Crowdsourcing Definitions and Its Features: An Academic Technical Report

Research Protocol

A systematic mapping is a process of identifying, categorizing, and analysing existing literatures that are relevant to a certain research topic. The result of a systematic mapping will provide a structured report based upon categorizations of the existing literatures, which is often able to illustrate a visual summary that portrays the mapping relationship between the literatures and the categories (Petersen et al. 2008). The mapping is obtained to identify the extent of the conducted studies, to address any proposed research questions as well as to generate more focus research questions.

To begin our systematic mapping, a set of systematic and structured protocols need to be established to ensure the validity and the value of the mapping result. In our study, we combined and adapted the protocol of those who are experts in this field, including Petersen et al. (2008), Kitchenham (2007), Bailey et al. (2007), and Mujtaba et al. (2008). The final product of the protocol will serve as a manual for conducting a competent mapping, where it will guide the entire research and draw the research boundaries. The mapping process is best described as illustrated in Figure 1 (Petersen et al. 2008).

For the purpose of this mapping study, we identify the papers in different disciplines which have clearly and explicitly defined crowdsourcing. As a main objective of the mapping, we are interested in knowing which features of the crowdsourcing, related to either the crowd or the crowdsourcer, have been mentioned in these definitions. We would also like to know things like the frequency of the features in various crowdsourcing definitions, the necessity or optionality of these features, and the correlation between these features and other attributes of the research including the time and the type of affiliation as well as the field of study.

In the following sub-sections, we will describe in details the steps for conducting our mapping study. The steps include the definition of the research questions, scope, and search criteria, and determining the selection criteria.

Definition of Scope

To frame the above research questions, we implemented the PICO (Population, Intervention, Comparison, Outcomes) criteria suggested by Petticrew and Roberts (2006). This will helps to outline the preliminary scope of the research questions in terms of the requirements that the researchers are willing to seek, and which are relevant to the evidence in the literature. This will provide the research initial boundaries, and therefore serve as an early focus to guide the course of the research.

– Population. Crowdsourcing is a relatively novel idea which was introduced in 2006. Therefore, we have put no time constraint on the selection of the papers we will study. Furthermore, we will not confine ourselves to a certain domain or domains of study, or types of study. As a result, the population consists of papers from computer science, business and management, law, and other domains of study in which crowdsourcing has been applied. Likewise, the population consists of empirical researches, preliminary studies, and proposed theories at various stages of maturity.

– Intervention. To provide an appropriate mapping, there are certain approaches that should be implemented. These include searching for literatures within the population, extracting information from collected papers, defining a set of classifications, creating the map, and analysing the results to answer the research questions.

– Comparison. Our systematic mapping study compares various dimensions of crowdsourcing. The dimensions include geographical distribution and time distributions, along with other dimensions. We have also chosen a wide range of dimensions based on the content of the papers, such as domains of study, form of study, and type of study.

– Outcomes. The collected papers must represent a wide coverage of studied areas in the field of crowdsourcing. This will ensure the validity and the objectivity of this systematic mapping study. We also chose to perform categorization of the existing studies in order to create the map. Finally, an analysis of the map will be done to draw perceptions about the field including the trends and areas which are still under-researched.

Definition of Search Criteria

In conducting our study, we imposed no time criteria on publication year of the papers in order to obtain papers related to crowdsourcing. Since crowdsourcing was introduced in 2006, our time period was naturally from 2006 until January 2014.

We conducted both automatic and manual searches for papers. We conducted the automatic search by relying on the popular search engines GoogleScholar, DBLP, ScienceDirect, ACM Digital Library, and IEEEXplore. GoogleScholar was particularly helpful because crowdsourcing is a multidisciplinary concept which can be found in a diversity of domains not necessarily indexed by other search engines. This includes studies in business, marketing, management, computing, and medicine. For studies which were found in the search and for which we could not retrieve the manuscript itself, we have tracked the venue in which the study was published and the official website of the authors trying to get it from there. In certain case, we had to write to the authors directly asking for the manuscript. In this step, we searched for terms like "crowdsourcing", "crowd-sourcing", "power of the crowd", and "wisdom of crowd".

We conducted the manual search in two phases. We conducted the first by tracking researchers who are well-known for their work in this area, hence finding papers with topics related to this research topic. This also helped us to identify further key researchers, research groups and events by identifying them in the papers which are both cited by, and also citing, the initial set of papers. The second part of our manual search was to target journals, conferences, symposiums, workshops, and academic technical papers related to crowdsourcing. In this regard, we reviewed papers from the following list of conferences and workshops (Table 1). Since crowdsourcing is a novel topic, we could not find conferences and workshops related to crowdsourcing which were older than 2009 though individual studies on the concept exist earlier than that date and were found using other forms of our search.

Table 1: List of conferences and workshops related to crowdsourcing, or accepting papers in crowdsourcing by year

2013	CHI 2013	Workshop in the ACM SIGCHI Conference on Human Factors in Computing Systems
	CrowdMM 2013	The 2nd International ACM Workshop on Crowdsourcing for Multimedia held in conjunction with ACM Multimedia 2013
	CrowdRec 2013	The first workshop on crowdsourcing and human computation for recommender systems, ACM Conference Series on Recommender Systems (ACM RECSYS)
	CrowdSem 2013	1st International Workshop on "Crowdsourcing the Semantic Web" in conjunction with the 12th International Semantic Web Conference (ISWC 2013)
	CrowdWork 2013	International Workshop on Crowd Work and Human Computation
	DBCrowd 2013	First VLDB Workshop on Databases and Crowdsourcing
	EC 2013	The 3rd Workshop on Social Computing and User Generated Content
	HCOMP 2013	The First AAAI Conference on Human Computation and Crowdsourcing
	ICWSM 2013 Workshop	Workshop on Social Computing for Workforce 2.0
	Machine Learning Meets Crowdsourcing (WCRWD)	ICML '13 Workshop in the 30th International Conference on Machine Learning
	NIPS 2013	Workshop on Crowdsourcing: Theory, Algorithms and Applications
	SoHuman 2	2nd International Workshop on Social Media for Crowdsourcing and Human Computation
	UbiComp 2013	ACM International Joint Conference on Pervasive and Ubiquitous Computing
2012	AAAI Spring Symposium 2012	Wisdom of the Crowd Workshop
	CHI 2012	Workshop in the ACM SIGCHI Conference on Human Factors in Computing Systems
	Collective Intelligence 2012	Workshop on Collective Intelligence
	CrowdMM 2012	International ACM Workshop on Crowdsourcing for Multimedia held in conjunction with ACM Multimedia 2012

