

Crowdsourcing as an Activity System: Online Platforms as Mediating Artifacts

A Conceptual Framework for the Comparative Analysis of Crowdsourcing in Emergencies

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Abstract. This paper explores a number of challenges in the analysis of crowdsourcing platforms, relying on major theoretical approaches. In order to address these challenges, it suggests applying cultural-historical activity theory (CHAT) to the analysis of crowdsourcing projects. Accordingly, it suggests that crowdsourcing projects can be analyzed as tools that contribute to the construction of activity systems. Applying CHAT allows addressing a number of central questions, including the relationship between subjects and objects as well the dynamics of the power relationship around crowdsourcing deployments. It also allows the conducting of a comparative investigation of crowdsourcing projects, while “activity” is considered as the major level of analysis. The paper also introduces a number of methods that can be used to investigate crowdsourcing applications as a manifestation of an activity system.

1 Introduction

Since Jeff Howe coined the term “crowdsourcing” in 2006 [33], a broad and interdisciplinary body of academic literature dedicated to this concept has been constantly developing. The research reflects numerous disagreements on a variety of issues related to crowdsourcing. The major field of battle is the definition of crowdsourcing. For instance, Estellés-Arolas and González Ladrón-de-Guevara [20] counted more than 40 different definitions of crowdsourcing and suggested their own, which made a comprehensive effort to integrate the others. Recently, Brabham dedicates special attention to discussions of “what crowdsourcing is and is not – strictly speaking.” [9].

There are a number of layers of disagreement in discussions around crowdsourcing. The first layer concerns the purpose of crowdsourcing applications. Some researchers approach them primarily either as a new business model for the production of material and immaterial goods or as a form of digital labor that allows increasing profit for firms [34,8,38,22,26]. Another body of literature expands the potential applications of crowdsourcing to problem-solving [8]. Depending on the disciplinary affiliation of the writer, the role of crowdsourcing is discussed in a context of crisis

response [43], the production of volunteer geographic information (VGI) [29,7], governance [6] or citizen science [30], among others. A number of papers suggest mapping the types of function and types of crowd in an application to a specific field e.g. crisis response [44].

Another layer of debate is the structure of the relationship between actors participating in crowdsourcing. For instance, Brabham [9] discusses the spectrum of control between the organization and the crowd. He defines crowdsourcing in very specific terms as a project where the purpose is defined by the organization, while the potential crowds that can be engaged have, in the process of achieving this purpose, a limited degree of freedom in their participation. According to Brabham, on the one hand, “when the locus of control is too much on the side of the organization – the crowd becomes a mere pawn.” On the other hand, “the opposite end of the spectrum when the locus of the control resides more on the side of the community” leads to self-governance, while a situation where “the organization is merely incidental to the work of the crowd” is also not considered by Brabham [9] as crowdsourcing.

Some researchers, however, use as examples crowdsourcing projects where the crowd is not only responding to a request, but also defines the purpose of the deployment (e.g. Wikipedia). Some research explores the obstacles to the collaboration of institutional and informal actors around the same project, in particular in the field of scientific research [48].

The nature of the resources that are mobilized is also disputed. Some researchers suggest relying on Surowiecki’s concept that what is mobilized is the “wisdom of crowds” [60]. Others approach it as “crowd capital” [56]. The discussion around the nature of resources also differentiates between those that are used for simple mechanical tasks and those that can address complicated tasks [55]. A concept of thin and thick engagement [28] can be helpful in differentiating between various forms of participation by the crowd in crowdsourcing projects. Relying on analysis of the nature of resources and the nature of tasks, a number of researchers [55] suggest models for the optimization of the crowdsourcing process and for matchmaking between the crowd and those who seek to engage it for a particular purpose.

The layers mentioned above present primarily instrumental research that is focused on how crowdsourcing is used, what impact it has on different fields and how its value can be optimized. Another stream of research on crowdsourcing is critical analysis. On the one hand, some researchers who have an optimistic attitude to information technologies approach crowdsourcing as a concept that can empower people. Concepts like “participatory culture” [36], peer production [4] “long tail” [1], “cognitive surplus” [59] allow us to discuss crowdsourcing as a concept that supports generosity, creativity and the agency of individuals. Meier [49] suggests that crowdsourcing can be used for the mobilization of “global goodwill”. On the other hand, some research suggests a dystopic vision of ICTs in general and of crowdsourcing in particular. Neomarxist scholars approach crowdsourcing as another form of “immaterial labour” [39] and as exploitation of the digital labor of crowds in order to gain profit for firms. Researchers such as Fuchs and Sevignani [26], who discuss the ICTs in classical Marxist vocabulary, suggest that crowdsourcing should be freed from the control of capital and transformed into “digital work” that serves the interests of people and not

the interests of capitalist structures. As Brabham [8] points out, “It is easy for critics to bemoan the oppressive exploitation of labor taking place in the crowdsourcing process, but narratives from superstars in the crowd indicate more agency than Marxist critiques would allow.”

