Is There PAPA in Crowd Work?

- A Literature Review on Ethical Dimensions in Crowdsourcing -

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Abstract— **The phenomenon of crowdsourcing has emerged as a new pattern of digitally mediated collaboration. This novel socio-technical arrangement changes the organization of work as well as its general nature and takes place in information systems (IS) in which humans face many threats to their dignity. For this reason, the importance of ethical issues within this new form of employment arises. Hence, in this paper we focus on the ethical issues in crowd work – a perspective that has been largely neglected by current crowdsourcing research. We analyze recent crowdsourcing literature and extract ethical issues by following the PAPA (privacy, accuracy, property and accessibility of information) concept, a well-established approach in IS. The review focuses on the individual perspective of crowdworkers, which addresses their working conditions and benefits. Although, the literature review exhibits that there are PAPA dimensions in crowdsourcing, only few focus on the crowdworkers as individuals. Our findings contribute to further research in crowdsourcing by introducing an ethical framework and give practical insight into how to design sustainable and ethical crowd work.**

Keywords: Crowdsourcing, Crowd Work, Ethics, Privacy.

I. INTRODUCTION

The rise of new information technologies, particularly the Internet as an immersive and multi-media rich technology, comprising low costs of mass communication, allows an interaction with a large number of external sources [1]. Like several fields of our economy, labor markets have begun inexorable migration into cyberspace and enable companies to access larger labor pools [2]. Against this backdrop, companies are able to reach out to these masses [3], and outsource tasks and functions, once performed by employees, to an undefined mass of individuals in form of an open call [4]. This new type of sourcing is referred to as 'crowdsourcing' [4], and is based on the concept of outsourcing corporate activities to an independent mass of people, called "crowdworkers" [5]. In addition, a third agent mediates between the crowdsourcing companies and the crowdworkers by providing a platform where these parties are able to interact. These crowdsourcing intermediaries [also referred to as "crowdsourcing marketplace"; see e.g., 3]. assure the connection between the crowdsourcing companies and the crowdworkers [1]. Due to the fact that the research focus is on crowd work for monetary

compensation e.g., [6], this paper addresses paid crowd work. Hence, crowd work is defined as digital gainful employment, in which the contributions and achievements of the crowdworkers are financially remunerated. The intrinsic motivation to participate usually plays a minor role [7]. This new form of gainful employment takes place in information systems (IS) as architectures in which human participants and/or machines perform work using information, technology, and other resources to produce informational products or services [8]. Due to the fact that crowd work includes individuals as well as organizations and intermediaries, it describes a socio-technical work system shaped through a set of these relationships [9]. Against this backdrop, Geiger et al. [10] define a crowdsourcing information system (CIS) as a special case of IS that produces informational products and/or services for internal or external customers by harnessing the potential of crowds. In this socio-technical context of CIS, people must deal with threats to human dignity and concerns about ethical issues are required [11]. Therefore, Mason [11] has focused on ethical questions concerning privacy, accuracy, property and accessibility of information (commonly referred to by the acronym PAPA), which still have their legitimation in modern forms of IS and its conditions, i.e. crowd work.

Although few studies have been conducted to address the usage behavior and demographic backgrounds of individuals working in the crowd e.g., [12], there is a gap in understanding ethical issues like the experiences and perceptions of crowdworkers [13]. Nevertheless, it is important to understand the perceptions of these individuals, in order to design fair crowd work. In literature, some promising approaches have focused on motivational [12] or trust-related aspects such as trust between crowdworkers, the crowdsourcing intermediary and the companies [14]. Against this backdrop, there has neither been systematic analysis concerning the specifications of crowdworkers nor a compilation of any underlying ethical criteria regarding their work. Nevertheless, it is essential to address the effects on individuals within CIS since the expansion of crowd work will gain momentum and an increasing number of people use this form of work to earn money to ensure the means of subsistence.

To our best knowledge, a uniform framework does not yet exist and is to be developed for further research in crowd work. Hence, an exhaustive literature review of crowd work could

help to create a common understanding of this new form of labor and moreover address directions for further scientific research in the field of ethical issues. This literature review describes a first step to explore ethical issues of crowdworker and can be seen as an initial input for developing a new research framework. Therefore as a result, we propose new directions for research by adapting the ethical issues of PAPA in IS and analyzing them in the context of crowdworkers. Hence, this literature review seeks to fill the outlined research gaps by addressing the following research question:

RQ1: What kind of ethical issues can be identified in crowdsourcing literature from crowdworkers´ perspective?