	CrowdSearch 2012	First International Workshop on Crowdsourcing Web Search
	CrowdSens	1st International Workshop on Multimodal Crowd Sensing
	EC 2012	2st Workshop on Social Computing and User Generated Content
	HCOMP '12	4th Workshop on Human Computation
	NIPS 2012	Workshop on Human Computation for Science and Computational Sustainability
	SoHuman2012	1st International Workshop on Social Media for Human Computation
	Workshop on Machine Learning in Human Computation & Crowdsourcing	Workshop In Conjunction with ICML 2012
2011	CHI 2011	Workshop on Crowdsourcing and Human Computation
	EC 2011	1st Workshop on Social Computing and User Generated Content
	HCOMP '11	3rd Workshop on Human Computation
	NIPS 2011	Workshop on Computational Social Science and the Wisdom of Crowds
	SIGIR-CIR	2nd SIGIR Workshop on Crowdsourcing for Information Retrieval
	UbiCrowd '11	2nd International Workshop on Ubiquitous Crowdsourcing
	WSDM-CSDM 2011	WSDM Workshop on Crowdsourcing for Search and Data Mining (CSDM)
2010	CrowdConf	1st Annual Conference on the Future of Distributed Work
	CrowdNet	1st Workshop on Cloud Labor and Human Computation
	CSLDAMT '10	NAACL HLT 2010 Workshop on Creating Speech and Language Data with Amazon's Mechanical Turk.
	CVPRW 2010	IEEE Workshop on Computer Vision and Pattern Recognition
	HCOMP '10	ACM SIGKDD Workshop on Human Computation
	NIPS 2010	Workshop on Computational Social Science and the Wisdom of Crowds
	SIGIR-CSE	1st SIGIR Workshop on Crowdsourcing for Information Retrieval, CSE 2010
	UbiCrowd '10	1st International Workshop on Ubiquitous Crowdsourcing
2009	KDD-HCOMP	1st Human Computation Workshop

To increase the number of collected studies, we also considered a related search derived from the previously identified relevant papers. We realized that most published research would provide a background study as a comparison to the conducted study. Therefore, identifying those references was helpful to widen the search boundaries. This helped the identification of anomalous papers within conferences or workshops that were not directly related to this research topic.

For each of the papers which we collected, we conducted an initial filtering method to identify the relevance of the paper to this research topics ensuring that the paper was within the scope of this study. We started by reading the titles and the abstracts, and determined the relevant keywords. If there were some doubts about the relation between that and our topic or the content of the paper, an additional reading through the introduction and the key parts of the paper was required to clarify the relevance. This was to avoid word similarities where the content itself has a different scope than the topic of this research.

Definition of Selection Criteria

Selection criteria define the inclusion and exclusion standards when deciding whether an existing study should be included in the systematic mapping. A paper must meet the conditions defined in the inclusion criteria to be included in the study. The exclusion criteria disqualify papers from those that have already been included.

The inclusion and exclusion standards need to be defined in a clear and objective manner. An explicit set of these standards increase the possibility of producing reliable results and minimizing the possibilities of any harm to the subject. They also define the boundaries that enable other researchers to replicate the search by implementing the same set of standards. However, if the inclusion criteria are too general, they may allow poor quality studies to be included and hence compromise the quality of the final results. On the other hand, if the criteria are too

strict, there may be fewer studies included, which might not represent the entire area of study as expected. This is particularly harmful for a mapping study which should cover a discipline in a relatively broad way.

Our inclusion criteria allowed any piece of literature (e.g. books, papers, technical reports) that focused on crowdsourcing with a clear definition of the meaning of the concept. For example, we took a decision about that looking at, but not limited to, sentences starting with "crowdsourcing means," "crowdsourcing is defined," "crowdsourcing can be viewed," "crowdsourcing refers to" and alike. When there was more than one definition in a paper, we considered the more thorough one.

On the other hand, we excluded any study in which crowdsourcing was either not defined, or it was defined without mentioning any features related to the crowd or the crowdsourcer, in other words, where the definition of the concept was too generic to the point where it does not decide any specifics of the characterizing features. We also excluded studies which were either totally unavailable or the availability was only in the form of abstract, tutorials, posters or presentation material. Our reason for this second exclusion criterion is that in the absence of the full text we would not be able to perform a thorough and trustworthy review. Unaccredited literatures and duplicated studies were also removed from our study.

Conduct of the Study

After we completed our search and a number of literatures were collected, we initiated the main mapping study. We extracted several attributes characterizing the paper such as the year of publication, the venue in which the paper was published, the affiliation country and type of the authors as described in Section 3.5. Then we did the analysis on how the paper defined and perceived crowdsourcing. This was done in two steps. The first step was to find definitions for crowdsourcing by going through the paper in detail, and the second step was to perform a content analysis in the definitions in order to extract features from them.

