires an interpretation of movements and gestures in interaction with other participants, was not considered. Instead, we focused on the content and verbal interaction data.

6.3 Round 3 - Survey of initial experts, senior SMA researchers, and ethics boards

In the final evaluation, a survey was conducted among six ethics board members to collect reasons for criticizing or rejecting SMA studies and consulted sources for ethical evaluation. This was done to ensure that all mentioned aspects are covered by the final artefact. We chose this approach over a detailed evaluation of the ethical issues in the artefact as it covers all phases of the SMA process in a small-step manner and exceeds the scope of work of the ethics boards which only make one-time decisions before the start of a study. Thus, a second survey was conducted to evaluate the framework itself involving four experts from the first evaluation round as well as seven additional SMA researchers to do justice to the circular nature of DSR and to test the artefact in a realistic scenario. The surveyed SMA researchers were asked to apply the extended framework to a planned or recently conducted SMA study. Based on the use case, they were asked to indicate for each ethical issue whether it sparked new thoughts (acceptance criterion I) and to provide general feedback in open text form. Additionally, they were asked to answer eleven questions on a 5-point Likert scale ("I don't

agree" to "I fully agree") on the applicability of the framework and the reflective questions (acceptance criterion II). Table 4 shows the expert sample for this round.

ID	Job title (gender)	Research discipline	Area of expertise	Country
E1	Professor (f)	Computer Science	Natural Language Processing	NL
E2	Professor (f)	Computer Science and Mathematics	Ethnomathematics Applied Statistics	IDN
E3	Professor (f)	IS	SMA and public communication	NOR
E4	Assistant Professor (m)	Psychology	Self-regulation Consumer Research	GER
E5	Professor (f)	Media Studies	Internet regulation	NOR
E6	Post-Doc and Docent (f)	Communication Science	Technology and Organization	FIN
Ethic Board Members				
Professors from the first interview round				
R4, R5, R8, R10 for details please see table 2				
Professors who were confronted with the artefact for the first time				
R13	Professor (m)	IS	SMA in organizational contexts	GER
R14	Professor (m)	Psychology	SMA and politics	GER
R15	Professor (m)	IS	SMA of social media crisis communication	GER
R16	Professor (f)	Communication Science	SMA on social movements	BRA
R17	Professor (m)	Communication Science	SMA and politics and journalism	GER
R18	Professor (m)	IS	SMA in organizational contexts	GER
R19	Assistant Professor (m)	IS	SMA and communication	UK

Table 4. Overview of last evaluation round with professors and ethic board members

7   Design Cycle - Evaluation Results

7.1   Interview Results

The aim of the expert interviews was to evaluate the completeness of the first prototype of the artefact. The results of the interviews have led to several additions and changes, which will be outlined in the following.

The meta reflection phase was moved prior to the 'Research Domain' in the framework to emphasise the overarching nature of these questions, regardless of the specific research project. Additionally, the subcategory of *avoiding harm - doing good* was changed to *general orientation of research* and *orientation towards the common good*. The former includes questions related to the beneficiaries of the research and the gut-feeling of the researcher about the research aim. The latter was included to account for research which might have to violate certain ethical principles to serve the common good.

To emphasise that the tracking reflection should be done prior to data tracking, it was renamed to pre-tracking reflection. Furthermore, *data gathering* was added to point to the ethical implications of alternative or complementary data sources, such as purchased datasets or existing (decontextualised) datasets, and their impact on the analysis and results.

Further, the interviewees highlighted the complexity of informed consent, for example in terms of cultural diversity (*"this does not make a lot of sense in a highly relational culture, so you have to develop a form of a kind of collective informed consent"*, R03), and feasibility due to low number of replies on social media and that *"there is no other sensible way to reach these people"* (R04). Overall, interviewees often regarded consent more relevant for small data sets, private

accounts, case-specific analyses than for mass data, public accounts, and aggregated analyses, thus, this distinction was added. The related concern of *re-identification* of individuals after publication was added to the Publication reflection.

Due to different national legislations, *sharing & sto*ring was added as researchers might have to agree on GDPR-compliant services and procedures. Also, when sharing data sets, R06 highlighted that, *"if you merge it [your data] with my data, I might now suddenly be able to identify your subjects and there is no fault of yours other than the fact that you shared it with me"*. Therefore, the aspect of data merging was added to the preparation reflection.

In the preparation reflection, before analysing the data, the protection of the researcher should be considered. R03 mentioned, *"we have to offer researchers more and more sophisticated ways of protecting their identity online so that they don't become a target"*. But also analysing hate speech or misinformation on social media can be emotional stress. Lastly, R12 emphasised that, *"you have to make value judgements on the data before you process the data, before you analyse the data. […] I think it's important to understand that statistical is also based on value judgements […] whether you choose a particular confidence level of 5 % or 1 % or .5 % will determine what comes out as significant in the end. And that's not a natural occurrence, that is a value judgement that is driven by something and has consequences for whatever you can say in the end."* Hence, we added that researchers should reflect on the limitations of their data and analysis and make those explicit.

