

From alienation to relation: Examining the modes of production in crowdsourcing

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Abstract. While crowdsourcing is increasingly used for data gathering and problem solving, the power relations in crowdsourced processes remain largely unexamined. Especially in crowdsourced public policymaking, an understanding of these processes is essential for verifying the data. For understanding the social processes behind the data and designing crowdsourcing technologies and processes suitable for public policymaking, it is important to understand power structures and relations within the crowd and between the crowd and the sourcer: Who has the power, what is being produced through crowdsourcing, and especially how and under which conditions. In this paper we develop a typology of worker relations in crowdsourcing by using Marx theory of alienation. The theory serves as a lens to compare and contrast tools for crowd-engagement in public policymaking. We show how different types of crowdsourcing can be described as levels of alienation where the worker, the consumer, their relations, and products are connected in modes of production representing different ontologies. In doing so, we contribute to the body of knowledge about crowdsourcing as a specific type of computer-supported cooperative work. For the research community we introduce a critical perspective on information systems as part of a relational system, whereby both external communications and personal identities are acknowledged. For the practitioner community, namely, decision-makers, we provide a useful resource, outlining in detail the differing potentialities of crowd-engaging in CSCW.

Introduction

In the last decade, many organizations have turned to crowdsourcing to engage with their customers, to become more innovative and efficient (Brabham, 2013; Estelles-Arolas & Gonzalez-Ladron-de-Guevara, 2012; Majchrzak, Wagnerr, & Yates, 2013; Prpić, Taeihagh, & Melton, 2015). Crowdsourcing as a specific form of Computer-Supported Cooperative Work (CSCW) is also applied to different aspects of policymaking, which also creates demands on transparency, equality and diversity when it comes to power relations in the crowdsourcing processes (Aitamurto, 2012; 2016; Hansson, Belkacem, & Ekenberg, 2014).

When considering how the users' relations are handled in such applications, these systems can alienate people as their relations can be used as commodities in form of user data (Dean, 2005). On the other hand, they can also enable the possibility of decreasing the alienation between actors in certain areas of production by establishing more direct links without any material intermediary and thus supply devices that undermines capitalism as these relations destabilize the market mechanisms (Stacey, 2008). Crowdsourcing allows an alienation of work relations on an unprecedented scale, which often effectively reduces the individual's control and capacity to overview the result of their own work. We therefore argue that Marx's (1844) theory of alienation is relevant when analysing crowdsourcing platforms. The theory was central to his analysis of industrial capitalism, and it is still useful as a way to understand production in a capitalist system.

Crowdsourcing settings like those in Amazon Mechanical Turk (ATM) have striking power differences between the crowd of workers and the "sourcers" (Felstinerf, 2011; Silberman, Ross, Irani, & Tomlinson, 2010), which also has resulted in collective action by crowd workers (Salehi et al., 2015). Lack of transparency and an asymmetry in the information access were also shown in Gupta et al.'s (2014) study of workers at the Amazon Mechanical Turk and by Ludwig et al. (2016) in mobile contextual studies.

Digital literacy and infrastructure are other aspects of participation that affect crowd workers' ability to control their work. Other ways to control crowd work are enforced by the rules, the technical system (Irani & Silberman, 2013), and the economic means (Bederson & Quinn, 2011). However, the technologies facilitating crowdsourcing initiatives enable stronger communities and direct relations between consumer and producer. Parts of today's network-based creative economy are characterized by the humanistic values, that scholars claim Marx was looking for when he formulated the theory of alienation (Michael Hardt & Negri, 2000). For instance, Hardt and Negri (2000, pp. 294) argue that the new economy of affective labour and networked relations amounted to 'a kind of spontaneous and elementary communism'.

The tensions between on one hand an extreme alienation due to the division of labor in micro tasks enabled by crowdsourcing tools, and the humanistic values in peer-produced commons (Benkler, 2002) have also gained attention from Marx scholars (Scholz, 2013). Media and communication scholars have used Marxist

terminology to examine social networking sites more closely (Beverungen, Bohm, & Land, 2015). Especially the definition of productive work in social media has been problematized, whether this should be considered free communication or a valorised social labour (Beverungen et al., 2015; Dean, 2005; Scholz, 2010; Stacey, 2008). Exploitation of workers in crowdsourcing is another theme where Marx theories have been used (Busarovs, 2013; Fuchs, 2014). However, despite this critical research there is a lack of a more structured overview focusing relations of tools for crowdsourcing and commons-based peer production.