RQ2: How do these ethical issues affect the crowdworker as an individual?

II. RELATED WORK

This section introduces crowdsourcing as a new concept of work organization and illustrates the relevance of ethical issues in crowdsourcing. Furthermore, the well-established PAPA model will be presented since it describes dimensions that a highly relevant in crowdsourcing contexts.

A. Crowdsourcing

In a crowdsourcing model, a firm or some type of institution first selects specific internal tasks that it wants to crowdsource and subsequently broadcasts the underlying tasks online, i.e., via a crowdsourcing platform. In a second step, individuals (e.g., registered on a crowdsourcing platform) self-select to work on the tasks' solution – either individually or in a collaborative manner – and subsequently submit the elaborated solutions via the crowdsourcing platform. The submissions are then assessed and – in case of successful completion – remunerated by the initiating organization.

Research on crowdsourcing is still in its inception. First studies on crowdsourcing have predominantly focused on specific applications of crowdsourcing, such as open innovation or human computing e.g., [15]. There are also some preliminary taxonomies, typologies and categorizations of crowdsourcing in the frame of which researchers try to identify the basic characteristics of this concept e.g., [16]. The thereby generated insights provide first references for the management and organization of crowdsourcing initiatives. However, there are much less insights with respect to crowdworkers' perspective – i.e., research on the individual-level that concerns, for instance, crowdworkers' attitudes, perceptions, experiences, preferences, needs or behaviors in the frame of crowd work.

Although, few studies address the crowdworkers` motivational or behavioral perspective, there is a research gap concerning underlying criteria. As researchers have explored the possibilities of human computation, they have paid less attention to ethics and values of crowdsourcing [17]. In spite of its main advantages – low labor costs – crowdsourcing has several shortcomings [18], such as: cheating, complicated quality control system [15] and ethics violation by exploiting and underpaying workforce [19].

B. Ethics in Crowdsourcing

As a philosophical subject, ethics refers to science or system of morals [20]. In particular, it attends to theories of morality or theories of how we ought to live [21]. In common language, ethics describes the study of value concepts such as 'good,' 'bad,' 'right,' 'wrong,' 'ought', applied to actions in relation to group norms and rules, which deals with many issues fundamental to practical decision-making [22].

Besides, ethics and fairness tends to have similar meanings but need to be distinguished precisely in order to outline clear ethical issues. A person's` subjective evaluation that a given distribution is "fair" (or not) is based on the equity rule e.g., [23] and state that individuals compare between perceptions of their own outcome-to-input ratio and what they feel they "deserve" [24]. Thus, fairness depends on a person`s perceptions as well as expectations and leads to an individual evaluation that may be different in each context. In contrast, we focus in this paper on ethics that is normative rather than descriptive and therefore has a superior political dimension for decision-making, which can result into policy or legislation [21]. Thus, computer ethics refers to a set of rules or principles, which are used for moral decision making regarding computer technology and computer use [25]. Living in the information age, modern society faces the advantages and chances of technological development.

Despite these positive aspects, there are also risks and threats related to technology, especially regarding the internet. Thus, in an early paper Mason [11] has introduced a theoretical social framework consisting of the four major ethical issues of the information age. These issues, known as PAPA, stand for privacy, accuracy, property and accessibility. The concept of PAPA as the foundation of information ethics has been validated and remained popular for almost three decades [26]. Therefore, this concept serves as a basis for developing an ethical framework for a new employment form of the information age – i.e. crowd work.

C. Privacy

Personal information privacy is defined as the ability of the individual to personally control information about oneself and one of the most important challenge of our digital age [27]. Beyond, privacy has consistently been viewed as an ethical issue across various disciplines [28] and inter alia IS researchers mention that control is actually one of the factors that shape general privacy and that general privacy is not control per se [29]. Therefore, privacy is multidimensional, elastic and dynamic in the sense that it varies with life experience [28]. According to Mason [11], the growth of information technology, with its enhanced capacity for surveillance, communication, computation, storage, and retrieval is a threat to personally control. Although it is an unethical act, policy makers covet information even if acquiring it invades another's privacy. Due to the ubiquitous collection, storage, analysis, and sharing of digital data, the explosion of IT, e-commerce, social networks, and government surveillance [30], the issue of privacy has become essential to any new form of work. Accordingly, in open source literature, as a related research field to crowdsourcing, privacy has been a major topic addressing work related aspects [31].