In the method reflection, four aspects were added. First, the potential *exposure of sensitive attributes or relationships* of social media users, for example, when conducting social network analysis. *Biases* were added to raise questions about unequal representation in the data and the generalisability of the results. Furthermore, aggregated analyses might not harm individuals, but the derived insights could have harmful implications for groups of people. To address these ethical concerns, researchers should examine whether their results are *supported by other data*. In the last reflection phase, the publication reflection, gender, and cultural aspects were merged in the more inclusive *promoting diversity* aspect, asking researchers to discuss diversity in their studies and to reflect their own socio-economic, cultural, and personal background. Lastly, *giving back* was added to inspire researchers to think about ways of compensating participants and sharing research benefits or insights with them.

7.2 Focus Group Results

The confirmatory focus group evaluation of the second version of the framework, which resulted from the expert interviews, targeted two evaluation criteria: "Awareness for Ethics" and "Applicability of the Artefact". Table 5 provides a summary of the supporting and opposing or challenging evidence for the two evaluation criteria.

In the first survey of FG1, one reply is missing due to technical issues. In FG1, while participants perceived ethical considerations to have played a moderately important role ($M = 3.34$, $SD = 1.15$), the perceived completeness of discussed ethical considerations was very low ($M = 1.34$, $SD = 0.58$). Hence, possibly, the participants could have discussed more ethical hurdles when given more time. This limits the insights for the first evaluation criterion derived from the pre-post analysis of discussed ethical considerations in FG1. In FG2, however, the perceived importance and completeness was medium to high ($M = 4$; $SD = 0.82$; $M = 3.25$, $SD = 1.26$), suggesting that the additional ethical reflection in the second round, for example related to power issues (see Appendix B), can be assigned more clearly to the guidance provided by the extended framework. Moreover, the interactions and statements during the

discussions, such as *"and I never really thought about this that we also might have an obligation to, for example, report fake news"* or *"I am really thinking all the time is this everything that we should ask ourselves in this step"* and the direct feedback during the focus groups imply that the extended framework stimulates further ethical reflection.

		Support	Challenges
A w a r e n e s s	1	- Extension of discussed ethical considerations (e.g., unintended insights, cultural biases, power issues; see Appendix for an overview of both discussion rounds)	- Not all keywords are self-explanatory, especially if researchers are not familiar with the referenced ethical debate (discussion not extended by those keywords)
	2	- Stimulating consideration (and discussion) of ethical questions - Starting point for further ethical reflection beyond the extended framework - Raising awareness for the importance of ethics in SMA	- Unclear purpose: framework as a "rule book" which researchers have to follow? - Unclear scope: what is unique to SMA ethics?
A p p l i c a b i l i t y	1	- Structuring the discussion - Memory aid	- Overwhelming representation - Difficult to understand
	2	- Saving time & reducing workload with concise overview - Confidence in research design - Avoiding ethical issues to be overlooked - Framework as a point of reference for ethical standards in SMA research & reports	- How to translate reflection into actions and which actions to choose - Additional material (reflective questions, best practices, examples) needed
	3	- Medium to high ratings on perceived support for planning and conducting ethical SMA research ($M = 4, SD = 0.53$)), willingness to use the framework ($M = 3.88, SD = 0.83$)), and added value beyond existing guidelines ($M = 3.75, SD = 0.46$))	- Mixed ratings on understandability of the framework ($M = 3.5, SD = 0.93$)

Table 5. Summarised evaluation of the criteria "Awareness for Ethics" and "Applicability of the Artefact".

The perceived applicability of the framework can be outlined by the following statements: *"there is a lot out there about ethics and also social media but what I like about the figure is that it brings it somehow to the point [...] You don't have to read 10 papers to find all the issues that might occur when doing ethical SMA research"* and, *"it seems useful because there are a couple of things where you think: Oh yeah, I might have thought about that but it would have taken me more time or... I would have thought about it at a too late stage"*.

Further feedback on the framework addressed the terminology, the need for a contact person for ethical guidance, and the challenge of balancing ethical considerations and research interests. Thus, the focus group evaluation highlighted that for the extended SMA framework to effectively support ethical reflection and be useful for SMA researchers, the ethical issues in the framework require additional explanatory material. To address this feedback, we compiled a manual including a short description of each issue, relevant sources, and a list of reflective questions to complement the extended SMA framework (see Appendix A). Thus, the third

version of the artefact consists of the extended SMA framework and the supplementary material. Both were once again evaluated regarding the acceptance criteria.