In this paper we have therefore systematically applied Marx theory of alienation as a way to compare the relational aspects in a number of platforms for crowdsourcing. To do so, we first introduce previous crowdsourcing typologies, from which we form a systematic framework for addressing crowdsourcing practices. Thereafter we introduce Marx theory of alienation and based on this theory we formulate questions regarding relationships between actors such as worker – consumer, worker – work, worker – self, worker – worker. These questions are then used when gathering data from cases of crowdsourcing tools that represent various types of crowdsourcing practices. After a first pilot study we have developed typologies of worker relations grounded in the empirical contexts. This typology is then applied in an analysis of 21 cases representing a diversity of crowdsourcing tools and contexts. Finally, we summarize our typology in four different *modes of production*. These different modes are not mutually exclusive, but co-exist within the same tools and processes.

Crowdsourcing

Crowdsourcing has gained a lot of attention recently, as a way to develop anything from ideas to manage crisis management: Companies and organizations are making practical use of crowdsourcing technologies to assemble multiple solutions (Retelny et al., 2014), and to dispense pieces of work to crowds of labourers (Martin, Hanrahan, O’Neill, & Gupta, 2014). In the public realm residents become involved in a more participatory government by contributing to open data resources (Hansson, Belkacem, & Ekenberg, 2014), the public take part in knowledge search and deliberation through crowdsourced policymaking (Aitamurto & Landemore, 2015), and they participate in budgeting (Kasymova, 2013). Government agencies use social media to enhance collaboration and innovation among its employees (Ben Eli & Hutchins, 2010) and to gather government data (Fyfe & Crookall, 2010). In citizen science the public becomes engaged in the collection of data or to improve research data (Causer & Wallace, 2012; Fort, Adda, & Cohen, 2011; Kamar, Hacker, & Horvitz, 2012; Kanstrup & Christiansen, 2006; Kittur et al., 2013; Wiggins & Crowston, 2012) and to participate in the research process (Aitamurto & Landemore, 2015; Cooper, 2014; Cooper et al., 2011). Natural disasters have showed a need to involve an extended crowd of interest civilians in data gathering (Hughes et al., 2014; McKay, 2014; Soden & Palen, 2014) and supporting with physical activities during crisis situations (Ludwig, Reuter, Siebigtheroth, & Pipek, 2015).

Even though the concept of *crowdsourcing* is common, the understanding of it varies. Several classifications of crowdsourcing have been proposed in academic fields such as computer science, economics, or management. Classifications based on, potential tasks (Kleemann, Voß, & Rieder, 2008) types of social networks (Kozinets, Hemetsberger, & Schau, 2008), management structures (Feller, Finnegan, Hayes, & O'Reilly, 2009), sourcing processes (Geiger et al., 2011), compensation type (Aitamurto and Landemore, 2015), or specific applications of crowdsourcing. As we here are looking foremost at *the tool support for relations*, not the relations per se, a typology based on specific applications of crowdsourcing makes most sense. Crowdsourcing can be divided into three distinct types depending on the technologies used (Estelles-Arolas & Gonzalez-Ladron-de-Guevara, 2012; Prpić et al., 2015), what we call human computation, peer competitions, and open collaboration:

Human computation

Crowdsourcing can be organized as a communication technology mediated market for labour, where workers and organizations exchange work for monetary compensation, like for example Amazon's Mechanical Turk or Crowdflower (Fort et al., 2011; Horton & Chilton, 2010; Irani & Silberman, 2013; Martin et al., 2014). The motivation to participate can also be intrinsic such as winning a game or feeling good, for instance when contributing to the reconstruction of maps after a nature disaster (Preis, Moat, Bishop, Treleaven, & Stanley, 2013; Schelhorn, Herfort, Leiner, Zipf, & Albuquerque, 2014)

Typically workers here are doing micro-tasks that do not need a special expertise, like transcribing images and audio, translating text, or tagging maps. Like in the Mechanical Turk, the fake chess-playing machine constructed in the late 18th century where a human chess master operated the machine (see Figure 1), crowdsourcing of this type is human computation (Quinn & Bederson, 2011), where the crowd acts with the same efficiency and simplicity as a computer. Based on an overview of human computation research, Quinn & Bederson (2011) suggest that this typically solves problems that potentially can be solved by computers and where the humans are strictly organised by the computational system. Typically here is the modularity of the tasks and the size of the crowd. The tasks are divided into small modules that each doesn't take much effort. The size of the overall crowd available at these microtasking markets is massive, why the tasks can be completed rapidly through the scale available on such platforms. On these platforms the individuals in the crowds usually undertake tasks independent of one another, sometimes even competing for work on this market where workers are largely anonymous and the tasks are simple and clearly defined.

Quinn & Bederson (2011) don't include data-mining in the concept of human computation as they don't think the challenges are the same, as users normally aren't active in the mining process. However, we don't agree on this distinction, as we first of all claim that not acting also is an action, and secondly, that users are actively participating in online contexts they are aware of are potentially mined, thus probably adopting their behaviour accordingly.