The crowdsourcing platforms collect an enormous amount of data from the crowdworkers. Subsequently, they analyze, use and store all the data to provide ideal solutions to the problems of the crowdsourcers. All these analytical methods, processes and algorithms are hidden operations and thus black boxes for any crowdworker. Hence, this ethical issue needs to be analyzed regarding crowd work. For any crowdworker must be assured, that his/ her personal information are protected and a self-determined control is possible.

D. Accuracy

Wang and Strong [32] define accuracy as the extent to which data are correct, reliable and certified. In IS, there are great challenges to meet raised expectations to provide accurate, visible, and timely information [33]. Particularly in organizational context, the data accuracy has been highlighted as an essential indication of quality [31]. Hence, this makes verifying the accuracy of the information of great importance to the groups using it [34]. The question of responsibility for the accuracy and authenticity of information as well as possible retribution, due to those injured by erroneous data, has arisen [35]. Concerning IS research, the issue of accuracy comprises an accountability for errors in information [36]. Misinformation can have great impact on individual´s lives, especially when the party with the inaccurate information has an advantage in power and authority [11].

Therefore, every individual needs to know whether personal or work-related information has been produced while respecting ethical principles of accuracy, particularly when employees – e.g., crowdworkers – rely on this accuracy in a vocational context. In crowd work, there are power asymmetries in favor of the crowdsourcing platforms as intermediaries. They manage all information about their crowds and thus they are responsible for correctness as well as reliability of this personal information.

E. Property

According to Velasquez and Velazquez [37] property describes a bundle of rights to exclusive use, to sell, to trade, or to generate income. Beyond, studies in the research field of IS have focused on how intellectual property (IP) can intimately affect the interests of organizations [26], especially regarding new developments that can change business models, e.g., within the open source movement [38] or the crowdsourcing phenomenon. Although the importance of property has led to a raft of legislation that includes innumerable international treaties and conventions, most of the scientific research has focused on legal perspectives of property [39]. Nevertheless, it describes an essential ethical issue, which has great impact on individuals in work context. Practitioners of artificial intelligence proceed by extracting knowledge from workers and implanting it into IS for economical purpose [11]. This exchange of IP implies control and property concerns [11], which have been widely discussed in open source context [31, 40]. For example in some crowdsourcing design contests, the crowdsourcer gets a wide range of design proposals from the crowd. Although, there will be only one winning design in the end that will be remunerated, the crowdsourcer can use all other designs. There are platforms on which these issues of the

transfer of IP are not explicitly regulated. Hence, ethical aspects in IP exchange and adequate compensation is essential in crowd work, as a new evolved form of employment.

F. Accessibility

According to the United Nations, states should recognize the overall importance of accessibility in the process of equalization of opportunities in all spheres of the society [41]. In a technical perspective, accessibility is an umbrella term for all parameters that influence human functioning in the environment [42]. The trend of computers has made technology more accessible and economically attainable to a mass of people [11]. Despite to this environmental view, in IS context accessibility to information is crucial [41] and include an individual´s provision of any required input as well as the comprehension of the presented information [43]. The ethical issue of accessibility aims to avoid the formation of information poor people who have no direct access to more efficient computational technology and little practical education in its use [11]. The intention is to combat information illiteracy and enable citizens of the information society to develop the intellectual skills to cope with information, access to the technological tools and to the information itself [34]. In OS software development, researchers have argued that access privileges vary and come to be identified as one of the principal requirements in the design of web-based systems and contents [44], which implies its importance and certain discrimination. Some crowdsourcing platforms provide more information about new jobs and potential crowdsourcers depending on the crowdworkers` rank or reputation on the platform. Therefore, some crowdworker may be discriminated and excluded from specific information and thus access to information is not equal for each crowdworker. Hence, accessibility is also an ethical issue in crowdsourcing context that need to be considered in evaluating and designing crowd work.

III. METHODOLOGY

In crowdsourcing context, especially within the emerging research field of crowd work, ethical dimensions have not been extensively examined. Thus, a systematic and exhaustive literature analysis is gaining importance [45] to provide a scientific basis for further research. Authors have noted that the procedure design of a literature review is to be intersubjectively verifiable to preserve the scientific value of the literature analysis [46]. Therefore, we introduce our procedure in identifying the relevant literature concerning crowd work by following the approach of Webster and Watson [45], who propose a concept matrix for systematic analysis.