The first step, definition finding, was performed as follows. We basically read the abstract part, the introduction part and the literature review part to see if we could find any definitions. Here, when we found definitions quoted from other papers, we went to the original paper, double checked the correctness of the quotation and adopted the original definition. However, we would continue reading the original paper to see if it came with its own definition. If no definition were found in the aforementioned parts, we would search the whole paper with the word "crowdsourcing" or "crowd-sourcing" to see if crowdsourcing was defined in any other part of the paper.

The second step, the feature extraction, was done after a definition was found in the paper. In this step, we performed a content analysis to see which features of the crowd and crowdsourcer were mentioned in the paper. To avoid confusion, we used a set of controlled vocabulary in order to ensure quality and coherency of the task. For example, words and expressions such as huge, big, large, and vast number were all extracted under the feature titled as "largeness."

While the initial number of papers we found in the area of crowdsourcing was 652, the results from the exclusion criteria reduced the number of relevant papers to 113. The classification process was applied to these papers as described in next section.

Feature Extraction for Crowdsourcing

As stated earlier, there is a relatively high number of definitions and perceptions of crowdsourcing in the literature. There are some general observations about the extracted definitions on crowdsourcing.

• The definitions were not notably domain-specific, i.e. they did not seem to be heavily influenced by the field in which the concept was studies and applied. This is an indicator of the uniqueness and the standalone nature of the concept.

• There is no consensus on the set of core features of crowdsourcing. This is an indicator that the concept is still in the exploration stage though it has got its unique nature as discussed in the previous point. . For instance, while some studies advocate that incentives should be present to the crowd (Bederson & Quinn 2011; Brabham 2008; Fraternali et al, 2012; etc.), others do not believe that providing incentives is a fundamental feature of crowdsourcing (Alonso & Lease 2011; Chanal & Caron-Fasan 2008; DiPalantino & Vojnovic 2009).

• Some of the definitions contradict with each other even for the conditions one should put on crowdsourcing platforms. For example, while some studies considered that crowdsourcing should be performed anonymously (Hirth et al, 2011), others claimed that crowdsourcing requires unanonymous task completion (Fraternali et al, 2012).

To clarify and concretely identify this divergence in the understanding of crowdsourcing, we have performed a feature extraction for crowdsourcing using the definition given in the selected papers. We remind here that our selection criteria allowed for including papers which clearly defined and clarified the meaning of crowdsourcing

A list of collected definitions for crowdsourcing can be found in our academic technical report, available in the link below. For each definition, we investigated the paper directly to extract the definition of crowdsourcing. Then, we have extracted the features which are present in the definition.

For feature extraction, we used the following signs:

- Features of the crowd are marked with a '+' sign.
- Features of the crowdsourcer are marked with a '*' sign.
- Features of the crowdsourced task are marked with a '#' sign.
- Facilities of the crowdsourcing platform are marked with a '=' sign.
- Reasons for crowdsourcing are marked with a '%' sign.

Also we used the following signs to show whether a feature is necessary or optional:

- Optional features are listed inside brackets.
- Necessary features are listed without any extra signs.

Table 2: List of crowdsourcing definitions and the extracted features

Document	Page	Definition	Features
Abraham, I., Alonso, O., Kandylas, V., Patel, R., Shelford, S., Slivkins, A., & Wu, H.	1	In this usage of crowdsourcing, a task or parts thereof are broadcast to multiple independent, relatively inexpensive workers, and their answers are aggregated.	+ Largeness * Financial Incentives = Provide Task Broadcast = Aggregate Results
Adepetu, A., Ahmed, K. A., Al Abd, Y., Al Zaabi, A., & Svetinovic, D.	3	Crowdsourcing is more than just creating a website where people just work. There must be a structure which guides the clients and the crowd in the desired directions, assists the clients in describing the challenges they want solved, and aids the crowd in executing tasks. It is also important that a crowdsourcing platform has a sufficient crowd, must be appealing to encourage participation, and must be relatively easy and feasible for the crowd to use.	+ Number Not Abundant # Problem Solving = Provide Assistance = Provide Attraction = Provide Ease of Use
Alonso, O.	7	A crowdsourcing marketplace is a human computation application that coordinates workers to perform tasks in exchange for rewards (usually money).	* Incentives Provision * [Financial Incentives] = Coordinate Crowd
Alonso, O., Rose, D. E., & Stewart, B.	10	Crowdsourcing is an open call to solve a problem or carry out a task and usually involves a monetary value in exchange for such service. Crowdsourcing has the "Web 2.0"-style attribute of increased interactive participation by large numbers of online users. But unlike user-generated content, social networks, and other popular trends, participants in a crowdsourcing ecosystem have little or no contact with each other. In particular, one worker cannot see the results of another's work.	+ Largeness + [Not Known to Each Other] * Open Call * [Financial Incentives] # [Problem Solving] = Online Environment = Provide Interaction = Hide Results from Others
Alonso, O., & Lease, M.	5	Crowdsourcing [is to] take a job traditionally performed by a known agent (often an employee), outsource it to an undefined, generally large group of people via an open call, new application of principles from open source movement.	+ Undefinedness + Largeness * Open Call # [Traditional Operation] # [In-house] # Outsourcing Task
Ambati, V., Vogel, S., & Carbonell, J. G.	80	Crowdsourcing has become popular in the recent years where one party can broadcast tasks on the internet to a large group of users that can compete and complete them for a micro-payment. Traditionally these tasks were performed by a resident employee or a contractor with a specific area of expertise. With crowdsourcing, such tasks are requested from an anonymous crowd, which is a mixture of experts and non-experts.	+ Largeness + [Competence] + Unknownness * Financial Incentives # [In-house] # [Outsourced] = Provide Task Broadcast = Online Environment
Araujo, R. M.	17	Crowdsourcing is an approach to solve problems by posing these problems to an open crowd, where a reward is offered for solutions meeting some quality	* Open Call * Incentives Provision