Analysis of crowdsourcing can also rely on a number of major theoretical frameworks that are often applied to the analysis of ICTs. The notion of connective action developed by Bennett and Segerberg [5] can significantly contribute to understanding the dynamic of the process behind crowdsourcing. According to Bennett and Segerberg, unlike collective action, which relies on coordination by organizational structures and hierarchical institutions that suggest a specific frame of action, “connective action networks are typically far more individualized and technologically organized sets of processes that result in action without the requirement of collective identity framing or the levels of organizational resources required to respond effectively to opportunities” [5]. While crowdsourcing can be approached as a manifestation of connective action, the concept does not allow for a distinction to be made between crowdsourcing and any other type of ICTs that also support the loosely organized action of many individuals.

Crowdsourcing can also be approached as a manifestation of networking power [13] and analyzed in terms of programming and switching power. In this case the major level of analysis is networks and crowdsourcing platforms are tools for the formation of networks around a particular purpose that can be analyzed in terms of “programming” and “switching” [12]. The purpose of crowdsourcing platforms reflects programming power. The coalition of groups that emerges as a part of collaboration around the platform’s purpose can be addressed through switching power.

According to the network power concept, ICTs do not necessarily favor horizontal actors and lead to a change in the power relationship. According to Castells, the power of networks can be used by the traditional power-holders – corporations and governments. That said, Castells also introduces the concept of mass self-communication, which suggests how networks can challenge the traditional hegemonic actors. According to Castells [11], mass self-communication is “[t]he building of autonomous communication networks to challenge the power of the globalized media industry and of government and business controlled media.”

The counter-power that relies on mass self-communication and uses the “opportunity offered by new horizontal communication networks of the digital age” is defined by Castells as “the capacity by social actors to challenge and eventually change the power relations institutionalized in society” [11]. Consequently one can suggest that crowdsourcing can be approached not only as a form of programming/switching power but also, potentially, as a technology that enables new forms of mass self-communication.

However, there are a number of challenges in using Castell’s theory to analyze crowdsourcing. First, it does not allow the addressing of any unique features of crowdsourcing projects. From this point of view of networks there is no substantial difference between social networks and crowdsourcing platforms. Both can be approached as manifestations of networking power. The focus on networks also does not leave space for other elements of crowdsourcing – the tools (crowdsourcing plat-

forms) and the purpose of crowdsourcing projects. Furthermore, it does not address the nature of the resources that are mobilized, while focusing primarily on the process of mobilization.

Neither the networking power concept nor collective/connective action and social mobilization theory can address the complexity of crowdsourcing or differentiate between it and other ICT-based applications. We can also see that the concepts that investigate crowdsourcing while relying on a specific notion of its purpose (be this production, problem-solving, the generation of generosity or governance) limit the scope of research in a way that can lead to missing a substantial part of the project.

The conceptualization of crowdsourcing requires a framework that will allow for the addressing of the actors and their relationships, the structure of resources, the process of mobilization of these resources and the purpose of mobilization. The concept needs to be neutral in terms of an optimistic or dystopian view of the ICTs. At the same time it should allow not only an instrumental, but also a critical analysis that explores the structure of power relationships in crowdsourcing projects.¹

Consequently, what is necessary first is a definition of crowdsourcing that distinguishes it from other forms of ICTs used for production and/or social mobilization, but at the same time does not limit its understanding to a particular form of relationship among the actors, a particular purpose or a particular definition of the nature of the resources mobilized. It should also avoid embedding critical interpretations of the nature of crowdsourcing as a process.

2 Definition of Crowdsourcing

The conceptualization of crowdsourcing requires a definition that will distinguish it from other ICT applications and address the challenges described above. This paper would like to suggest that the unique feature of crowdsourcing is that in any crowdsourcing project there is a link between communication and action. The structural properties of the crowdsourcing tools and deployments always link communication to mobilization. In other words, the major characteristics that distinguish crowdsourcing projects from a number of other online tools, including social networks and blogs, is that crowdsourcing projects are action-oriented tools which by definition are used to mobilize and engage Internet users and a variety of potential audiences.