7.3   Results of the final evaluation

In the final evaluation round, the SMA researchers applied the artefact to a variety of SMA topics and methodological approaches. For example, to studies with a focus on enterprises or the analysis of infodemics and pop-cultural phenomena with qualitative and quantitative methods. Regarding *ethical awareness*, twelve of the 34 ethical issues each provided additional food for thought for at least six of the SMA researchers. For each of the remaining 22 ethical issues, at least one of the SMA researchers indicated that it stimulated ethical reflection. Thereby, the ethical issue „common good" of the meta reflection stage was selected most frequently ($n = 9$) and discussed in the open feedback as well. For example, R18 asked himself in how far it would be unethical to do research which has no contribution to the common good. Further, R5 emphasized that the focus of one's own study (e.g., company or society) influences the individual importance of various sub-aspects, which makes every ethical evaluation an individual process. As all participants were senior researchers with extensive experience, several noted that the had already implicitly taken many points into consideration (R18, R5, R19), sometimes due to special industry standards of their application environment (R18). Yet, the participants shared the positive impression that the framework would support them in planning and conducting SMA studies ($M = 4.64$, $SD = 0.5$) and provides additional value to existing guidelines ($M = 4.36$, $SD = 0.67$). The easiness to understand the framework was rated slightly lower ($M = 4.18$, $SD = 0.6$). Yet, all participants moderately to strongly agreed that they would apply the framework in their research ($M = 4.45$, $SD = 0.69$) and recommend it to their PhDs and students ($M = 4.45$, $SD = 0.82$). More divided was the opinion of the participants if the framework reduced the methodological quality of their work ($M = 2.1$, $SD = 1.51$). While nine researchers could not identify any negative impact, two were sure that there was a negative impact on their methodological quality. The support by the initial list of reflective questions was rated as high ($M = 4.55$, $SD = 0.82$). The easiness to understand the list of initial reflection questions was rated a bit higher than the overall framework ($M = 4.27$, $SD = 0.79$). Similar to the overall framework, the participants saw added value of the initial reflection questions to existing guidelines ($M = 4.45$, $SD = 0.69$). All participants moderately to strongly agreed that they would apply the list of reflection questions in their research ($M = 4.36$, $SD = 0.67$) and that they would recommend using the reflective questions to their PhDs and students ($M = 4.72$, $SD = 0.47$).

The survey of six ethics board members found that the main reasons ethics boards rejected research designs was due to privacy-related issues which were not considered sufficiently by research teams. Respondents mentioned privacy as a generic term, but also profiling, re-identification, anonymity, and the legal issue of informed consent and GDPR. Furthermore, the respondents mentioned neglected sensitivity of data, planned manipulation of subjects, and protection of the researcher from negative influences in the form of false news and violent scenes as points to be considered. Two other meta-themes raised were the limitations of the open-science ideals in social media research due to legal boundaries and taking potential negative impacts of SMA into consideration. To guide their evaluation, the respondents consulted different sources such as institutional bodies (e.g., data protection officer), or articles, books, and existing guidelines, such as legal considerations (e.g., GDPR). All agreed that additional guidance with a more specific hands-on approach is missing.

8 Discussion

The evaluation rounds involving two focus groups, individual application of the framework to a realistic scenario, and consultation of ethics boards supported both acceptance criteria, indicating that the artefact provides a valuable addition to the environment of SMA researchers. Specifically, the extended SMA framework and the accompanying reflective questions cover the crucial points for ethical approval of ethics boards from different cultures and regulatory environments and thus, could help SMA researchers to prepare better for such evaluations. Thereby, the framework goes beyond the one-time evaluation of a study by providing specific guidance throughout the entire research process. In the evaluation with a group of culturally and thematically diverse, highly experienced SMA researchers, the artefact was perceived to stimulate ethical reflection. The combination of the extended SMA framework and the reflective questions were rated as highly applicable and useful for researchers with less experience in SMA (students, PhDs) as well. Nevertheless, the evaluation also highlighted certain challenges which need to be considered while applying the extended SMA framework and which we will discuss in the following section. One of these challenges concerns the interpretation of the ethical issues in each phase as a 'rule book' that the researcher must follow and the wish for specific ethical best practices (cf. Table 5). This perception points to a prevalent, yet problematic 'tick the box'-approach to research ethics (Dawson, Lignou, Siriwardhana, & O'Mathúna, 2019; Grieves, 2019). While ethical committees examine and approve research designs only prior to the start of the research project, these approvals are often based on standardised criteria, which does not do justice to the explorative character of SMA. Due to the unique challenges of SMA research, such as quickly changing circumstances (new social media platform(s), changing terms and conditions, new features etc.) and the interdisciplinary nature of SMA, providing explicit rules to follow would likely fail to capture the reality of SMA research. Thus, by providing descriptions of possible ethical issues and reflective questions we aim to stimulate reflection, yet not every aspect is equally relevant for every SMA study. Especially given that SMA research is also used in time-pressing and societally highly relevant domains such as disaster response (Mirbabaie et al., 2020), some ethical considerations might be neglectable in those cases ("common good", Appendix A). However, these ethical deliberations are complex and need to be evaluated on a case-by-case basis (Zook et al., 2017). Hence, similar to the ethics by design approach (d'Aquin et al., 2018) our study shows that SMA research ethics require open reflection (i.e., adaption, interpretation, dialectic) throughout the research process and iterative adjustments (i.e., tailored to the research process stages). The extended SMA framework (figure 4) in combination with the reflective questions (Appendix A) embody these principles.

The optimal presentation of the framework is an area for future research. Based on the feedback from the interviews and focus groups, we imagine an interactive website which allows users to gradually "zoom in" on the stage of the research process they are currently interested in to avoid the framework to be overwhelming. Moreover, the website might incorporate ethical questions tailored to the users' SMA project. Such a website could also provide a platform for researchers to discuss research designs and best practice examples.