		threshold.	# Problem Solving = Provide Quality Threshold
Baba, Y., & Kashima, H.	554	Crowdsourcing is a type of online activity of outsourcing specific tasks to a large group of people.	+ Largeness #Outsourcing Task = Online Environment
Bederson, B. B., & Quinn, A. J.	98	Online labor is a practice in which requesters post tasks to a public web site where people do the tasks in exchange for money. Workers and requesters often remain anonymous. In addition to human computation and crowdsourcing, online labor has also been an enabling platform for experiments and practical application of collective intelligence and wisdom of crowds.	+ [Not known to Each Other] + [Not Known to Crowdsourcer] * Financial Incentives =Provide Task Broadcast = Online Environment
Bozzon, A., Brambilla, M., Ceri, S., & Mauri, A.	153	Crowdsourcing is an emerging way of involving humans in performing information seeking and computation tasks… Large crowds may take part to social computations for a variety of motivations, which include non-monetary ones, such as public recognition, fun, or the genuine wish of contributing their knowledge to a social process.	+ Largeness + Motivation + [Knowledge Sharing] * [Financial Incentives] * [Social Incentives] * [Entertainment Incentives]
Brabham, D. C.	1	Crowdsourcing is an online, distributed problem solving and production model already in use by for–profit organizations such as Threadless, iStockphoto, and InnoCentive. Speculation in Weblogs and wisdom of crowds theory assumes a diverse crowd engaged in crowdsourcing labor. Furthermore, and as crowdsourcing is in some ways similar to open source software production, prior research suggests that individuals in the crowd likely participate in crowdsourcing ventures to gain peer recognition and to develop creative skills.	+ Diversity + [Personal Skill Development] * [Social Incentives] # Problem Solving # Co-creation = Online Environment
Brabham, D. C.$_2$	79	Crowdsourcing is not merely a web 2.0 buzzword, but is instead a strategic model to attract an interested, motivated crowd of individuals capable of providing solutions superior in quality and quantity to those that even traditional forms of business can.	+ Motivation + Competence # Problem Solving = Online Environment = Provide Attraction = Provide Quality Threshold = Provide Quantity Threshold
Brito, J.	26	This is an example of what has become known as "crowdsourcing" or, in academic circles, "peer production." The idea is to allow a large group of persons to create, by making small individual contributions, a good that would traditionally have been produced by a single individual or an organization.	+ Largeness # Co-creation # Individual Contribution # [In-house] # [Outsourced]
Bry, F., Kneissl, F., Krefeld, T., Luecke, S., & Wieser, C.	2	Crowdsourcing denotes the participation of many humans on the Web to achieve a common goal.	+ Largeness = Online Environment
Buecheler, T., Sieg, J. H., Füchslin, R. M., & Pfeifer, R.	683	Crowdsourcing is an extreme case of dealing with the unknown, where emergence and the reactions to emerging behavior play an important role: The individuals of the "crowd" are a priori unknown and contingency plans for unexpected behavior of this interacting mass cannot be fully prepared beforehand.	+ Not Previously Known to Crowdsourcer + Largeness
Cavallo, R., & Jain, S.	34	Crowdsourcing is an increasingly popular model of procurement in today's online marketplaces. A principal seeks completion of a task, posts an open call for submissions, and allows multiple agents (workers) to simultaneously submit solutions, awarding a prize to the participant with the best solution.	* Open Call * Incentives Provision = Online Environment = Provide Task Broadcast = Provide Result Submission
Chanal, V., & Caron-Fasan, M. L.	5	In line with these approaches we will define "crowdsourcing" as: The opening of the innovation process of a firm to integrate numerous and disseminated outside competencies through web facilities.	+ Largeness + Expertise Diversity + Competence # Innovation = Online Environment
Chrons, O., & Sundell, S.	20	The concept of distributed work, in the context of very small microtasks, is relatively new. The rise of fast networks and cheap terminals created the opportunity to break down complex tasks and send them to a distributed workforce for processing. This was dubbed crowdsourcing by Jeff Howe.	+ Diversity # Micro Tasks # Complex Tasks = Provide Task Broadcast