We employed a three-stage approach to identify a comprehensive set of academic studies upon which the literature review is based. Initially, we conducted a search of key terms 1 in the EBSCO, Business Source Premier and

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1 Original search string in EBSCO database: JN "X" AND ((TI "crowdsourcing" OR AB "crowdsourcing" OR KW "crowdsourcing") AND (TI "crowd" OR TI "ethic" OR TI "work" OR TI "worker" OR TI "labor" OR TI "employ" OR TI "employment" OR TI "employee"

Science Direct databases analyzing the AIS senior scholars´ basket of journals2 to provide a high quality search. Within the research fields of IS and behavioral research, these outlets allow an interdisciplinary analysis. We focused on these research streams due to the fact that crowd work is a new form of online work arrangements in which many mechanisms of behavioral research, particularly concerning individuals, apply. Since the ethical perspectives of crowd work represent an emerging topic in IS and thus requires a wide descriptive review [47], we then added the proceedings of the most relevant conferences as well as journals based on the VHB-JOURQUAL 3 (2015)3 to cover a broader interdisciplinary research field. Besides these areas, additional sources like research articles and books also depict a relevant object of analysis, as they condense substantial research findings and give insights into from practice. Hence, using the mentioned key strings, in the third stage we additionally searched on Google Scholar.

In the literature, there are different notions for employment within the crowd. Due to the fact that "crowd work" is a highly comprehensive term, which therefore is seldom used independently as a keyword in titles or abstracts and the focus of this review is on the work perspective as well as on the proposed PAPA issues, we developed the following extensive search string, based on Boolean search operators: (TITLE-ABSTR-KEY("crowdsourcing" AND "crowd" OR "work" OR "worker" OR "labor" OR "employ" OR "employment" OR "employee" OR "privacy" OR "accuracy" OR "property" TI "accessibility" OR "IS" OR "information systems")).

Based on the sample of identified papers, subsequently, we expanded the search by using forward and backward citation indices and continued this procedure until an exhaustive set of studies is identified [48]. The determined timeframe included literature form the initial crowdsourcing article "The Rise of Crowdsourcing" by Howe [4] in 2006 up to 2015.

Additionally, we applied a boundary criterion to identify the relevant literature by including only those papers, which address crowdsourcing as a new form of labor. Since the unit

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OR TI "privacy" OR TI "accuracy" OR TI "property" OR TI "accessibility" OR TI "IS" OR TI "information systems" OR AB "crowd" OR AB "ethic" OR AB "work" OR AB "worker" OR AB "labor" OR AB "employ" OR AB "employment" OR AB "employee" OR AB "privacy" OR AB "accuracy" OR AB "property" OR AB "accessibility" OR AB "IS" OR AB "information systems" OR KW "crowd" OR KW "ethic" OR KW "work" OR KW "worker" OR KW "labor" OR KW "employ" OR KW "employment" OR KW "employee" OR KW "privacy" OR KW "accuracy" OR KW "property" OR KW "accessibility" OR KW "IS" OR KW "information systems").

2 Association for Information Systems (AIS) is an international organization that serves as the premier global organization for academics specializing in IS. The senior scholars´ basket of journals ranks the most relevant journals in IS (http://ais.site-ym.com/?SeniorScholarBasket).

3 VHB-Jourqual is a journal ranking of the Association of University Professors of Business Research (VHB), the umbrella organization of German university professors in the field of business administration. This Ranking provides the most relevant sources in IS.

of analysis is crowd work, in particular with focus on the individual, we have excluded all papers that obviously address computational or mathematical topics within the title, abstract or keywords.

IV. FINDINGS

In sum, we identified 48 literature sources, upon our further steps of analysis are based. In general, we differ between detected "Hits" and intensive "Reviewed" sources, which exclude all thematic non-compliant papers after reading the full abstract. Within the senior scholars´ basket of journals we have reviewed 5 out of 6 papers, whereas VHB-JOURQUAL journals contained 9 and conferences one relevant source. Moreover, the additional search step complements the identified literature, containing 18 relevant sources, shown in Table I:

TABLE I.   CONSIDERED LITERATURE

Journal	Database	Search	Coverage	Hits	Reviewed
AIS senior scholars´ basket of journals	-EBSCO -Business Source Premier -Science Direct -Google Scholar	Title, Abstract ;key-words	since 2006	6	5
VHB-JOURQUAL 2.1 – Journals				11	9
VHB-JOURQUAL 2.1 – Conferences				1	1
Additional sources				30	18

Based on the identified literature of 33 sources, we analyzed and synthesized the ethical issues regarding the proposed PAPA concept. Moreover, we differentiate between the three main entities of crowdsourcing (crowdsourcer, intermediary and crowdworker) concerning every single ethical issue to provide more detailed insights. Depending on which perspectives of these entities are considered, the literature has been classified.