Lastly, it is noted that the different reflective questions are often interrelated or even overlapping. For example, the question of informed consent is always linked to the value of transparency, which relates to the autonomy and privacy of the user. To strike balance

between providing concrete questions tailored to SMA processes without oversimplifying abstract ethical concepts is an ongoing challenge.

The artefact in its final form marks a first step towards providing much-needed applicable ethical guidance for SMA researchers (Taylor & Pagliari, 2018) and shall serve as a basis to ignite further discussions and subsequent research within the field on how to ethically approach SMA. It can be understood as research routed in explicit morality, setting the foundation for deeper thoughts and a step towards ethical theory (Stahl, 2012). We encourage researchers to investigate additional methods and useful theory that supports the ethical reflection of SMA researchers in the future, including the mapping of additional - maybe institutional or other - hindrances to why ethics guidelines are accepted and used. We are convinced that there will be a rich vein for further research also on the theoretical underpinnings of the design and usage of ethics guidelines in SMA.
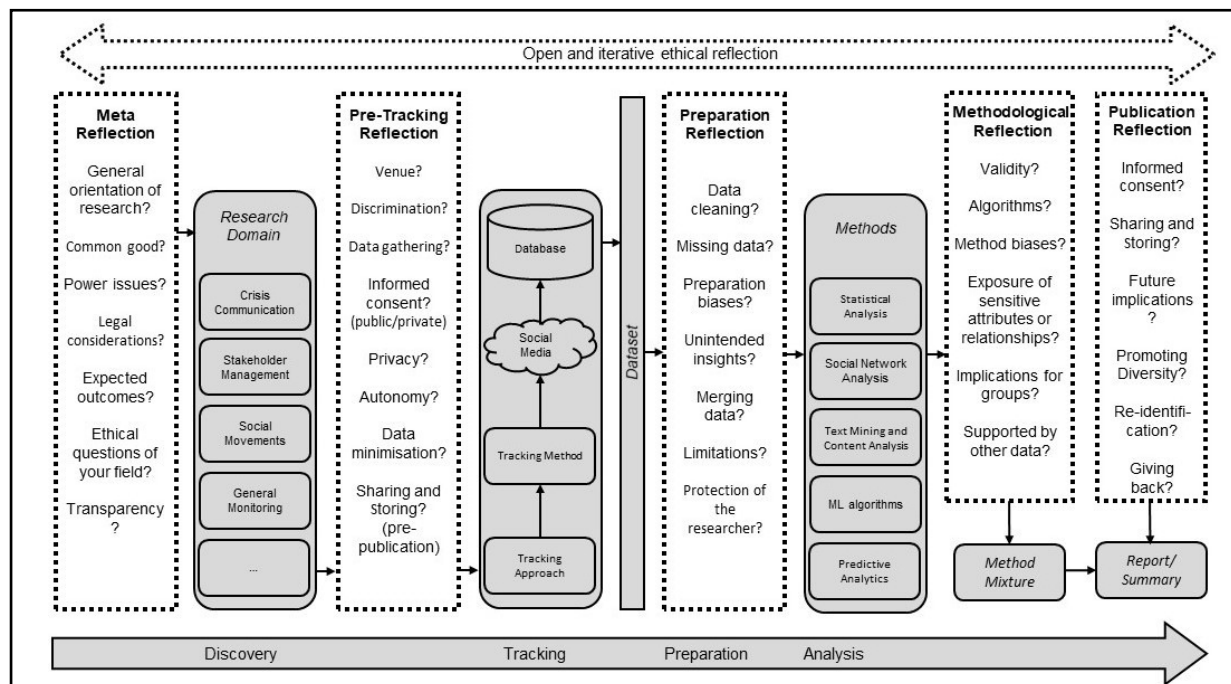

Figure 4. Final version of the extended SMA Framework with five ethical reflection phases.

9   Limitations and Future Research

Ethics and SMA research are constantly evolving fields. Thus, the presented framework can only be as good as the current knowledge base. To succeed at providing SMA researchers with practical guidance, it will be necessary to regularly check and update the framework. Although the framework (and supplementary material) was evaluated with the help of twelve expert interviews, two focus groups, and applied by individual experts to a realistic scenario, applying the framework in practice and over longer period will provide richer insights. Simultaneously, the optimal presentation of the framework should be elaborated. By testing the artefact in diverse cultural contexts, the limitation that the authors all have a Western European background can be overcome. Further, it would be helpful to conduct a systematic literature review on the prevalent ethical topics in SMA research to map the debate, indicate the overlaps of different concepts, and thus increase the applicability of those discourses to the research process.