Crescenzi, V., Merialdo, P., & Qiu, D.	8	Crowdsourcing platforms represent an intriguing opportunity to "scale-out" supervised wrapper inference approaches. These platforms support the assignment of mini-tasks to people recruited on the Web, and thus allow the engagement of a large number of workers to produce massive amounts of training data.	+ Largeness # Micro Tasks = Online Environment = Supervise Crowd = Provide Task Assignment
Dang, H., Nguyen, T., & To, H.	1	Crowdsourcing has emerged as an efficient framework to obtain tasks in a large scale. By utilizing a large contribution of the crowd, crowdsourcing enables the acquisition of needed services or products without any concerns on employees or suppliers.	+ Largeness # Co-creation
Das, R., & Vukovic, M.	1	A related enterprise is crowdsourcing, which aims to outsource tasks that are traditionally performed by designated human agents to an undefined large group of humans.	+ Undefinedness + Largeness # Outsourcing Tasks # Traditional Operation
Della Mea, V., Maddalena, E., & Mizzaro, S.	14	Crowdsourcing, i.e., the outsourcing of tasks typically performed by a few experts to a large crowd as an open call, has been shown to be reasonably effective in many cases.	+ Largeness * Open Call # Outsourcing Task # Traditional Operation
Difallah, D. E., Demartini, G., & Cudré-Mauroux, P.	1	Crowdsourcing is becoming a valuable method for companies and researchers to complete scores of micro-tasks by means of open calls on dedicated online platforms… Crowdsourcing is the process of indirectly employing anonymous people over the internet, often for a nominative amount of money, to complete concise tasks (called micro-tasks) that are typically too complex for today's computers but relatively simple for humans.	+ Not Known to Crowdsourcer * Open Call * [Financial Incentives] # Micro Tasks # Simple for Humans # Complex for Computers = Online Environment
DiPalantino, D., & Vojnovic, M.	119	Methods of soliciting solutions to tasks via open calls to large-scale communities have proliferated since the advent of the Internet; the term crowdsourcing was recently coined to refer to these approaches.	+ Largeness * Open Call # Problem Solving = Online Environment
Djelassi, S., & Decoopman, I.	683	A firm can mobilize a customer by engaging in crowdsourcing practices. The idea is to open up the company's processes and business model to "the crowd" through Web 2.0 applications with an aim to gain access to external resources (ideas, skills, knowledge, technologies, etc.). As a form of user-driven innovation and co-creation, crowdsourcing is not simply a marketing promotion tool but a process through which companies can apply individuals' open innovation to their innovation efforts, a form of "outside-in" collaboration in Chesbrough sense of the term.	+ Competence + Collaboration # User-driven # Innovation # Co-creation = Online Environment
Doan, A., Ramakrishnan, R., & Halevy, A. Y.	87	We say that a system is a CS system if it enlists a crowd of humans to help solve a problem defined by the system owners.	+ Largeness # Problem Solving = Provide Enrolment
Dontcheva, M., Gerber, E., & Lewis, S.	1	Crowdsourcing, or relying on a distributed network of individuals to reduce monetary and time costs, to complete a task is an emerging paradigm that is changing the way creative work is done.	+ Diversity % Reduce Monetary Costs % Reduce Time Costs
Dugan, C., & Geyer, W.	1	Crowds are a powerful entity and crowdsourcing is often described as a distributed problem-solving and production model.	+ Diversity # [Problem Solving] # [Co-creation]
Erickson, T.	1	By "crowdsourcing" I mean: Tapping the perceptual, cognitive or enactive abilities of many people to achieve a well-defined result such as solving a problem, classifying a data set, or producing a decision.	+ Competence + Largeness # [Problem Solving] # [Co-creation]
Estellés-Arolas, E., & González-Ladrón-de-Guevara, F.	197	Crowdsourcing is 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. The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate bringing their work, money, knowledge and/or experience, always entails mutual benefit. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to their advantage what the user has brought to the venture, whose form will depend on the type of activity undertaken.	+ Expertise Diversity + Diversity + Largeness + Volunteering + [Competence] + [Self-esteem] + [Personal Skills Development] * Open Call * Incentives Provision * [Financial Incentives] * [Social Incentives] # Complexity

			# Modularity = Online Environment
Faradani, S., Hartmann, B., & Ipeirotis, P. G.	26	A crowdsourcing market is the place, usually an online website, where workers find and perform tasks often for a financial reward.	* [Financial Incentives] = [Online Environment]
Foncubierta Rodríguez, A., & Müller, H.	9	Crowdsourcing has received much attention in many domains recently as volunteers perform so–called human intelligence tasks for often small amounts of money, allowing to reduce the cost of creating manually annotated data sets and ground truth in evaluation tasks.	+ Volunteering * [Financial Incentives] % Cost Reduction
Franklin, M. J., Kossmann, D., Kraska, T., Ramesh, S., & Xin, R.	62	Microtask crowdsourcing platforms such as Amazon's Mechanical Turk (AMT) provide the infrastructure, connectivity and payment mechanisms that enable hundreds of thousands of people to perform paid work on the Internet.	+ Largeness * Financial Incentives # Micro Tasks = Online Environment = Provide Payment Mechanism
Fraternali, P., Castelletti, A., Soncini-Sessa, R., Vaca Ruiz, C., & Rizzoli, A. E.	69	Crowdsourcing: this approach focuses on the distributed assignment of work to an open community of executors. A typical crowdsourcing application has a Web interface that can be used by two kinds of people: work providers can enter in the system the specification of a piece of work they need (e.g., collecting addresses of businesses, classifying products by category, georeferencing location names, etc); work performers can enrol, declare their skills, and take up and perform a piece of work. The application manages the work life cycle: performer assignment, time and price negotiation, result submission and verification, and payment.	+ Diversity + Competence * Open Call * Financial Incentives = Online Environment = Provide Task Broadcast = Provide Enrolment = Provide Skill Declaration = Provide Task Assignment = Provide Time Negotiation = Provide Price Negotiation = Provide Result Submission = Verify Results = Provide Payment Mechanism
Gao, H., Barbier, G., & Goolsby, R.	10	Crowdsourcing allows capable crowds to participate in various tasks, from simply "validating" a piece of information or photograph as worthwhile to complicated editing and management, such as those found in virtual communities that provide information—from Wikipedia to Digg. This is a form of collective wisdom information sharing that strongly leverages participatory social media services and tools.	+ Competence + Knowledge Sharing # [Simple Tasks] # [Complex Tasks]
Gao, Q., & Vogel, S.	30	Crowdsourcing is a way of getting random labor force on-line with low cost.	+ Undefinedness * Financial Incentives = Online Environment % Reduce Monetary Costs
Goncalves, J., Ferreira, D., Hosio, S., Liu, Y., Rogstadius, J., Kukka, H., & Kostakos, V.	753	Crowdsourcing has been adopted as an umbrella term to refer to the coordinated approach in which a computationally challenging task is broken down into several pieces. Those pieces are subsequently "solved" by humans (referred to as "workers") and the results are finally combined to construct an overall solution to the problem. People complete these for a number of reasons including payment, altruism or simply contribute without being aware (e.g. reCAPTCHA).	+ [Love of Community] * [Financial Incentives] * [Incentives provision] # Complex Tasks # Complex for Computers # Micro Tasks # Problem Solving = Coordinate Crowd = Aggregate Results
Grier D. A.	7	Crowdsourcing is generally understood to be a way of using the Internet to employ large numbers of dispersed workers.	+ Largeness + Spatial Diversity = Online Environment
Hansen, D. L., Schone, P. J., Corey, D., Reid, M., & Gehring, J.	650	Though exact definitions of crowdsourcing vary, they typically involve the completion of discrete tasks by voluntary contributors who have varying levels of expertise.	+ Volunteering + Expertise Diversity # Micro Tasks
Harris, C.	15	Crowdsourcing tools such as Amazon's Mechanical Turk (AMT) show considerable promise in having simple yet tedious tasks executed rapidly. These platforms provide a legion of available Internet workers to complete HITs (Human Intelligence Tasks) in exchange for micro-payments – precisely the type of activity that can help HR recruiters narrow a pile of resumes to only those of interest.	+ Largeness * Financial Incentives # Simple for Humans = Online Environment % Reduce Time Costs
Heer, J., & Bostock, M.	203	"Crowdsourcing" is a relatively new phenomenon in which web workers complete one or more small tasks, often for micro-payments on the order of	* [Financial Incentives] # Micro Tasks