In the case of crowdsourcing, the symbolic power of representation and the material power of action are interrelated because of the design of the system. The type of social construction and discourse that are mediated and produced through crowdsourcing platforms have a link to the specific types of action defined by a particular platform. Consequently, a crowdsourcing platform is a framework that relies

¹ One of the other theoretical frameworks that can link people to tools and approach crowdsourcing as a form of enrollment is actor-network theory (ANT). However, this also fails to distinguish crowdsourcing platforms from other tools. Moreover, the approach of ANT to power relationships could create significant challenges for critical analysis of crowdsourcing deployment (in particular the power relationships).

on a link between communication and the mobilization of a crowd in order to carry out a specific type of action defined through the platform. The way in which the situation is framed always appears in the context of a potential action.

Accordingly, I would like to limit the comprehensive definitions and rely on a definition of crowdsourcing as the ICT-mediated mobilization of networked individuals' (the crowd's) resources in order to achieve a particular goal. This definition does not limit the nature of the purpose, but suggests that crowdsourcing is always purpose-oriented. It does not suggest a specific mode or relationship between crowd and organization, but argues that the mobilization of the crowd's resources by any type of actor is always the core of a crowdsourcing project. Finally, it emphasizes that crowdsourcing is always mediated through ICTs.

Instead of defining the potential forms of application of crowdsourcing platforms, this paper suggests mapping the potential resources that can be mobilized through the mediation of the Internet in order to achieve a particular purpose. Every crowdsourcing platform seeks to mobilize a particular set of crowd resources.² It can include:

- Sensor resources (mobilization of the crowd in order to collect information around a specific topic)
- Intellectual resources (knowledge and experience)
- Analytic resources (data-mining and the curating of information that does not require prior knowledge)
- Financial resources (money, also known as crowdfunding)
- Commodity resources (any type of goods or objects that have value)
- Physical resources (any type of activity that requires physical action, participation, demonstration or volunteering)

The core element of crowdsourcing is not the structure of the actors' relationship and not the purpose, but the action that is enabled by the mobilization of the resources of the crowd and mediated through ICTs. Therefore the major level of analysis should be the process - the action, and the system of resources, actors and purposes that emerge around it.

When applying this notion to Castells' argument about the capacity of horizontal networks to challenge traditional power structures, we have to distinguish crowdsourcing platforms from other forms of "mass self-communication." Consequently, in order to incorporate crowdsourcing within a discussion of power, I would suggest that crowdsourcing is a specific form of mass self-communication that should be conceptualized as "*mass self-mobilization*." That said, "mass self-mobilization" is only a private case of crowdsourcing, while the crowd can be also mobilized by external entities and organizations.

²Resources of any type can also be measured in terms of time – how much time needs to be spent in order to have the resources required for specific tasks or for completing a specific task. This means that the value of similar resources has a relative nature and can be different for different people.

The purpose of this paper is to suggest a conceptual framework that addresses activity as the major level of analysis of crowdsourcing platforms. This framework allows investigation of a linking of the technology to the action through the notion of *mediated activity*. However, at the same time it approaches crowdsourcing not as a technological platform, but as a new social phenomenon enabled by ICTs. In order to achieve the purpose of this methodological project and address the challenges described above, I would suggest using cultural-historical activity theory (CHAT). The following sections will describe the principles of CHAT and elaborate on how it can be applied to the analysis of crowdsourcing projects.

3 Cultural-Historical Activity Theory and the Analysis of Crowdsourcing Projects

3.1 Activity Theory and Mediation

The foundation of activity theory relies on Karl Marx's Theses on Feuerbach [46]. Vygotsky and his colleagues Luria and Leontiev "used Marx's political theory regarding collective exchanges and material production to examine the organism and the environment as a single unit of analysis" [62]. According to this concept, there is no direct linkage between an individual and his/her environment. The relationship between a subject (individual) and an object is always mediated. The mediation is conducted through variety of cultural means, including tools and signs.

The role of the tools in a relationship between the subject (the person) and his environment (object), as developed by Marx, became a basis for the concept of artifact-mediated and object-oriented action [61]. While it is out of the scope of this paper to trace the origins of CHAT, it is worthwhile to highlight this central element: the notion of mediation. In this perspective, "all human experience is shaped by the tools and sign systems we use" [52]. As Engeström has also put it, "subject's actions are mediated through tools/instruments and directed at a particular object" [18,19]. According to Kaptelinin and Nardi [37] "the structure of a tool itself, as well as learning how to use a tool, changes the structure of human interaction with the world. By appropriating a tool, integrating it into activities, human beings also appropriate the experience accumulated in the culture."