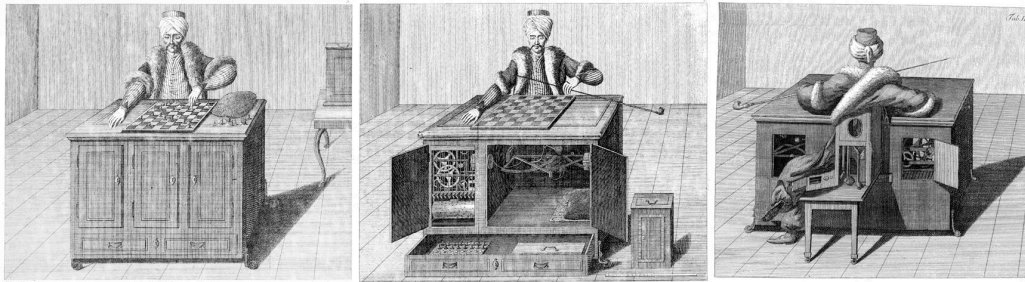


Figure 1. The Mechanical Turk, by Wolfgang von Kempelen 1784.

Peer competitions

Peer competitions, crowdsourcing tournaments and idea competitions, are another form of crowdsourcing where participants partake in an often public contest that involves some sort of prize or public recognition (Blohm, Bretschneider, Leimeister, & Krcmar, 2011; Piller & Walcher, 2006; Wagner, 2011). Here problems or challenges are posted to crowds on in-house platforms such as Challenge.gov (I. Mergel & Desouza, 2013), or external platforms such as IdeaConnection, Hypios, TekScout, and InnoCentive (Daren C. Brabham, 2013; Lee, Chan, Ho, Choy, & Ip, 2015).

These platforms are also termed open innovation platforms as the competitions can involve both generation of ideas and solving problem (Antikainen, Mäkipää, & Ahonen, 2010; Morgan & Wang, 2010).

Here the crowds often have some sort of explicit expertise or skill. Reputation is therefore sometimes expressed on a profile page and the participants' profiles can often be public. These platforms generally also attract and maintain more specialized crowds with a certain interest. 99Designs and CrowdSpring provides a platform for design competitions (Wooten & Ulrich, 2015), while the crowd at Kaggle focuses on data science solutions (Carpenter, 2011). Participants can sometimes submit independent solutions to competitions, while others encourage group participation. Crowdfunding is another type of peer competition, where participants are supposed to come up with funding for a certain project within sometimes set timeframes, but can sometimes also contribute with ideas to develop the project. The crowd also provides a potential marketing network for the finished project.

Open collaboration

The third form of crowdsourcing is more about deliberation and collaboration where social media networks or self-organized wikis provide an environment for developing a problem or opportunity posted by an organization or individual. Here the participation is voluntary and there are no prizes or money involved. Participants are often known to each other or at least have public profiles within

online social networks. The collaborations can be organized for example through a wiki (Jackson & Klobas, 2013), or using social media (Croeser & Highfield, 2014; Gruzd & Roy, 2014; I. A. Mergel, 2012; Moser & Eijkeren, 2016). Participants can be everything from a few individuals to large-scale networks, as the potential in networks such as Facebook and Twitter is enormous. However, the scale depends less on the platform than the engagement for the task. The open collaboration can also take place on multiple platforms, as social networks aren't constrained to single platforms or technologies (Prpic & Shukla, 2014). Several authors claim this type of practices shouldn't be defined as crowdsourcing as that they are not invented for this purpose (Estelles-Arolas & Gonzalez-Ladron-de-Guevara, 2012). However, as these tools and practices, like e.g. the common use of posting public calls in forms of hashtags posted on multiple platforms, do *serve the purpose of crowdsourcing*. Furthermore, when using crowdsourcing for the purpose of public policy-making, we need to use and understand tools in use by the public, in order to reach a large crowd.

3 Theoretical framework and data

The communal aspects of the network-based creative economy have led scholars such as Hardt and Negri (2000) to argue that this economy can be seen as a form of communism, in the way Marx defined communism in his theory of alienation. This "Multitude" can be described as a networked model for resistance against global capitalism consisting of collectives of individuals working together in multiple networks rather than sharing single identities (Michael Hardt & Negri, 2005; Virno, 2004). On the other hand, this could also be seen as a liberal manifesto. Boltanski and Chiapello (2005) demonstrate how this relational communism just as well can turn into a "new spirit of capitalism", where the workers are commodifying their relations and self-managing their affective labour. Berardi (2009) claims that this changing nature of labour requires a shift in our thinking about alienation. The divisions between the owner of the means of production and the workers remain, but because labour is increasingly mental, the concept of alienation needs to be reinterpreted (Ibid). In industrial capitalism, the work is contained in physical objects controlled by the owner of the factory. But in the semi-capitalist economy, it is according to Berardi instead one's ideas, one's "soul" which are controlled by the capitalist economy.