As shown in Table II, about half (17 out of 33) of the identified papers describe ethical issues out of a crowdworkers` perspective. Although, these findings imply a certain interest of the circumstances and conditions regarding the crowdworkers, almost any source considers only one PAPA dimension. There are only three papers [2, 49, 50], which address more than one PAPA dimension. Nevertheless, within each ethical PAPA issue, there is a relative high proportion on the crowdworkers` perspective. Concerning privacy, the proportion of papers addressing crowdworkers is even 55.6%.

For the analysis we used the following concept matrix, which has been developed by Salipante, Notz et al. [51] and adapted for IS literature by Webster and Watson [45]:

TABLE II.   CONCEPT MATRIX OF ETHICAL ISSUES IN CROWDSOURCING LITERATURE

Articles	PAPA Concept by Mason [11]											
	Privacy			*Accuracy*			*Property*			*Accessibility*		
	CS	I	CW	CS	I	CW	CS	I	CW	CS	I	CW
A. Afuah and C. L. Tucci [52]				X						X		
P. J. Ågerfalk and B. Fitzgerald [38]					X	X						
J. Albors, J. C. Ramos and J. L. Hervas [53]							X			X		
T. K. Armstrong [54]										X		
B. L. Bayus [55]				X								
B. Bergvall-Kåreborn and D. Howcroft. [56]								X				
M. Bernstein et al. [57]			X									
A. Doan, R. Ramakrishnan and A.Y. Halevy [58]												X
J. Feller, P. Finnegan, J. Hayes, and P. O'Reilly [49]								X	X		X	X
A. Felstiner [2]				X	X	X	X	X	X	X	X	X
O. Folorunso and O. A. Mustapha [59]												X
D. Geiger and M. Schader [60]											X	X
C. G. Harris [61]			X				X					
B. Heymann [62]									X			
M. Hirth, T. Hoßfeld and P. Tran-Gia [63]						X						
L. C. Irani and M. Silberman [17]							X					
H. Kajino, H. Arai and H. Kashima [64]			X									
G. Kazai, J. Kamps and N. Milic-Frayling [65]						X						
G. Kazai, J. Kamps and N. Milic-Frayling [66]						X						
J. M. Leimeister, M. Huber, H. Krcmar [67]											X	X
A. Majchrzak and A. Malhotra [68]								X		X		
G. Montelisciani, D. Gabelloni, G. Tazzini, G. Fantoni [69]											X	
X. Peng, M. A. Babar and C. Ebert [70]								X				
M. K. Poetz and M. Schreier [71]							X					
F. A. Schmidt [72]									X			
M. Sundic and K.-H. Leitner [73]							X		X			
L. R. Varshney [74]	X											
L. R. Varshney, A. Vempaty and P. K. Varshney [75]	X											
Y. Wang, Y. Huang and C. Louis [50]			X			X						
Y. Wang, Y. Huang and C. Louis [76]			X				X					
S. B. Wicker [77]	X					X						
S. Wu, X. Wang, S. Wang, Z. Zhang and A. Tung [78]		X				X						
H. Zheng, D. Li and W. Hou [79]				X	X							
TOTAL	3	1	5	4	5	6	7	5	5	4	6	6
COVERAGE in %	33.3	11.1	55.6	26.7	33.3	40	41.2	29.4	29.4	25	37.5	37.5

[a.] CS = Crowdsourcer; I = Intermediary; CW = Crowdworker

These analyzed literature addressing the crowdworkers` perspective needs to be differentiated by their specific focus in order to identify ethical issues that really address the individual person, because "ethics is essentially an individual matter" [80]. Therefore, we separate in technological, task-related and individual foci on crowdworker. While the technological focus includes tools, methods and requirements that affect the crowdworker, task-related criteria outline threats, legal issues as well as general factors that are linked to the crowdsourcing initiative. Besides, this paper addresses the focus on the crowdworker as an individual and the relating PAPA issues. Table III gives insights about the distribution of ethical issues with individual focus on the crowdworker in the reviewed sources.