While Vygotsky was the first to introduce the notion of mediated activity, his interests were focused primarily on the individual level and the development of human consciousness through the mediated interrelation of subjects and their environments. Leontiev [41] treated activity as a holistic unit of analysis that not only could be applied to individuals, but also "broadened the scope of Vygotsky's mediated action by introducing human activity as the unit of analysis that is distributed among multiple individuals and objects in the environment" [62].

Relying on the latter notion Engeström [16] developed an analytical framework for the analysis of activity systems, while defining his primary level of analysis as a "joint activity or practice" and the activity system as a "systems of collaborative human practice" [17]. Engeström's model identifies a number of new components that

had not been conceptualized previously, including rules, community and division of labour. The elements at the top of the triangle remain the same: subjects, mediating artifacts and objects.

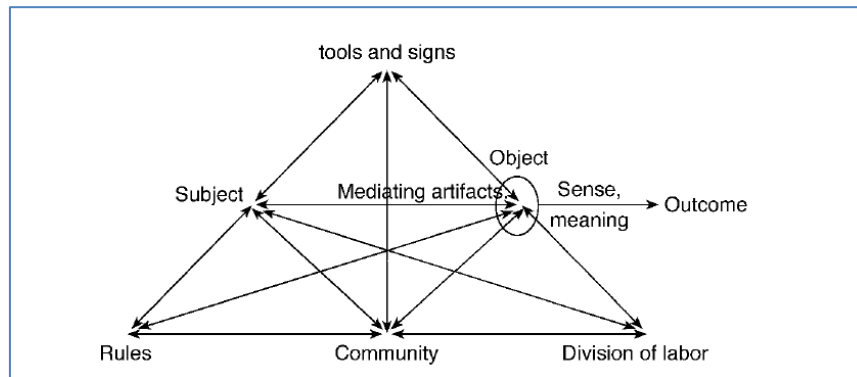


Fig. 1. The structure of a human activity system, by [16]

The notion of community allows for the argument that a division of labor takes place in a particular community that collaborates around a particular object. At the same time, an activity system is also based on a set of rules and norms that are shared by its members.

3.2 Activity and Natural Disasters

The traditional field of application of activity theory is education and concepts of child development. CHAT is often used to analyze organizations. It has started often to be used for the analysis of human-computer interaction [37]. Here, however, I would like to illustrate the advantages of the application of CHAT to an analysis of crowdsourcing based on addressing emergency situations.

Leontiev [40,41,42] writes that when we talk about the social environment of a person we mean the environment that the person is adapted to living in. The closest environment is the social group that a person belongs to and his circle of communication. Leontiev, however, emphasizes that adaption to the surrounding environment is not the core of personal development. On the contrary, at the core of development is the capacity associated with opportunities to go outside the comfort zones of the surrounding environment. Leontiev argues that the development of new activity systems is “caused by dialectical contradictions between organisms and their environments” [37].

In some cases a person can go out of his/ her own comfort zone. However, in other cases, his/her comfort zones are destroyed when a person has not changed their environment. This happens in crisis situations, and in particular natural disasters. Accordingly, a natural disaster is not only a tragedy, but also an opportunity for development. A disaster suggests a new form of relationship between a person/ collective and

nature, and this relationship – emergency response – is mediated through a variety of tools. Consequently, a natural disaster leads to the definition of new objects of activity and the transformation of everyday life activity systems.

There are two layers of analysis relying on CHAT that can be applied to emergency situations. The first layer is that of analyzing professional emergency response organizations, which present institutionalized forms of activity systems created in order to respond to emergencies. The second layer addresses the general population, including affected communities and potential volunteers who are not affiliated with formal emergency response institutions.

For instance, activity theory was used for an analysis of NASA’s response to the Challenger disaster [32]. Owen [53] uses activity theory for an investigation of the emergency response to bushfires in Tasmania. A group of researchers used activity theory in order to investigate the emergency response to attacks in Mumbai [57].

Mishra and others [50] provide a case study of using activity theory as a conceptual and methodological framework for the analysis of organization-based emergency response. Their paper investigates the contradictions and tensions in an emergency response system as a potential trigger for innovation. It relies on a number of methods, including training observation and semi-structured interviews with tactical commanders in the UK Police, Fire and Rescue Services and Ambulance Service.