The capitalist system Marx described when formulating his theories was based on nineteenth-century industrial capitalist society. Marx (1844) argued that capitalism created alienation in society that operated on several levels:

- *Alienation between the producer and the consumer.* Instead of producing something for another person, the worker produces for a wage.
- *Alienation between the producer and the product of the work.* As the production is split into smaller parts and the worker becomes an instrument that makes a limited part of the whole, the pride and satisfaction of work is lost.

- *Alienation of workers from themselves*, since they are denied their identity. By losing control over the product of work and thus pride in labour, the worker is deprived of the right to be a subject with agency.
- *Alienation of the worker from other workers*, through the competition for wages, instead of working together for a common purpose.

A capitalist society, divided into classes of bourgeoisie and proletariat, stands in contrast to the ideal of communist society where there is no need for the state and class differentiation; instead everyone owns the means of production, and the principle of distribution is famously:

“From each according to his ability, to each according to his need.” (*Karl Marx, 1875*)

This has often been interpreted that everything should be shared equally, but Marx says nothing about equality, rather he emphasizes the relationships between people and their abilities to contribute to production and society. A ‘communist society’ is a society where everyone is linked in a mutual interdependency with others and nature, and self-actualization is the driving force (Ibid). In this perspective, production is a mutual exchange that strengthens individuals. The producers are strengthened by expressing themselves through their work, where the product is an expression of their subject and position in the world, and thus expands their power and range. As this expression of their identity is put into use, and used by other individuals, the producers also get the satisfaction of seeing their products in use, as a response to other people's human needs (Ibid).

The concept of *crowdsourcing* is common, but understanding varies. Based on several existing definitions, Estelles-Arolas and Gonzalez-Ladron-de-Guevara (2012) present an integrated definition of crowdsourcing as a “type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task.” When considering modern crowdsourcing, the practice of acquiring services, ideas, or data from a crowd of people enabled by communication information technology, (Brabham, 2009; Prpić, Taeihagh, & Melton, 2015), those technologies can further alienate people as their work is divided in micro-tasks and their relations becomes commodified, but the technologies can also become a mean for reducing alienation by establishing direct links between workers and between workers and consumers (Stacey, 2008). These applications can be seen as an expression of the talent of the producer and the needs of the consumer, but also as an act of recognition between humans, that is, a social relationship. By applying Marx's terminology, we argue that instead of alienation, stronger relationships might be created:

- The relationships between the producer and the consumer. Instead of producing work for a wage, a direct relation to another person is developed.
- The relationship between the producer and the product of the work. As the product and the producer is the same person, and the

producer has total control over her own work and can feel proud of this work.

- The relationship with oneself. When production is mainly about expressing oneself and creating one's own community of followers, the worker is no longer a stranger to him or herself.
- Relationships between workers. Not competing for the salary, but working together for the common network that everyone depends on strengthens relationships.

In our following analysis we will use Marx's four levels of alienation, and the dichotomy between alienation and relation, as a framework to explore cases from the three crowdsourcing categories; *human computation*, *peer competitions*, and *open collaboration*, described in table 1.

Table 1. 21 cases of crowdsourcing tools divided in three type groups: Human computing, Peer competition, and Open collaboration.

Human computing	Amazon Mechanical Turk	In Amazon Mechanical Turk, participants are part of a crowdsourced labour market, create knowledge, produce data, solve problems as well as act as test subjects in crowdsourcers' projects (for instance, for behavioural studies). Most tasks are micro tasks, where the workers receive small monetary rewards.
	Amara	Amara is a tool that enables editing subtitles for videos. An easy to use interface makes it simple to invite a crowd of editors to co-produce subtitles in multiple languages.
	Testbirds	Testbirds is a platform for crowd-testing of software where testers receive monetary rewards.
	OpenStreetMap	In OpenStreetMap (OSM) participants contribute to the development of an online map and also to the development of the mapping tool. There are no payments involved.
	Waze	In Waze participants contribute to a real-time navigation application with traffic information collected through their mobile devices. The tool also enables a more active sharing of data about traffic situations and also invites participants to the development of the map itself by editing e.g. roads and houses.
	Ushadi Quakemap	In Quakemap participants use a map to coordinate needs and resources in earthquake struck areas.
	PartS	In the citizen science framework PartS participants contribute by capturing data with their mobile devices during long time studies.
Peer competitions	Brainr	Brainr is an idea-sourcing tool where users submit ideas and solve problems submitted by other users.
	InnoCentive	InnoCentive is a problem solving tool that uses competitions for money as a way to engage participants. It focuses on the development of problems in engineering, natural science, and business.
	OpenIdeo	OpenIdeo is a crowdsourcing and co-creation platform for gathering and developing ideas and design solutions. Challenges are posted by the Ideo design company and partner organizations, e.g. UN, etc. The