		$0.01 to $0.10 per task.	= Online Environment
Heipke, C.	551	The term crowdsourcing is derived from outsourcing, where production is transferred to remote and potentially cheaper locations. Analogously, crowdsourcing describes the concept where potentially large user groups carry out work which is expensive and/or difficult to automate.	+ Spatial Diversity + Largeness * Financial Incentives # Difficult to Automate # Expensive to Automate % Reduce Monetary Costs
Heymann, P., & Garcia-Molina, H.	478	We define crowdsourcing to be getting one or more remote Internet users to perform work via a marketplace.	+ Spatial Diversity = Online Environment
Hirth, M., Hossfeld, T., & Tran-Gia, P.	2918	Crowdsourcing can be viewed as a further development of outsourcing... in the crowdsourcing approach, the worker chooses which tasks he wants to work for.	+ Volunteering # Outsourcing Task
Hirth, M., Hossfeld, T., & Tran-Gia, P.₂	322	In crowdsourcing, a task is not performed by a designated outsourcing company or worker, but it is accomplished by "the crowd". This means, that an employer using crowdsourcing does not choose who will work on the task, but he will hand over the task to the crowd and an anonymous worker will complete it. In order to mediate between the employer and the crowd, a crowdsourcing platform is needed, which offers an interface for the employer to submit his tasks and an interface for the crowd workers to submit the completed tasks. These platforms also provide a reward system which allows the employer to pay for the completed tasks.	+ Undefinedness + Not Known to Crowdsourcer * Financial Incentives # Outsourced = Provide Task Broadcast = Provide Result Submission = Provide Payment Mechanism
Ho, C. J., Jabbari, S., & Vaughan, J. W.	534	Crowdsourcing markets have gained popularity as a tool for inexpensively collecting data from diverse populations of workers.	+ Diversity * Financial Incentives % Reduce Monetary Costs
Ho, C. J., Slivkins, A., & Vaughan, J. W.	1	Crowdsourcing markets, such as Amazon Mechanical Turk and Microsoft's Universal Human Relevance System, are platforms designed to match available human workers with tasks to complete. Using these platforms, requesters may post tasks that they would like completed, along with the amount of money they are willing to pay. Workers then choose whether or not to accept the available tasks and complete the work.	+ Volunteering * Financial Incentives = Provide Task Assignment = Provide Task Broadcast = Provide Price Negotiation
Hossfeld, T., Hirth, M., & Tran-Gia, P.	142	Crowdsourcing means to outsource a job to a large, anonymous crowd of workers, the so-called human cloud, in the form of an open call.	+ Largeness + Unknownness * Open Call # Outsourcing Task
Howe J.	N/A	Crowdsourcing is the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the large network of potential laborers.	+ Undefinedness + Largeness + [Collaboration] * Open Call # Traditional Operation # [In-house] # Outsourcing Task # [Individual Contribution] # [Collaborative Contribution]
Hsieh, G.	1	Crowdsourcing marketplaces allow people to employ workers to work on tasks ranging in complexity, from labeling images to writing product descriptions. In exchange, the workers are compensated with monetary payments offered by the requesters.	* Financial Incentives # Complexity
Huberman, B. A., Romero, D. M., & Wu, F.	758	With the advent of the web and the ease with which one can migrate content to it, that pattern has reversed, leading to a situation whereby millions create content in the form of blogs, news, videos, music, and so on, and relatively few can attend to it all. This phenomenon, which goes under the name of crowdsourcing, is exemplified by websites such as Digg, Flickr, YouTube, and Wikipedia, where content creation without the traditional quality filters manages to produce sought out movies, news and even knowledge that rival the best encyclopaedias.	+ Largeness = Online Environment # Co-creation
Ipeirotis, P. G., Provost, F., & Wang, J.	64	Crowdsourcing services, such as Amazon Mechanical Turk, allow for easy distribution of small tasks to a large number of workers.	+ Diversity + Largeness # Micro Tasks
Jayakanthan, R., & Sundararajan, D.	25	The spread of the internet has given us opportunities to throw diverse problems at self organizing crowds of motivated and talented amateurs and gather the results with enormous efficiencies of scale and cost which help us do more with less. Crowdsourcing, as coined by Jeff Howe in his seminal 2006 Wired magazine article, has become a powerful and succinct framework for those who aim to harness the wisdom of the crowds to target problems in	+ Motivation + Competence * Financial Incentives = Online Environment = Provide Task Broadcast = Provide Result Submission