10 Conclusion

To decide what is morally right or wrong in the research process can be a major challenge for SMA researchers, as they are confronted with an abundance of theoretical ethical debates, dilemmas, ethical guidelines, and legislations. The excessive demands, a possible lack of sensitisation for ethical issues, and high time pressure in academia can lead SMA researchers to squander the chance to conduct more ethical research. In this paper, we present a framework for ethical SMA research which assists researchers to reflect the ethical implications of their decisions throughout the entire SMA research lifecycle. The SMA framework by Stieglitz et al. (2014, 2018) was chosen as a basis and was extended by five ethical reflection stages: the meta–, pre-tracking–, preparation–, methodological–, and publication reflection. The reflection stages provide researchers with thought-provoking impulses to ethically reflect their research design and implementation. To better understand which questions might be relevant for their specific studies, a list of additional descriptions and reflective questions is provided. Based on 'ethics by design' principles, the framework for ethical SMA research can accompany researchers throughout the whole research lifecycle, and thus, can function as the practical guidance researchers need to conduct more ethical SMA research. The improvement of individual moral decisions can lead to an improvement not only on an individual level (e.g. privacy, autonomy, protection of the researcher) but might have positive implications on the society as a whole (e.g. future implications of the research, cultural dimensions and diversity). Besides our practical contribution, the study highlights the ethical concepts which are of relevance for IS research and the need to spark discussions in our community to increase the positive impact of IS research on both academia and society.

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Appendix A

Disclaimer: The following manual serves as a complementing resource to the extended framework. It resulted from the knowledge base, the interviews, and the focus group discussions. Each of the following aspects relates to an - often highly complex- ethical debate. Please bear in mind that these questions and short descriptions are therefore not exhaustive. Feel free to contact us in case you find something missing.

Ethical aspect (added in version)	Description & types of issues arising in SMA research	Sources	Exemplary reflection questions
Meta reflection			
General orientation of research? (Version 2)	<u>Description</u>: The question and goals of the research aim at a goal which is good and desirable.	IRE 1.0 (2020), p. 19 ACM, 2018 AIS, 2019 Interviews	• What is your gut feeling regarding your research? • Do you feel that something could be harmful/ wrong/ problematic about your research?
Common Good?	<u>Description:</u> The expected results of the research are beneficial to society as a whole so that minor ethical shortcomings associated with the research are justifiable.	Interviews	• Does your research make an outstanding contribution to society? • Does your research help to solve a society-transcending grievance? • Is the impact of the research positive enough to justify minor ethical violations?
Power issues? (Version 2)	<u>Description:</u> SMA researchers can face various power issues regarding their research, e.g. dependence on social media platforms to access data (e.g., APIs, web scraping), terms and conditions, and technical possibilities. This imbalance might affect possible research directions and designs. Moreover, researchers often depend on third-party funding, with a funder potentially impacting the research through self-imposed censorship. At last, there can be a power imbalance between the researcher and the research subjects, which might result in divergent expectations regarding the research.	Lomborg & Bechmann (2014) Bruns (2019) Møller & Bechmann (2019) IRE 3.0 (2020) IEEE (2020)	• How do possible power imbalances influence your research design? How can you mitigate these influences when developing your design? • How does the source of funding influence your research? Which options do you have to safeguard your independence as a researcher? • What is your relationship with the research subjects? What expectations do the different parties of the research have?
Legal	<u>Description:</u> Ethics and law are	IRE 1.0 (2002)	• Which legal

considerations? (Version 1)	interwoven. Some ethical considerations are (partially) covered in legal frameworks (e.g., data protection and data minimization in the GDPR), which should thus be considered when planning and conducting SMA research.		frameworks apply to your research? Are (non-European) research partners aware of and prepared to comply with GDPR regulations?
Expected outcomes? (Version 2)	<u>Description</u>: Approaching an investigation with an open mind is as important for SMA researchers as for any other scientist. They must question if certain expectations or biases on their part are influencing the research design and/or analysis. The composition of the data set and the constant reflection about the inclusion of all groups of people is crucial.	Interviews IRE 3.0 (2020), p.9 Chen, Zheng, & Ceran, 2016	• What are the expected outcomes of your research? How are those expectations influenced by your socio-economic / cultural background? How do they influence your research design? • Does your data collection include all user groups you want to include in your research?
Ethical questions of your field? (Version 1)	<u>Description</u>: Each field of research, faculty, or institute follows its own code of conduct and often has an open and ongoing dialogue on ethical guidelines. SMA researchers should be aware of these developments, depending on which research branch they identify with they might be aware of ethics authorities.	IRE 1.0 (2002) IRE 2.0 (2012) IRE 3.0 (2020) IEEE (2020) ACM, 2018 AIS, 2019	• Which ethical debates or considerations from your field of research are relevant to your research?
Transparency? (Version 1)	<u>Description</u>: Ethical guidelines often call for more transparency in research (e.g. open data) but social media content can in many cases be easily linked back to individuals. Thus, SMA researchers need to find a balance between the protection of individual privacy of social media users and the growing need for transparency in research.	IRE 3.0 (2020), p. 20 Jobin et al. (2019)	• How can you increase the transparency of your research? Which standards could you agree on with your collaborators (for example for documenting design or analysis choices)? • Can you design your research in a way that is compatible with open data / open research / data donation?
Pre-tracking reflection			
Venue? (Version 1)	<u>Description</u>: The venue refers to i) the actual and the perceived publicity of content to the general	IRE 1.0 (2002), p. 4-5	• Where does the interaction, action, and communication under