		platform often provides a monetary award.
	Lego Ideas	Lego Ideas is a tool that allows users to develop designs for Lego products and to compete for the opportunity to see this to be available commercially. Potentially the winners can get a percentage of the gains.
	Ideascale	Ideascale is a crowdsourcing platform for collaboratively developing ideas in a structured way.
	Kickstarter	Crowd-funding platform where participants can co-fund projects.
	Crowdsourced law reform	In the case of crowdsourced law reforms in Finland participants were invited to contribute with their knowledge on law reforms about off-road traffic and housing company management.
Open collaboration	Twitter	Twitter is a micro-blogging platform that enables crowd production of data in the form of short text messages, URL:s and images.
	Wikipedia	Wikipedia is an online encyclopaedia, enabled by a wiki that makes it easy to create and develop webpages in discussion with other users. The people who use it write it collaboratively.
	Facebook group	The social media network Facebook provides a discussion tool called Group that enables a deliberative model of information exchange
	LocalWiki	LocalWiki is a Wiki connected to mapping tool, the map is the starting point for the information added and describes how the material is connected to a local site. The information is displayed on the crowd-map, and users can add new points of interest and develop what other users have contributed with.
	Flickr	Flickr is an image-sharing network where users store and share images directly with peers or as members of special interest groups.
	Instagram	Instagram is a mobile online social networking service that supports sharing of pictures and videos, publicly or privately on the app.
	YouTube	YouTube is a video sharing website where users can watch, create and upload their own videos to share with others.

Result

A typology of worker relations in crowdsourcing

To identify a range of typologies useful for identifying relations, we have analysed a number of crowdsourcing platforms, focusing on how these tools support the relations in crowd production. These roles can be either clearly divided, as in the working relations on a crowdsourcing platform such as the Amazon Mechanical Turk, or they can be the same as in a collaboratively developed Wikipedia post, where the consumer also can be the worker. We start with a very broad definition of a crowdsourcing tool as an *ICT enabled, often large-scale, collaborative production*. To enable a comparison of some crowdsourcing platforms from a participatory perspective, we started with

fundamental questions focusing on worker and consumer positions, description of the outcome of the work, and how community is supported. We then after a first pilot study adjusted these definitions to better mirror the practices in the cases and to develop typologies grounded in the empirical contexts.

The analysis addresses the following questions regarding relationships:

Between the worker and the consumer: Is it a separation between the worker collecting the data and the consumer of the data, or do they know each other?

- (A) Separation: No relation
- (B) Reputation: Worker or/and consumer might be displaying a certain reputation; the product/consumption is connected to a person.
- (C) Recognition: Worker and consumer can acknowledge each other's existence, like e.g. through user names and user profiles.
- (D) Bond: Worker and consumer can get to know each other; there are support for communication like discussion forums and profile pages.

Between the worker and the work: What is the underlying ontology? Is the result described as; bits and pieces, a discussion, or an expression by a subject?

- (E) Bits and pieces: No relation, the work is separated in bits and pieces so the worker has no connection to the whole.
- (F) Contributions: Worker is producing clearly defined assignments, and there is not much room for creativity.
- (G) Dialogues: The result is more like a discussion.
- (H) Agenda: The work is the expression by a strong subject.

Within workers; worker and self: Is the crowd worker an object that provides data without much control, or an active subject?

- (A) Object: The worker is a passive object.
- (B) Instrument: Worker is an instrument producing clearly defined assignments.
- (C) Expert: The worker is an expert with a certain skill or ability.
- (D) Subject: The worker is a subject with agency and purpose.

Between workers: What is the available tool support for community? Does the interface express certain group awareness? Can workers communicate shared interests or establish a community?

- (A) Alienation: Workers have no relations with other workers.
- (B) Common denominators: Workers have a common interest.
- (C) Public: The workers share a public, a forum for expressing their opinions.
- (D) Community: The workers have tools to establish a community with other workers.

This typology of alienation is summarized in Figure 2 where the levels of relations A to D are mapped to the four worker relations Marx describes; Worker – consumer, worker – work, worker – self, and between workers.

We used this typology to analyse the 21 cases described in table 1 that were chosen because they represent a diversity of crowdsourcing tools and contexts found in all three groups of crowdsourcing tools.