		multiple areas, which had hitherto been unexplored and untackled because of problems of obscurity and vastness.	% Cost Reduction
Karger, D. R., Oh, S., & Shah, D.	284	Crowdsourcing systems such as Amazon Mechanical Turk establish a market where a "taskmaster" can submit batches of small tasks to be completed for a small fee by any worker choosing to pick them up.	+ Volunteering * Financial Incentives # Micro Tasks = Provide Task Broadcast
Kaufmann, N., & Schulze, T.	1	Crowdsourcing, the outsourcing of a task to an undefined network of laborers using a type of "open call" can be used to recruit participants for these systems.	+ Undefinedness * Open Call # Outsourcing Task
Kazai, G.	165	Crowdsourcing is an open call for contributions from members of the crowd to solve a problem or carry out human intelligence tasks (HITs), often in exchange for micro-payments, social recognition or entertainment value.	* Open Call * [Financial Incentives] * [Social Incentives] * [Entertainment Incentives] # Problem Solving
Kern, R., Thies, H., Zirpins, C., & Satzger, G.	3	Crowdsourcing in the form of human-based electronic services (people services) provides a powerful way of outsourcing tasks to a large crowd of remote workers over the Internet.	+ Largeness + Spatial Diversity # Outsourcing Task = Online Environment
Kleemann, F., Voss, G. G., & Rieder, K.	6	Crowdsourcing, as argued in this article, takes place when a profit oriented firm outsources specific tasks essential for the making or sale of its product to the general public (the crowd) in the form of an open call over the internet, with the intention of animating individuals to make a contribution to the firm's production process for free or for significantly less than that contribution is worth to the firm.	* Open Call * [Financial Incentives] # Outsourcing Task # Co-creation # Individual Contribution = Online Environment % Reduce Monetary Costs
Korshunov, P., Cai, S., & Ebrahimi, T.	35	A possible solution is crowdsourcing, which is an increasingly popular approach for solving problems benefiting from large number of participants.	+ Largeness # Problem Solving
Larson, M., Cremonesi, P., Said, A., Tikk, D., Shi, Y., & Karatzoglou, A.	1	Crowdsourcing, i.e., micro-outsourcing tasks to a large number of general public users, represents a promising mechanism by which recommender systems can actively gather more information to improve recommendations.	+ Largeness # Outsourcing Task # Micro Tasks
Law, E.	3	Based on these definitions, crowdsourcing can be considered a method or tool that human computation systems can use to distribute tasks through an open call.	+ Diversity * Open Call # Provide Task Broadcast
Le, J., Edmonds, A., Hester, V., & Biewald, L.	17	Crowdsourcing is the use of large, distributed groups of people to complete microtasks or to generate information.	+ Largeness + Diversity # Micro Tasks
Lehman, J., & Miikkulainen, R.	2	Such human computation can often be made more scalable by employing crowdsourcing, whereby many small contributions from a diffuse group of people (often online) are aggregated.	+ Largeness + Diversity #Micro Tasks = [Online Environment] = Aggregate Results
Li, B., Appling, D. S., Lee-Urban, S., & Riedl, M. O.	125	Crowdsourcing is the outsourcing of complicated tasks—typically tasks that cannot be performed by artificial intelligence algorithms—to a large number of anonymous workers via Web services.	+ Largeness + Unknownness # Outsourcing Task # Complex Tasks # Complex for Computers = Online Environment
Li, H., Yu, B., & Zhou, D.	1	Crowdsourcing has recently emerged as a powerful alternative. It outsources tasks to a distributed group of people (usually called workers) who might be inexperienced on these tasks.	+ Diversity + [Competence] #Outsourcing Task
Ling, P., & Mian, Z.	1	A new innovation model for companies to overcome these problems lies on opening up their innovation activities to customers through Internet, called crowdsourcing. Because large groups of people are smarter than an elite few, no matter how brilliant, better at solving problems, fostering innovation, coming to wise decisions, even predicting the future.	+ Largeness # Innovation # Problem Solving = Online Environment
Liu E., & Porter T.	327	Crowdsourcing as practiced by many organizations, including some of the largest corporations in the world, leverages modern technology to cast a wide net in search of innovation. It is the outsourcing of a task or a job, such as a new approach to packaging that extends the life of a product, to a large group of potential innovators and inviting a solution. It is essentially open in nature and invites collaboration within a community.	+ Largeness + Collaboration * Open Call # Innovation # Outsourcing Task # Problem Solving