	public. The more private a venue is or the more private it is perceived by users (e.g., Telegram channel vs Twitter), the more responsibility SMA researchers have to inform and protect research subjects. Moreover, it is determined by ii) the vulnerability and type of research subjects (e.g. minors, marginalized groups). The higher the vulnerability, the higher the responsibility of SMA researchers to protect research subjects.		study take place? ● How is it shaped by the venue and how might that influence your research and results? ● How can you protect vulnerable groups and subjects in your research?
Discrimination? (Version 1)	Description: Social media users and data are often not representative of society (e.g., elders might not use social media). Certain actors might communicate very actively (e.g., influencers, activists, bot accounts), while others remain silent observers. Unequal representation limits the informative value and generalizability of the findings and could be harmful to individuals or groups. Thus, SMA researchers should plan their data tracking with representation and diversity in mind to avoid or reduce potential discrimination.	IRE 3.0 (2020) IEEE (2020) ACM (2018)	● Who is represented in the data you consider for your research? Who is not? ● Who are the subjects of your research and how might that influence your results? ● How do you include and account for diversity (gender, culture) in your research?
Data gathering? (Version 2)	Description: Self-collected or purchased data may be subject to power issues or discrimination. Thus, SMA researchers should explore options for gathering additional data sets when planning their data tracking.	Interviews	● Can you complement your data set for example by buying data sets, using existing data sets, or alternative methods? ● (If applicable) In which context were alternative data sets created or collected? How do they affect the outcomes of your research?
Informed consent? (public / private) (Version 1; distinction added in version 2)	Description: Not all social media users are aware that terms and conditions often allow third-party usage of their data. Thus, SMA researchers should explore ways of informing social media users about the usage of their data in research. Obtaining users' informed consent is especially relevant for small data sets, closed groups, private	IRE 3.0 (2020) Fiesler and Proferes (2018) Interviews	● Are you tracking public or private profiles and how do you distinguish them? ● Which options do you have to obtain informed consent when tracking private profiles?

	profiles, and case-specific analyses as compared to mass data, public profiles, and aggregated analyses.		
Privacy? (Version 1)	<u>Description:</u> Withholding or selectively sharing information about oneself (one's privacy) is an important norm in ethics guidelines. SMA researchers should be aware that social media often blurs the lines between public and private and people might share information online without being fully aware that these are public.	Adjerid, Peer, & Acquisti (2018) Mittelstadt (2017) Zimmer (2010) IRE 1.0 (2002) ACM (2018)	• Are you aware of the paradox that people share information online but overlook that these are entirely public? • Which steps can you take to protect the privacy of social media users? • Do you investigate public figures or do you focus on ordinary citizens?
Autonomy? (Version 1)	<u>Description:</u> Maintaining autonomy means that social media users can make their own decisions and behave the way they desire without getting manipulated. SMA researchers can affect the autonomy of social media users by applying AI in the analysis of the data to derive certain criteria and predictions about the individuals, e.g. their likelihood to suffer from depression. Manipulation of timeline or newsfeed which unconsciously steers the discourse of a group in one direction can hurt autonomy, too.	Laacke et al. (2021) Jouhki et al. (2016)	• Are you planning interventions (e.g. on social media) which could be seen as manipulative or a restriction of the users' autonomy? • Are you planning to derive results which make predictions about individual users?
Data minimisation? (Version 1)	<u>Description:</u> Data minimisation refers to collecting the minimal amount of (private) data that is sufficient to answer a research question.	IRE 3.0 (2020) Møller and Bechmann (2019)	• Even if you are a big data researcher - are there ways of minimising the collection of (private) data? • How can you refine the time frames for tracking, the selection of keywords etc. to adhere to this principle? • How will you deal with collected data that does not contribute to answering your research question?
Sharing & Storing (pre publication)?	<u>Description:</u> Safeguarding data security can be subject to both ethical and legal frameworks.	Interviews	• How do you plan to store your data? Is it possible to share the

(Version 2)			• Is your data storage and sharing compliant with legal frameworks? • How can you organise the access management when working with international partners? • What tools and platforms are available?
Preparation reflection			
Data cleaning? (Version 1)	<u>Description:</u> Social media data is often of low quality or 'noisy' (e.g. colloquial language, typos, emoticons) and requires data cleaning prior to analysis. Replacing, correcting, or removing inaccurate or incomplete records reflects the researcher's expectations and value judgments of the data and are likely to influence subsequent analysis and results. Thus, SMA researchers should reflect on their motivation and expectations when cleaning social media data.	Stieglitz et al. (2018) IRE 3.0 (2020), p. 41	• How do you clean your data and what is your motivation behind it? • What other research outcomes would be possible if the dataset was not cleaned? • How do you identify outliers and what are the consequences of removing them?
Missing data? (Version 1)	<u>Description:</u> Social media data is rarely representative for the population or phenomenon under investigation. Thus, SMA researchers should try to check their data for representativity of (minority) groups and diversity of perspectives and opinions. Missing data might influence the results and could cause harm.	IRE 3.0 (2020), p. 41 boyd & Crawford (2012), p.669	• Did you check who is represented in your data set? • Who or what might be missing? • How can you react to missing data?
Preparation biases? (Version 1)	<u>Description:</u> Procedures and methods used by (commercial) data providers or social media platforms for data collection might have built-in biases. SMA researchers should aim to understand and reflect on the process which resulted in the obtained data set.	Bruns (2019) Møller & Bechmann (2019) IRE 3.0 (2020), p. 20	• Which procedures and methods does the platform or data provider use to supply the data? Could these have built-in biases?
Unintended insights? (Version 1)	<u>Description:</u> SMA research can lead to insights about groups, users or topics which were not of primary interest for the research. If these insights touch on sensitive areas or could have substantial harmful impacts, they might	European Commission (2018), p. 14	• How would you react to unintended insights (e.g., hate speech, cyberbullying, sedition, harmful fake news, terrorist groups or acts, manipulation of users