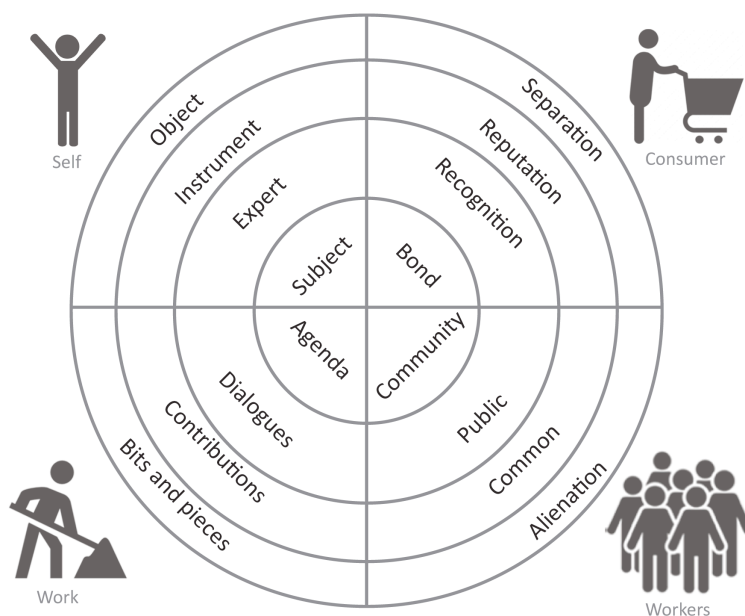


Figure 2. A typology of worker relations

Four modes of production in crowdsourcing

We assumed that the three different types of crowdsourcing tools should represent a scale of relations from separation to bonds, which was also true on a general level. The support for workers' relations in the *human computing* cases were weak or non-existence in most cases, and never strong. There is either total separation or the worker is visible for the consumer through reputation mechanisms, but there is no mutual connection. It is foremost the worker that has a reputation, the consumer isn't visible. The support for workers' relations in the *peer competitions* cases was strong or at least existed in most cases. In the *open collaboration* cases there were good, mostly strong support for all types of relations.

However, in practice this picture was more complex. By dividing the data in more detailed categories we describe how the types of relations are handled in the three groups (shown in Figures 3-5), illuminating that the division between the worker and consumer is more varied. Both Testbirds and Waze used reputation as a way to identify participants, and the division between consumer and worker is fluid as the consumer also partakes in the sourcing of the map. In the citizen science project PartS participants profile information is available. Here the sourcer has a profile page and based on this information the worker decides whether to join or reject the study. The worker also has a profile page the sourcer/consumer can access. The sourcer is also the consumer of the data.

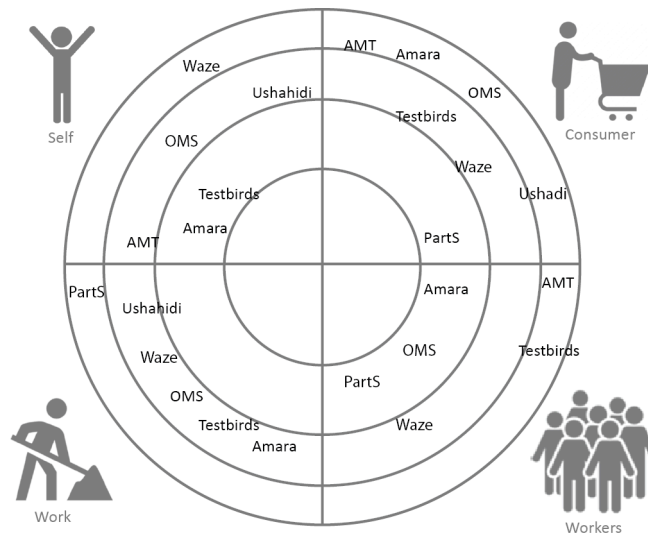


Figure 3. Four types of worker relations in cases of human computing where the inner circle represents strong bonds, the next one some relations, the third weak bonds, and the fourth outer circle no bonds.