Finally, we can state that only 9 papers directly address the ethical issues of crowdworkers as individual persons. As already mentioned above, privacy issues not only address crowdworkers` perspective but also put the focus of the ethical issues on the individual. Surprisingly, we have found no literature source focusing individual accuracy.

TABLE III.   ETHICAL ISSUES WITH FOCUS ON THE INDIVIDUAL CROWDWORKER

| Focus | Ethical Issues of Crowdworkers | | | |
	Privacy	Accuracy	Property	Accessibility
Technological		- A. Afuah and C. L. Tucci [38] - M. Hirth, T. Hoßfeld and P. Tran-Gia. [63] - Y. Wang, Y. Huang and C. Louis [76]	- J. Feller, P. Finnegan, J. Hayes, and P. O'Reilly [49]	- J. Feller, P. Finnegan, J. Hayes, and P. O'Reilly [49]
Task-related	- C. G. Harris [61]	- G. Kazai, J. Kamps and N. Milic-Frayling [65] - G. Kazai, J. Kamps and N. Milic-Frayling [66] - A. Felstiner [2]	- A. Felstiner [2] B. Heymann [62]	- A. Felstiner [2] - O. Folorunso and O. A. Mustapha [59]
Individual	- M. Bernstein et al. [57] Kajino et al. [64] - Y. Wang, Y. Huang and C. Louis [50] - Y. Wang, Y. Huang and C. Louis [76]		- F. A. Schmidt [72] - M. Sundic and K.-H. Leitner [73]	- A. Doan, R. Ramakrishnan and A.Y. Halevy [58] - D. Geiger and M. Schader [60] - J. M. Leimeister, M. Huber, H. Krcmar [67]
Total (ind.)	4	-	2	3

A. The Privacy of the Crowdworkers

There is a lack in scientific research that deals with privacy problems in crowdsourcing. Harris [61] has criticized the crowd as a possible mechanism or instrument for surveillance by collecting sensitive data through their initiatives. Although this describes a task-related threat to privacy, Bernstein et al. [57] first mention privacy as an ethical issue of individuals by asking questions about Amazon Mechanical Turk. In context of crowdsourcing platform requirements, the authors point out that it is essential to design strong reputation systems for crowdsourcers and crowdworkers, while respecting privacy and preserving anonymity. In particular, they ask how to obtain demographic data while respecting individual privacy. Hence, following studies specify these questions and developed initial privacy model designs, which include various dimensions of crowdworkers privacy concerns and preferences, in mobile crowdsourcing [50]. The authors illustrate central aspects based on the disclosure of user identity, user location and activity via mobile crowdsourcing systems [76].

In a recent study, Kajino et al. [64] criticize the use of quality control methods, which are currently applied in crowdsourcing, as an invasion into the privacy of workers. Due to the collection of data, the crowdsourcers are able to generate sensitive information and further estimate abilities of the individual crowdworker. Thereby, regardless of any technological or legal perspectives, the focus changed on the individual level of crowdworker and the resulting benefits for them.

B. The Accuracy of the Crowdworkers

In context of technology, Ågerfalk and Fitzgerald [38] include quality and transparency of information and processes within crowdsourcing as issues of accuracy. Hence, the authors have not just mentioned an intermediaries´ point of view, but integrated also ethical aspects addressing crowdworkers. The crowdworkers need to understand why specific decisions are made and therefore a maximum of structural and technological clarity has to be implemented. Another aspect of accuracy includes the development of techniques to detect cheating crowdworker. Due to their anonymity, the crowd is encouraged to cheat the crowdsourcers in order to maximize its income [63]. The authors postulate malicious intentions or behavior of the crowdworkers and outline methods to verify task results and thereby identify cheating crowdworkers. In sum, there is a possibility of incorrect or inaccurate data being reported unintentionally or maliciously by crowdworkers [50]. Furthermore, due to the diversity of the crowd, the accuracy of crowdsourcing output depends on different variables [66]. In this context, recent studies have analyzed the relationships between the crowdworkers` characteristics and the resulting task performance measured by the workers` accuracy [65]. This research focus is on the general output and task-related performance of the workers and describes the intention to optimize the results for the crowdsourcers.