	require SMA researchers to take some form of action, e.g. to report to authorities		via bot networks)?
Merging data? (Version 2)	<u>Description:</u> Supposedly irrelevant information in a data set might lead to identification of research subjects if it is combined with information from other data sets. SMA researchers should thus take special care when merging datasets for analysis.	Interviews Zook et al. (2017)	• Does the possibility of re-identification increase because you are merging different datasets?
Limitations? (Version 2)	<u>Description:</u> The selection of analysis methods (e.g., type of algorithm) and statistical criteria (e.g., significance levels) can result in limitations. The value judgments and expectations of researchers influence which analysis is chosen and what results will be considered relevant.	Interviews	• How is your data set, data preparation, and choice of analysis limited? • How do you declare or account for those limitations?
Protection of the researcher? (Version 2)	<u>Description:</u> Researchers can become a target (e.g., subject to hate speech) if they conduct SMA research on certain topics or within certain communities. Further, being confronted with disturbing social media content might cause psychological harm. Thus, protecting the researcher for example by carefully concealing their online identity is important for some areas of SMA.	Interviews	• Does the researcher need to be protected? Is the researcher confronted with disturbing material? • Does the researcher conduct research in a conflictual area which could put the researcher at risk due to the research results?
Methodological reflection			
Validity? (Version 1)	<u>Description:</u> This principle refers to the suitability of an analytical approach to answer a particular research question. SMA methods should be selected based on fit rather than habit. For example, social network analysis can be performed on almost all major SMA datasets, but results might not always be meaningful. When using machine learning, SMA researchers often get a result that looks valid, but do not have enough knowledge how the result was achieved.	Burton-Jones, 2009	• Do you select your method because it is a habit and existing competence or because it is the best fit for your research design?
Algorithms? (Version 1)	<u>Description:</u> Analysing social media data with algorithms can bear ethical hurdles. For example,	Eke, Norman, Liyana Shuib, & Nweke (2020)	• If machine learning is applied, how do you separate the dataset

	if social media data serve as training data for machine learning, inherent biases in the data will be reproduced by the model. Further, if algorithms are used in SMA to make or inform decisions, researchers should be aware of the black box problem and explore options to increase transparency and explainability of the employed models and discuss who is accountable for the algorithmic decisions. When using pre-trained models or analysis services, researchers should consider the training data used for pre-training (e.g., cultural context, demographics).	IEEE (2020) IRE 3.0 (2020) Martin (2019) Mittelstadt, Allo, Taddeo, Wachter, & Floridi (2016) Zook et al. (2017)	into training, validation, and test data? Do you test on previously unseen data? ● Do you use a pre-trained model? If so, what do you know about the training data and the performance of the model (e.g. embedded cultural biases)? ● Do you understand the functionality of the algorithm or is it a black box for you? ● Is the algorithm used to make decisions? Who is accountable for those? ● What implications has the "imperfection" of automated analysis of for example unstructured data such as tweets (spelling mistakes, colloquial language etc.)? ● Which additional materials are you using (e.g., word dictionaries), how were these developed, and how might they influence the results?
Method biases? (Version 2)	Description: SMA researchers should check for and mitigate potential biases in their data analysis and in predictions resulting from the analysis (e.g. in machine learning models). These also serve as a basis for estimating the generalisability of the findings.	Interviews	● Does the dataset allow for a generalisation of results? ● Is it possible that the data could have multiple meanings? ● Is there any danger of misclassifying people or groups for example based on their language and / or culture?
Exposure of sensitive attributes or relationships? (Version 2)	Description: During the process of SMA, sensitive attributes or relationships can be discovered and subsequently exposed (e.g. relationships between users based on social network analysis).	Interviews Zook et al. (2017)	● In which sense does your research allow insights to sensitive attributes of people / groups?
Implications for	Description: Insights on a group-	Interviews	● Is there a risk that your