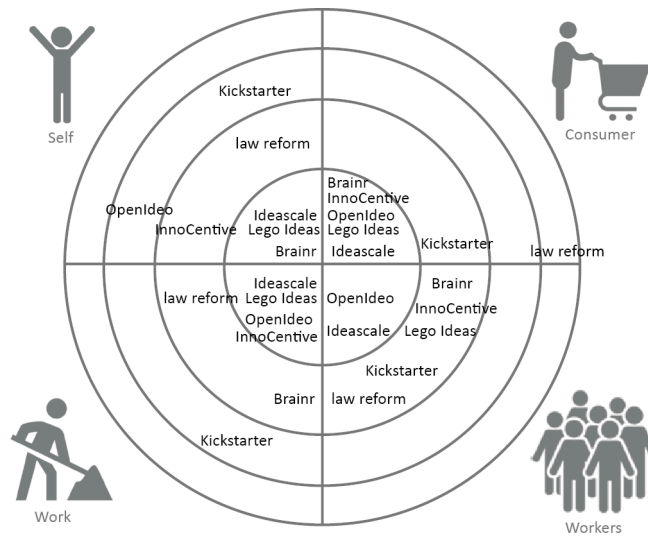


Figure 4. Four types of worker relations in cases of peer competing where the inner circle represents strong bonds, the next one some relation, the third weak bonds, and the fourth outer circle no bonds.

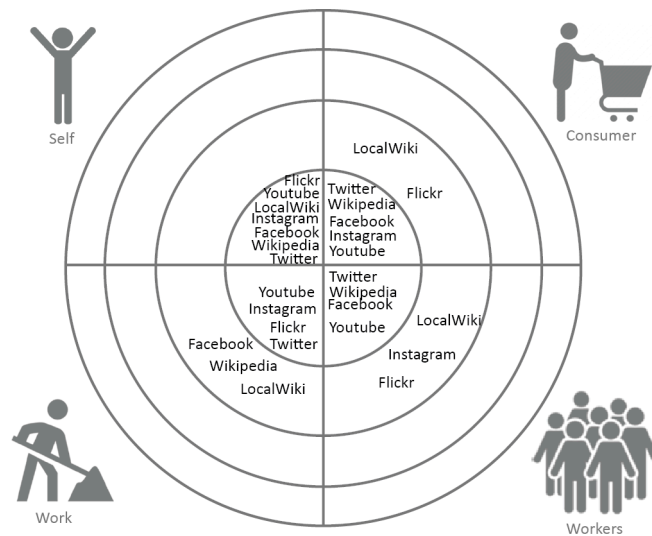


Figure 5. Four types of worker relations in cases of open collaboration where the inner circle represents strong bonds, the next one some relation, the third weak bonds, and the fourth outer circle no bonds.

Worker and work

When we compare the three categories we see that the greatest division is in how the relations between the workers and the work are supported. In the human computing tools there is none or a weak support for these relations. Workers have few means to understand and connect to the result of their work. This as a contrast to the peer competing and open collaboration tools where the relation to the work is an important motivator, as for example in OpenIdeo where the challenges are engaging and creative.

However, most of the crowdsourcing tools we analysed provided support for multiple types of worker positions. When we compared the types of information produced by these means of production, we identified several ways of looking at the data and the production process. In the case of driving around with a mobile device producing GPS coordinates, the facts are rather simple and undeniable. Anyone with the same device could get similar data driving the same way. On the other hand, also geo-mapping tools like OpenStreetMap need a diversity of users to cover the map collecting multiple facts from different locations and experiences, why the users not merely are passive objects providing data by moving around but also someone with experience of moving around in a certain region.

Worker and self

On one level worker's identity can be seen as a mere passive object whose movement or surroundings become recorded with geo-mapping or sensing functionalities, while moving or driving around. On another hand users also create credibility: The more contributors or participants in the data collection, the more legitimacy is created for the result. Users can also contribute more actively

with data, like in the citizen science project PartS, where users not only provide with sensor data, but also act like instruments contributing information via questionnaires.

In Waze the constraints to what the user actually can do are also precise. Mostly users drive around passively collecting speed data. But there are also means for improving a map and there is a toolbox of shapes and categories to add on. The participant is not only an object but an instrument that submit/develop documents. However, within these constraints the participant is seen as an actor with expertise about a certain area and who is the expert that controls the quality of the map. In the case of crowdsourced law in Finland the workers/contributors could for example be instruments that provide information for a better policy: writing down their knowledge about the issue by addressing the prompt on the crowdsourcing platform.

The constraints are, however, not always absolute, but something that can be negotiated and developed in a process. The instrument can also be an active subject that communicates and co-produce the process with others on the platform, including peer-producers and crowdsourcers such as civil servants in crowdsourced law-reforms. Likewise, the development of OpenStreetMap takes place in discussion forums and conferences.

Worker and the consumer

The relation between the worker and the consumer varied a lot in the analysed cases. One position was to not provide any means of communication or information about users, like in the citizen science project where this was avoided for ethical reasons. In Amazon Mechanical Turk, users are seen as competitors, and the tool a market mechanism that distributes the work provided by a client. Another position is that communication means are not provided, but users' reputation is known, and users might participate due to a common denominator. Also in the application every edit is negotiated in comment functionality. In the PartS tool, participants are also consumers, having the option to create empirical studies by their own, which capture as well as analyse mobile device data, thus taking the role of owner/researcher controlling the process. In PartS the researcher can also communicate directly and anonymously with the contributors. Other tools put a lot of effort into developing bonds between workers, and workers and consumers.