Hitherto, there is a lack of ethical accuracy issues with focus on the individual in recent literature. Nevertheless, aspects like the accuracy of personal data of the crowdworkers as well as provided information to process the task should be on the research agenda. Proposed methods to assure transparency and monitoring [38] could be adapted with focus on individual benefits to close this gap.

C. The Property of the Crowdworkers

On a technical level, Feller et al. [49] introduce filtering mechanisms of intellectual property, in order to effectively evaluate the generated content. Furthermore, intellectual property transfer support describes communication services that reduce costs associated with language and cultural differences between the parties [49].

The legal focus of intellectual property includes serious risks by distributing tasks to a large pool of anonymous workers [2]. Crowdsourcers can attempt to design their requests to protect sensitive information. Nevertheless, crowdworkers may still be able to harvest some knowledge of a valuable piece of intellectual property by completing even a small task [2]. This legal focus on intellectual property, again postulates malicious intentions with respect to the crowdworkers and describes a one-sided view on this ethical aspect. However, there may also be important ethical issues concerning ownerships of rights that need to be mentioned focusing the individual crowdworker.

Against this backdrop, concerning the appropriation of the intellectual assets of crowdworkers, a clear definition of terms and conditions of engagement and financial compensation mechanisms as a prospect can mitigate risks of dissatisfaction, underpayment or the fear of intellectual property theft [73]. According to Schmidt [72], exploitation emerges as soon as the product of the crowd is privatized and transformed into profit while not being beneficial at least to those in the crowd. The author characterizes this crowd based property as a collective good that needs to be compensated [72]. Hence, the generation and transfer of IP in crowdsourcing are generally associated with the compensation of the crowdworkers. Therefore, ethical issues regarding property should be discussion on basis of appropriate rewarding [49].

D. The Accessibility of the Crowdworkers

A technological aspect of ensuring access to the crowd, depicts knowledge mobility [49], which include enabling factors like aggregation, discoverability and problem articulation to foster and maximize the number of participants within crowdsourcing initiatives. These concerns have not been made only out of an intermediarys´ view but also include crowdworkers´ issues and propose technical standards to foster accessibility. Analyzing legal topics related to crowdsourcing, Felstiner [2] argues that current principles governing union access to employees do not translate well into cyberspace, because they rely on concepts of physical property. In fact, against the backdrop of Turkopticon as a common infrastructure that enables workers to engage one another in mutual aid [17], the accessibility to digital union-like institutions will be essential for ethical crowd work in the future. Furthermore, in order to prevent crowdsourcers from untrustworthy crowdworker, Folorunso and Mustapha [59] developed a combination of Trust-Based Access Control (TBAC) strategy and fuzzy-expert systems to enhance the quality of human computation in crowdsourcing environment. This attempt includes restrictions regarding the access of crowdworker because of quality issues and concerns of unreliability.

In an early study, Leimeister et al. [67] introduce different kinds of knowledge (experts, mentors, community), which facilitate the collection process of an intermediary but simultaneously should be available to crowdworkers. This emphasizes the need to individuals` accessibility and has been specified with the request to an user interface that makes it easy for crowdworkers to contribute [58]. Based on this design requirement, Geiger and Schader [60] propose designing mechanisms for personalized task recommendation. These recommender systems describe a set of tools and techniques that provide suggestions of potentially useful items based on individual preferences of the crowdworkers. Thereby, the authors introduce a systematic design of personalized task recommendation approaches in crowdsourcing information systems [60]. These should assist individuals in finding suitable tasks and thus create benefits for both contributors and requesters. Furthermore, it would be ethical to consider about accessibility of crowdsourcing out of an individual crowdworkers` perspective. In particular, if the crowdworker has proper access to all information needed to complete the tasks, there would be a general improvement of crowd work affecting all parties.