groups? (Version 2)	level are often perceived as less or not problematic. However, they can have harmful consequences such as creating or manifesting certain stereotypes.		research insights harm a specific group?
Supported by other data? (Version 2)	<u>Description</u>: SMA researchers should explore to what extent their findings align with existing research and whether the data or analysis could be triangulated with insights from other sources.	Interviews	● How do my results connect to other / existing research? Can you support or complement your analysis by other data (non-social media data)?
Publication reflection			
Informed consent (Version 1)	<u>Description:</u> Obtaining informed consent of social media users included in the study in the pre-tracking reflection is often not feasible. An alternative approach to address this important ethical consideration is to obtain informed consent of those users whose social media content will be presented in the study (e.g., in social network graphs or content analysis results in the publication).	IRE 3.0 (2020) ACM (2018) Williams, Burnap, & Sloan (2017)	● Would it be an option to ask those users for informed consent, whom you want to quote directly in the study and thus overcome the problem of prior informed consent in big data analysis?
Sharing & Storing (post publication)? (Version 1)	<u>Description:</u> SMA researchers often face the challenge of finding a balance between protecting individual privacy, complying with terms and conditions of social media platforms for sharing or redistributing content, and complying with open access requirements of a publisher when finalising an SMA project.	Stieglitz et al., 2020	● How can you react to the dilemma of required open access publishing (open data) by research grant providers and restrictions through legal frameworks and terms of conditions of social media platforms?
Future implications? (Version 1)	<u>Description:</u> According to the idea of responsible research and innovation, SMA researchers should always reflect if the outcomes of their work are desirable. This includes participating what implications their findings (e.g., the development of a new SMA method) might have on society. Potential harm which might result from it should be anticipated and prevented.	Stahl et al., 2013	● Are there any measures you can take today to avoid future harm that can result from increased technological possibilities, or a combination with other data sets?
Promoting diversity?	<u>Description:</u> When assessing or publishing SMA results,	Interviews	● Does your research publication account for

(Version 2)	researchers should avoid generalising findings to populations which were not represented in the study. Instead, researchers are advised to discuss the diversity (e.g. culture, gender) of their research, transparently report limitations, and reflect on the impact of their own socio-economic, cultural, and personal background.	Zook et al. (2017) boyd & Crawford 2012	and promote diversity? ● Are you aware of your own 'cultural lenses' and do you make them explicit in te publication?
Re-identification? (Version 2)	Description: In SMA, the risk of re-identification is particularly high as for example a tweet or author name can be easily found online. Avoiding re-identification is crucial to protect users' privacy, especially if users are not aware that their data was used in research, and they did not provide explicit informed consent. Thus, researchers should carefully check the risks for re-identification and explore options to anonymise their findings as much as possible.	Interviews Williams, Burnap, & Sloan (2017) Zimmer (2010)	● Is there a possibility to re-identify individuals and groups when combined with other data? ● Are you encrypting, anonymising or pseudo-anonymising your data and / or your results? ● Are you aware of the possibility of fabricating tweets?
Giving back? (Version 2)	Description: Unlike research participants in other studies, SMA subjects are usually not compensated for their contribution to research. By adding this aspect, we would like to encourage researchers to think about ways of giving back to the researched community, for example by sharing benefits or insights in an accessible way.	Interviews	● In which sense will your research publication give something back to the community you have researched? ● Are there other ways of giving back?

Table 6. *Final framework with description, sources, and initial reflection questions.*

Appendix B

Additional material on the focus groups

	Ethical considerations round 1	Ethical considerations round 2
FG 1	- Relevant data sources differ depending on the country - Secure data storage (concerns about commercial platforms such as Google drive) - Avoiding re-identification of Twitter users - Potential harm through clustering groups based on sensitive	- Informed consent not possible on Twitter - Potentially revising keywords for tracking to represent minorities better - Country / cultural bias when analysing tweets only in a certain language - Data cleaning, identifying misinformation - Re-identification when publishing tweets - Reporting identified bot accounts to Twitter (unintended insights)

	information (e.g., extreme political orientation) Important role: *M* = 3.34 Completeness: *M* = 1.34 (*N* = 3)	-	Sharing data and code with publication
FG 2	- Popular data sources (userbase) depend on the country - Public vs private data on Twitter - Informed consent (contacting individuals, terms of use) - Secure storing and sharing of data (GDPR compliant) - Anonymizing data - Being transparent about own biases & background Important role: *M* = 4.0 Completeness: *M* = 3.25 (*N* = 4)	- Cultural dimensions (different policies in different countries / cultures) - Generalisability of findings - Being transparent about own biases & background - Data minimisation (SMA tendency to track everything) - Power issues (restrictions of platform API) - Transparent data cleaning description - Unintended insights (obligation to report fake news, hate speech?) - Giving back (non-academic publications, contacting platform provides) - Researcher's biases throughout all phases

Table 7. *Overview ethical consideration in the discussion of the research design supported by the original SMA framework (round 1) compared to the discussion of the research design supported by the extended SMA framework (round 2).*

Statement	*Mean (Range)*
The extended framework would support me in planning and conducting more ethical SMA research.	4 (3-5)
The extended framework is easy for me to understand.	3.5 (2-5)
The extended framework is an addition / provides added value to existing ethical guidelines.	3.75 (3-4)
I would apply this framework in my research.	3.88 (2-5)
Applying the ethical reflections reduced the methodical quality of my research design.	1.38 (1-2)

Table 8. *Assessment of the perceived usability and applicability of the framework after discussing the research design supported by the extended framework (N = 8).*