Mapping the activity system of emergency response allowed the examining of “the role of tools within the activity system and the way in which they mediate behavior” [50]. The research provides an example of how the question of mapping an emergency response activity system can be formulated by relying on a triangle of the activity system (including rules, community, division of labor). The analysis suggests contradictions between emergency response officials and the technologies they use, as well as contradictions between subject and rules, subject and community, and subject and division of labor. The paper concludes that Activity Theory is “a valuable methodological and analytical tool” for the investigation of emergency response. It also suggests that we can rely on the analysis that “tensions and contradictions are considered as a source of innovation” [50].

As we can see, most of the applications of CHAT to emergency response analysis are focused on institutional structures and not on the general population. However, according to Leontiev [42], we would expect a natural disaster to be a moment of transformation in particular for those who do not expect it. CHAT allows the conceptualizing of the relationship between nature and people, in a context of collective activity.

In addition to the Engeström model, which can be used for mapping an emergency response system (including the community of responders, the division of labor between responders and the tools that mediate the response), the framework also allows us to focus on tensions and contradictions within an activity system that emerges in a case of disaster. At the same time, CHAT allows us to approach emergency response as a situation of development for a society whose members are forced to find themselves outside their comfort zone.

3.3 CHAT as a methodological framework

As Nardi has pointed out [52], “[a]ctivity theory is a powerful and clarifying descriptive tool rather than a strongly predictive theory.” According to Yamagata-Lynch (2010), many studies use CHAT as a descriptive tool for mapping activity systems as a part of qualitative research without relating to its conceptual implications. In other words you do not have to be a CHAT scholar in order to apply CHAT. Therefore it is possible to separate CHAT as a theory from activity systems analysis as a methodology [62].

As a methodology for mapping systems, CHAT allows the identification of what Engeström suggested were bounded systems of activity. As Yamagata-Lynch points out, “activity theory researchers and practitioners need to examine interactions shared among multiple activities and the boundaries of those activities to identify the potential development and changes in both human activity and societal systems” [62]. CHAT provides the methodological framework that allows us to draw the boundaries of a system for the purpose of an analysis.

4 Crowdsourcing as Mediation of Activity

This paper argues that ICT, and in particular crowdsourcing platforms, can give rise to different types of new activity systems. In different socio-political environments we can expect the emergence of different types of activity system. This difference is mediated through tools (crowdsourcing platforms).

Additionally the paper argues that, as a methodology, CHAT can provide a framework for analyzing crowdsourcing platforms and responding to a number of central questions about the structure of power relationships and the association between crowdsourcing deployments and their socio-political environment. It suggests that “activity” can be identified as the major level of analysis as a part of the investigation of crowdsourcing platforms.

Accordingly, crowdsourcing platforms can be conceptualized as mediating artifacts of activity systems that suggest a particular structure of potential action. In other words, crowdsourcing platforms can be approached as a mode of governance and a technique of power [23,24,25]. Relying on CHAT, the purpose of this investigation is the deconstruction of crowdsourcing platforms as platforms that suggest a particular range of actions and define a particular type of activity system.

According to Engeström, various activity systems inherit various types of tension between the nodes, and as a consequence we can expect to identify various types of tension in various environments that lead to the emergence of various types of activity system as they are mediated through crowdsourcing platforms. The triangle also allows us to analyze the internal contradictions and conflicts within an activity system where the “nodes” pull and push against one another” [47]. These tensions can be considered as a process of constant mediation and renegotiation of the boundaries of activity systems, while the dynamic of tensions can be followed through crowdsourcing platforms.

In other words, contradictions are the driving force of change and development. However, once users are able to participate in the development of crowdsourcing systems from within, it may allow the users to resolve the contradictions without a need to create a new activity system. The way a contradiction is resolved can suggest who is dominating in a particular activity system, whether it is institutions (structure) or individuals (agency). Contradictions can also lead either to the polarization of different activity systems or to the integration of citizen and state in joint activity systems.

CHAT methodology and terminology allows us to ask and address the following questions:

- What are the boundaries of an activity system and their purpose? What is the degree of flexibility/ generativity within the system?
- What is the structure of community/ division of labor and what are the rules in a particular activity system?
- Who plays a dominant role in the definition/ mediation of boundaries of the activity system and the purpose of this system? Is it a structure-driven or an agency-driven system?
- What are the major tensions within the activity system, how does it develop and what is its proximal zone of development?
- Are there any competing activity systems around the same objects (e.g. natural disasters)?
- How can the same technologies give a rise to different activity systems in different cultural-historical/ socio-political environments?