V. DISCUSSION

A. Theoretical implications

In line with few existing studies, our paper shows that ethical issues are fundamental to develop sustainable crowd work and thus, has important theoretical implications. In general, we identified the great research gap regarding ethical issues of crowd work with focus on the individual crowdworker. According to Busarovs [18], although some crowdworker do not feel exploited, from a theoretical point of view, crowdsourcing can be determined as an exploitive practice, since seven out of sixteen definitions of exploitation describe crowdsourcing as exploitation. There is a risk that crowd work will fall into an intellectual framing focused on low-cost results and exploitative labor [81]. In order to prevent an exploitative frame in crowdsourcing our paper is the first that addresses a comprehensive view on underlying ethical criteria. This is essential because crowdsourcing develops rapidly with new features of web 2.0 legislators, whose objective is protection of workers, as citizens [18]. Furthermore, we have found design aspects to be a major issue in coping with ethical problems. Our review shows that there are several design approaches in crowdsourcing context, but only few addressing the individual crowdworker and its benefits. In context of ethical privacy concerns, privacy protection is a system requirement that must be treated like any other functional requirement [31]. Therefore, approaches like "privacy by design" refers to the underlying philosophy of protecting privacy in the early design stage of technological development [31] and must be used to prevent the individual crowdworkers` privacy.

Beyond, the risks of inaccurate or malicious crowdworkers need to be minimized. We believe that a higher accuracy is not only useful to crowdsourcers but a potential for reciprocal benefits between crowdworkers and intermediary or crowdsourcer. In this context, using appropriate systems,

machine intelligence can help to make the crowd more efficient, skilled, and accurate [81]. Furthermore, research should focus on accessibility as an ethical issue to be guaranteed for any crowdworker. Even back in 1986 access to IS has been a relevant issue in ethics and still today has not lost its importance. In research on gender and computer ethics, Adam [21] has examined inequalities in participation and access between the genders in relation to aspects of the use of computers. This study shows how accessibility is connected with equality and adapted into crowdsourcing, a wide field of application opens up. Just by the diversity and heterogeneity of the crowd, a fundamental understanding of accessibility to ethical crowd work is essential.

B. Practical implications

The present literature review has significant practical implications. First, concerning data accessibility, Brynjolfsson and McAfee [82] note that there is a need to plan and to enact legislation for what we do about this in the future. Therefore, we have to consider about an underlying framework like PAPA to ensure new ethical forms of crowd work. We need to prevent a possible scenario that includes a disparity in economic power, in which the owners of data and algorithms have and add all of the economic value, and the rest of the workforce adds little or none [82]. In this context, practical issues of accessibility include net neutrality, software ergonomic or equality in pursuing crowd work. The ethical issue of privacy is connected with legislative activities. These legal concerns with privacy are typically expressed in data protection legislation, e.g., the European Directive 95/46/EC, which obliges all EU Member States to legislate strict data protection [39]. Some of those legal activities are then reflected back in mainstream IS work and thus affect crowdworkers.

With regard to accuracy in crowdsourcing, the architecture of Mobile Works, a platform intermediary, reassigned those crowdworkers whose overall accuracy was below a certain level to training tasks until their accuracy improved [83]. We recommend this to be a good example how to cope with ethical issues regarding the individual crowdworker and enhance further development of infrastructures and designs to foster accuracy in crowd work.

Our findings illustrate that basically the same kind of ethical issues that have been relevant for decades in IS research (i.e., PAPA), still have significant impact in modern crowd work contexts. To be more precisely, the identified ethical issues affect crowdworkers` privacy, relationship to crowdsourcers and work autonomy.

VI. CONCLUSION

Our paper seeks to identify ethical issues in crowd work, especially with focus on the crowdworkers` perspective. For each of the three agents in crowd work ethical aspects are essential. Nevertheless, after analyzing the relevant literature we conclude, that ethical issues are addressed only occasionally within top IS research. Although ethical topics of PAPA can be found, the research focus is not on individual level. Although, the crowdworkers are the performing party within crowdsourcing initiatives, their perspective concerning

ethical issues has been neglected. Hence, the theoretical contribution of the literature review includes the identification of this research gap. Furthermore, we received an overview of ethical topics in crowd work and gain first insights based on the PAPA concept.

The practical implication of this review aims to raise the awareness of ethical issues in crowd work, concerning all participating agents with focus on the individual crowdworker. However, it is essential not only to be aware of ethical issues but use them as an underlying pattern of ethical crowd work design. By adapting the PAPA concept into crowd work context we introduced a new framework for further research. Following studies should use these insights as a basis to foster ethical issues in crowdsourcing research with a certain focus on the individual crowdworker. Although it affects the individual crowdworker, the distinction between fairness and ethics shows that the concept of PAPA has a more general claim to validity. Once Kittur et al. [81] have asked: "Can we foresee a future crowd workplace in which we would want our children to participate?". We are convinced that the answer can be given easier when you think of PAPA.

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