Workers and workers

In Waze, in addition to the map there are a discussion forum that provides support to a large community of Waze workers, and it also enables Waze users to bond with users in other social networks. Workers have a public profile that shows their activity on the discussion forum. On the actually map it is all about helping strangers, and thus to contribute to an abstract common.

In Waze, even though anyone can contribute to the map, there is an idea that people with real experience of a site are more experts than others. The products of the work can best be described as position recordings, reports and edits, where the editing is a potentially deliberative dialogue with everyone else that contributed to the post. In the case of the crowdsourced law reforms the production of data takes

place in idea and comment submissions and in the dialogues and negotiations that develop knowledge about the consequences of the law reforms. In these deliberative processes transparency is important, the OpenStreetMap for example describe every edit in history and conflicts are handled after an open protocol. However transparency might hinder participation in some cases where there is need for privacy for some reason. In PartS secrecy is for example essential for participation.

These different worker relations to the work, to oneself, to the consumer, and to other workers, can be described as different ontologies or modes of productions. From an idea of *crowd capitalizing* where the worker as a random *passive object* from which bits and pieces are sourced, to *crowd instrumentalisation* where the crowd provides data from multiple realities, to *crowd deliberation*, and finally to a performed reality of the *relational crowd* where the worker also is the consumer and the owner of the means of production, and the product is an expression of self realisation. Table 2 summarizes these relations with corresponding modes of productions.

Table 2 Typology of worker relations with corresponding modes of productions.

Mode of production	Worker – consumer	Worker – work	Worker self	Worker – worker
Crowd capitalizing	Separation	Bits and pieces	Passive object	Alienation
Crowd instrumentalising	Reputation	Contributions	Instrument	Common denominators
Crowd deliberation	Recognition	Dialogues	Expert	Public
Relational crowd	Bond	Agenda	Subject with agency	Community

Concluding reflection

In this exploratory paper, we have examined the role of the crowd workers, the crowd work consumers, the nature of their relations and the crowd-produced work, using Marx theory of alienation to identify a typology of worker relations in crowdsourcing.

We suggest that these types of relations can be described as different levels of alienation whereby the worker, the consumer, worker’s self, and the work are connected in four modes of production:

- *Crowd capitalizing*: A functional mode of participation, where the crowd worker is viewed as a random object that provides facts and lends legitimacy to the process. There are no channels of communication.
- *Crowd instrumentalising*: In this more instrumental mode of production is enabled by the tool, and workers are instruments that make contributions for a certain cause. There is a common interest and the worker is aware of the other workers in the crowd.
- *Crowd deliberation*: In a more consultative mode of participation, workers are viewed as experts and production is a way to get in tune with public views

and values, garner good ideas, and develop consensus through deliberative dialogues. The worker has a communication channel to the other workers, they share a public; be it a newspaper, a mailing list or similar forum that makes communication with the other workers possible.

- *Relational crowd*: In a more performative transformative mode, workers both are producers and consumers, as well as owner of the means of production, peers that co-produces new theories and have political capabilities. There is communication support for community and participants are connected in mutual relations.

These different modes are, as our cases show, not mutually exclusive, but co-exist within the same tools and processes. However, these concepts express different aspects of participation and levels of relations. These modes and corresponding typologies might be useful as a way to discuss participation in crowdsourcing in a more nuanced way, and to develop tools with a better awareness of how different types of relations can be supported. Especially in cases of public policymaking where a diversity of perspectives are needed this can be useful.

In Marx's vision self-fulfilment through participation in a relational economy was the aim. However, self-fulfilment is also close to self-exploitation, and maybe the online instrumentalisation of our relations will lead to a situation where the self is the new work that is produced and consumed on the relational market. Just as Boltanski and Chiapello (2005) demonstrate this relational communism can just as well turn into a new internalised form of capitalism, where the workers are commodifying their relations exploiting their selves. This can be seen as Berardi (2009) suggests as a way for a capitalist economy to control the workers "souls". In this paper we have provided a reinterpretation of the concept of alienation based on how alienation takes place in crowdsourcing contexts. By exploring how the capitalization of relations takes place in practice and in more detail, we provide a better understanding of these processes and how to support the use of such participatory methods in different aspects of policymaking.

In our on-going work, we will expand the case base to more realms and develop our model further, to identify similarities and differences between contexts. Another issue that needs to be addressed and incorporated into the model is data surveillance, which adds to yet another layer of alienation.

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