Mediation of the division of labor in a particular activity system is one of the most important roles of crowdsourcing platforms. This refers to the way the labor is divided in crowdsourcing platforms (e.g. what can be done by skilled and unskilled volunteers, how the division of functions is defined and who defines the framework for division).

The structure of community itself (whether it is an open or a bounded community, who is excluded and included, what the criteria are for becoming part of the community) is particularly important for the mapping of crowdsourcing platforms as activity systems. These elements are embedded in the structure of the mediating tools (platforms).

5 The Power and Construction of Activity Systems

Cultural-historical activity theory does not discuss the role of power or the power relationship. At the same time, it emphasizes the linkage between the cultural-historical context and the nature of the activity system, which provides a window of opportunity for an investigation of the association between a particular type of environment and the particular structure of an activity system.

One can suggest that, since the roots of activity theory grew from the concept developed by Karl Marx, the Marxian approach to power relationships should be ap-

plied as a part of activity theory. This argument would be misleading since one has to differentiate the way Marx understood the nature of the social world through the dialectical relationship of subject and object from the particular situation described by Marx as capitalism.

Indeed, the production that takes place in capitalist society can be described in terms of activity theory. One can argue that capitalist powers use ICTs in order to construct activity systems and in order to control them, define the object of activity and gain from what is produced. For instance, Mosco [51] defines outsourcing as a “multifaceted phenomenon, one vector in an increasingly complex international division of labor involving far more than simply the transfer of service jobs from high to low wage nations.” In other words, in case of outsourcing, ICTs enable the creation of global activity systems that connect and divide labor between developed and developing countries. One of the examples of outsourcing as a construction of global activity systems is call centers, which were conceptualized by Brophy [10] as a form of communicative capitalism.

However, a global activity system does not necessarily have to be constructed as a form of capitalist abuse. Activity theory does not necessarily make an argument about the exploitation of labor and alienation of a subject from the means/fruits of production. Indeed, social media and crowdsourcing platforms can be used to construct activity systems that serve the interests of large firms and support exploitation, but that does not necessarily mean that this happens in every case. Moreover, some neo-Marxist scholars [27] tend to see a form of exploitation in any online platform and in any activity system, while ignoring the fact that the same tools can serve a variety of interests and favor variety of actors, and that in some cases there is no opposition between the interests of users and the interests of the owners of a particular platform. Besides, not every effort to gain profit from users is a form of exploitation.

Information technologies, and in particular crowdsourcing platforms, can be constructed in different ways and conceptualized as tools that mediate activity and allow the emergence of new activity/ development of existing activity systems. A crowdsourcing platform is an example of a mediating artifact. Consequently, various online platforms enable the creation of various types of mediated activity system.

The core thesis concerning power relationships that can be argued on the basis of activity theory is that the structure of activity systems can favor the interests of particular actors, and that activity systems can be constructed in different ways to serve the interests of different types of actor. Consequently, one can argue that the structure of specific activity systems can embed a particular structure of power relationships.

Relying on the triangle of activity systems, we can ask a number of questions - what the object of the activity system is, how the labor is divided, who is excluded from and included in the community, what kind of rules exist within the systems. The responses to these questions are reflected in the structure of tools that serve as mediating artifacts for the activity systems. Consequently, an analysis of the structure of mediation tools can allow the deconstruction of a particular mode of power relationship.

Since the tools are developed and created by someone, we can argue that activity systems are also the object of construction and therefore can serve the interests of

different actors. One can differentiate between *agency-driven activity systems* created from the bottom up within horizontal networks and *system-driven activity systems* created from the top down within hierarchical structures. There are also options that can be seen as situated between these two extremes.

A neo-Marxist perception of power can explore only one side of the relationship between actors. There is, however, another notion of power that allows us to address the complexity of the power relationship while focusing on activity as a primary unit of analysis.

In his late works concerning governance as a disciplinary mode of power, Michel Foucault argues that the main subject of a power relationship is possibilities of action by other people: "To govern, in this sense, is to structure the possible field of action of others" [25]

A concept of *power as governance* was introduced by Foucault in his last works and in particular in *The Subject and Power* [25] where he suggests that government is a designation of the way "in which the conduct of individuals or of groups might be directed". This can suggest various groups and topics for government e.g. the government of children, of souls, of communities, of families, of the sick." Foucault approaches the move from a variety of possibilities of action to one singular outcome as governance [21].

Activity is the major object of disciplinary regulation, when activity systems can be imposed and enforced from the top by institutions. At the same time, however, the notion of governance allows us to identify a field of opportunities where agency can flourish through new activity systems. Constructing activity systems can be approached as a "technique of power" [23].

One of the major advantages of Foucault's approach is that the power relationships are not fixed or stable, but ongoing through permanent change and struggle. As a part of the decentralized nature of power, Foucault denies the notion of power that comes from a particular center. According to Foucault, power is range of effects "that run through the social body as a whole". Power is inherited in and reproduced through every action [24].

Activity as a level of analysis allows the conceptualizing of the nature of this struggle, which takes place within activity systems as well as around the construction and introduction of new activity systems through new forms of activity mediation, and the definition of the boundaries of activity systems.

This notion allows crowdsourcing platforms to be approached as a field of struggle. As a technology that enables us to construct new activity systems, we may expect that institutional actors will try to use it as a new technique of power and disciplinary framework for activity, while the horizontal or bottom-up actors will try to use this opportunity to construct independent activity systems in order to allow what was conceptualized above as mass self-mobilization. This is why limiting crowdsourcing to a relationship between institutions and the crowd [9] can miss the analysis of the role of crowdsourcing in a reconsideration of power relationships, where the crowd participates not only in activity itself, but also in the definition of the activity framework.

From this perspective ICT, and in particular crowdsourcing, and the architecture of online platforms can be conceptualized as forms of "governance of crowds" that

through their structure suggest “the possible field of action of others.” Every platform may have embedded a different “possible field of actions.” The purpose of analysis in this case is to deconstruct the possible field of actions and the “possibilities of action of other people” that are embedded in a particular architecture and suggested to the crowd.

6 The Generativity of Activity and “Vertical crowdsourcing”

In order to explore the potential of crowdsourcing as a form of activity mediation to challenge the existent power structure, it is useful to apply the notion of generativity. Zittrain [63] defines generativity as “a system’s capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences.” Applying this notion to crowdsourcing allows us to ask to what extent crowdsourcing systems are capable of allowing activity that will produce unanticipated change. Consequently, we can formulate a number of potential paths for the impact of the agency on crowdsourcing as activity systems:

1. The system of activity and its boundaries are constructed by individual/ horizontal agents.
2. The system of activity has been changed from within in order to allow new forms of activity.
3. The boundaries of the system are flexible enough to allow various forms of activity, including unanticipated outcomes. The degree of flexibility of the activity system can also be conceptualized as the degree of generativity – the potential capacity of the system to produce unanticipated outcomes.

An example of an issue that can be examined in order to evaluate the degree of generativity of activity systems, and the power relationship within this, is the structure of categories in crowdsourcing platforms (e.g. Ushahidi). The structure of categories suggests a particular form of activity if this is a gathering of particular types of data or/and a facilitation of particular types of offline action. In this case the question is who defines the categories, to what extent they are flexible and diverse, and who is able to change these definitions.

In fact, the categories define the boundaries of the activity system. This can be conceptualized as the taxonomy of an activity system. But once the users are able to participate in the definition of categories, or once the creator of the platform is not an institutional actor, or the structure of categories is vague enough that the lack of clarity allows a diversity of activity forms, we can argue that crowdsourcing allows us to move from a taxonomy to a folksonomy of activity, where the structure of activity systems is defined by those who participate in these systems (by the community, in terms of Engeström’s model).

By contrast, we can introduce a model of “*vertical crowdsourcing*” where the structure of activity is defined by the institutional actor, without any space for the

influence of agency on the system's structure. In this case the purpose of the system, the boundaries, the structure of categories, the rules, the right to participate in community and the division of labor are dictated by the agent that created the platform. In many cases the major purpose of this type of activity system is not to produce the expected outcome, but primarily to control the activity of the crowd and neutralize the potential for independent forms of activity. This is also the situation where we can expect alienation between the community, the tools and the purpose of activity – as introduced by Marx.

Since CHAT links the structure of mediation to a particular cultural-historical environment, activity theory allows us to investigate the association between the role of ICTs in the mediation of activity and the socio-political/ cultural environment. Accordingly, it allows us to argue that the same type of technology can lead to the emergence of different forms of mediation in different socio-political environments. At the same time, however, while talking about the cultural-historical context, CHAT does not address specifically the political context of mediation. Therefore there is a space for addressing not only the cultural and historical dimension, but also the political contexts, in terms of the development of activity systems. This will allow us to focus, in the comparative analysis of crowdsourcing applications as activity systems, not only on the structure of these systems, but also on the identity of those who construct these systems and the dynamics of the power relationship around the development of a system.

7 Crowdsourcing-based Emergency Response as an Activity System

According to Leontiev, crisis can be approached as a change in the “comfort zone” of the surrounding environment that forces us to adapt to a new situation [41]. A disaster is a situation where, in order to respond, the development of new forms of activity is required. Thus emergency situations are a particularly suitable case for an analysis of the development of activity systems and an examination of the role of crowdsourcing platforms in the mediation of activity in particular and how ICTs can give a rise to new activity systems in general.

Emergency response is a system of activity where people (subjects) use tools towards objects (nature) in order to struggle against a disaster. A crisis response crowdsourcing platform cannot be analyzed by itself, but only in the context of an activity system that is mediated through the platform. While the crowdsourcing platform belongs to a tool that mediates response to disaster and negotiates the range of actions that can be applied to an object by the subject, one should question how this tool can be associated with rules (and norms), community and a division of labor that regulates the structure of collective action as part of the response.

In other words, we need to ask who the responders are (e.g. full-time workers or volunteers, professional or unskilled responders, local community or national/ global population), what functions they fulfill (e.g. mapping, coordination, humanitarian response, firefighting) and how these functions are divided between the members of

the community. Moreover the division of labour can take place between professional and unskilled responders (and then we can expect integration of organization-based and citizen-based resources into one activity system) or we might see that emergency response organizations and citizens fail to collaborate, and create separate activity systems and respond independently to the emergency. This separation should be reflected in the structure of crowdsourcing projects. Additionally, it is important to distinguish between two layers of activity: responding to the problem as a form of activity (e.g. providing food) and coordination of activity as a form of activity (e.g. allocation of resources between different needs).

Barton [3] suggests that, in a case of disaster, the everyday social system is replaced by an emergency social system. Relying on the notion of an activity system, one could suggest that we should focus on a shift between “everyday life activity system” and “emergency activity system”. The major question that should be asked is whether the emergency activity system introduces new types of norm, new forms of community or a different division of labor, and if the form of this change can be associated with the role of the system/ state. For instance, activity in everyday life can be more regulated, with a clear division of labor, while an activity system in response to emergency has a different structure of rules, communities and in particular division of labor.

To conclude, the analysis of crowdsourcing and how it mediates action can help to understand the entire activity system of disaster response, and conversely the nature of an activity system is embedded within the structure of a crowdsourcing platform.

8 Methods for Mapping Activity Systems

8.1 Online Mapping

The online mapping of activity systems is focused on an analysis of online platforms as mediating tools of activity systems. There are two layers of analysis of online platforms: content and structure. For instance, content analysis of the messages on a crowdsourcing platform can allow us to identify the major types of activity mediated through this platform [1]. The structural analysis focuses on the design and various properties of the platform, e.g. categories, protocols of mobilization of community, the criteria for joining and membership (open or closed), the structure of moderation and the criteria for activation/ mobilization of the community defined by the platform. The structure (e.g. division into teams) can also teach us about the division of labor.

An additional method is joining/observing the online teams of users of crowdsourcing systems and analyzing their activity by relying on virtual ethnography methods.

8.2 Offline Mapping

The purpose of offline mapping is to investigate the role of ICTs, and in particular crowdsourcing tools, as mediating artifacts for activity systems. The purpose in this case is to look at the offline dimension of activity and to see to what the contribution

of crowdsourcing platforms was and to what extent it was significant. This type of research can be conducted by relying on ethnographic observation (e.g. participatory observation through joining responders in emergency or coordination centers for emergency response) or interviews with developers of platforms, volunteers/crowdsourcing platform users and members of relevant organizations (e.g. emergency agencies in the case of analysis of emergency response).

9 Conclusion

This paper has suggested that cultural-historical activity theory and focusing on activity as the major level of analysis can significantly contribute to an analysis of crowdsourcing projects. The application of a framework is able to address a number of conceptual challenges that were identified by using other theories as part of the investigation of crowdsourcing. It has also been suggested that ICTs in general and crowdsourcing platforms in particular can be approached as tools that mediate activity and contribute to the construction of activity systems.

CHAT can assist us in conceptualizing the relationship between subject and object, as well as in analyzing power relationships around crowdsourcing platforms. It also enables us to investigate the association between crowdsourcing and the socio-political environment, which makes it possible to conduct a comparative analysis of a crowdsourcing project that addresses the same issues in different cultural and political systems.

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