Lofi, C., Selke, J., & Balke, W. T.	109	In general, the term crowdsourcing may be attributed to any system or platform that explicitly or implicitly enlists a vast number of humans to collaboratively solve complex problems.	+ Largeness + Collaboration # Complex Tasks # Problem Solving = Provide Enrolment
Lukyanenko, R., & Parsons, J.	3	Crowdsourcing refers to the engagement of the general public in specific tasks defined by project owners or their clients… Crowdsourcing user-generated information promises to expand organizational "sensor" networks, making it possible to collect large amounts of data from highly diverse audiences.	+ Diversity # User-Driven
MacLean, D., Yoshida, K., Edwards, A., Crossman, L., Clavijo, B., Clark, M., … & Saunders, D. G.	2	Crowdsourcing is a form of massively parallel collaboration, the main distinguishing feature of which is the low overhead to entry of participation and low level of investment from a participant. The power is in the sheer number of people interested in seeing the goals of the project achieved.	+ Largeness + Collaboration + Motivation * Feedback to Crowd
Mahmood, A., Aref, W., Dragut, E., & Basalamah, S.	26	Crowdsourcing is the practice of solving large problems by dividing them into smaller tasks, each of which is then solved by humans from an online community.	# Problem Solving # Micro Tasks = Online Environment
Mahmoud, M. M., Baltrusaitis, T., & Robinson, P.	15	Crowdsourcing has emerged as a technique that makes use of the wisdom of the crowd to help solve problems by outsourcing tasks to a distributed group of people.	+ Diversity # Problem Solving # Outsourcing Task
Mao, K., Yang, Y., Li, M., & Harman, M.	1205	Crowdsourcing is an emerging paradigm for accomplishing traditional tasks. It is used to outsource software development through an open call format.	* Open Call # Outsourcing Task # Traditional Operation
Mason, W., & Watts, D. J.	100	One important sub-class of peer production is a phenomenon known as "crowd-sourcing" in which potentially large jobs are broken into many small tasks that are then outsourced directly to individual workers via public solicitation. Workers sometimes work for free, motivated either out of intrinsic enjoyment or some form of social reward.	+ Largeness * Open Call * [Financial Incentives] * [Entertainment Incentives] * [Social Incentives] # Micro Tasks # Outsourcing Task
Mazzola, D., & Distefano, A.	3	For our purpose the term "CS" will be taken to mean an intentional mobilization, through web 2.0, of creative and innovative ideas or stimuli, to solve a problem, where voluntary users are included by a firm within the internal problem solving process, not necessarily aimed to increase profit or to create product or market innovations, but in generally to solve a specific problem.	+ Volunteering # Innovation # Problem Solving # Co-creation = Online Environment
Mellebeek, B., Benavent, F., Grivolla, J., Codina, J., Costa-Jussa, M. R., & Banchs, R.	114	Crowdsourcing enables requesters to tap from a global pool of non-experts to obtain rapid and affordable answers to simple Human Intelligence Tasks (HITs), which can be subsequently used to train data-driven applications.	+ Spatial Diversity + [Competence] * Financial Incentives # Simple for Humans # Simple Tasks % Reduce Time Costs % Reduce Monetary Costs
Morris, R.	1	Crowdsourcing, a field that aims to cultivate and coordinate the collective efforts and wisdom of large groups of people, is also vastly multidisciplinary.	+ Largeness = Coordinate Crowd
Mortensen, J. M., Musen, M. A., & Noy, N. F.	1	A recent development, microtask crowdsourcing, allows one to break down complex tasks into simple, short tasks for humans to complete. Workers, usually in an online marketplace, complete these tasks for a small fee.	* Financial Incentives # Micro Tasks # Complex Tasks # Simple for Humans = [Online Environment]
O'Neill, J., Roy, S., Grasso, A., & Martin, D.	197	Crowdsourcing – basically where task outsourcing is delegated to a largely unknown Internet audience – is emerging as a major example of such collaboration. Crowdsourcing is the act of taking a task traditionally performed by an employee or contractor, and outsourcing it to an undefined, generally large group of anonymous people, in the form of an open call.	+ Largeness + Unknownness + Collaboration + Undefinedness * Open Call # Outsourcing Task # [In-house] # [Outsourced] = Online Environment
Oleson, D.,	43	Crowdsourcing has become a global phenomenon with a low barrier to entry.	+ Largeness

Author	Count	Definition	Codes
Sorokin, A., Laughlin, G. P., Hester, V., Le, J., & Biewald, L.		Millions of people around the world now participate in a digital and virtual workplace. The crowdsourcing ecosystem is one in which work is being redefined as an online meritocracy in which skilled work is rewarded in real time and job training is imparted immediately via feedback loops.	+ Spatial Diversity + Competence * Incentives Provision = Online Environment = Provide Feedback Loops
Osorno-Gutierrez, F., Paton, N. W., & Fernandes, A. A.	32	Crowdsourcing has recently emerged as a way of tapping into human expertise through the web.	+ Competence = Online Environment
Poetz, M. K., & Schreier, M.	246	Analogous to open-source software, the underlying idea is to outsource the phase of idea generation to a potentially large and unknown population, referred to as the "crowd," in the form of an open call. Such initiatives have consequently become known as "crowdsourcing" … crowdsourcing relies on a self-selection process among users willing and able to respond to widely broadcast idea generation competitions.	+ Largeness + Unknownness + Volunteering + Motivation + Competence + Diversity * Open Call # Outsourcing Task # Innovation = Provide Task Broadcast
Porta, M., House, B., Buckley, L., & Blitz, A.	14	A second way emerging technologies enable new value through customer intimacy is via ''crowdsourcing'' and ''crowdsupport.'' These terms refer to enlisting customers to directly help an enterprise in every aspect of the lifecycle of a product or service… A large enterprise can enlist its group of highly dedicated users to help improve the overall quality of its products and services for all; often these users will do this for free.	+ Motivation * [Financial Incentives] * [Open Call] = Provide Enrolment
Pujara, J., London, B., & Getoor, L.	2	Another recent innovation is crowdsourcing, which brings the labeling task to a broader community of willing, motivated participants. This is often accomplished by rewarding volunteers for their service, either monetarily or by designing a game around the task at hand.	+ Diversity + Volunteering + Motivated * [Financial Incentives] * [Entertainment Incentives]
Ranade, G., & Varshney, L. R.	150	A notable example of decentralized organization is crowdsourcing. Crowd-power has been harnessed to design everything from t-shirts to software to artificial intelligence algorithms by soliciting contributions via open calls. The ability to reach a large crowd of skilled workers quickly and inexpensively gives firms an alternative means for accomplishing tasks.	+ Largeness + Competence * Open Call * Financial Incentives # Co-creation % Reduce Time Costs % Reduce Monetary Costs
Redi, J. A., Hossfeld, T., Korshunov, P., Mazza, F., Povoa, I., & Keimel, C.	29	Crowdsourcing (CS) is a powerful tool for gathering subjective ground truth for large multimedia collections. Big amounts of users (microworkers) can be reached to accomplish a set of small tasks in exchange for a symbolic payment, which is particularly convenient when large user studies have to be conducted.	+ Largeness * Financial Incentives # Micro Tasks
Ribiere, V. M., & Tuggle, F. D. D.	96	Crowdsourcing consists of making an open online call for a creative idea, or problem solving, or evaluation (Bonabeau, 2009), or any other type of business issues, and to let anyone (in the crowd) submit solutions. The winning idea will often be rewarded. The collective intelligence (wisdom) and the background diversity of the crowd will often offer companies very creative and innovative ideas for a relatively low cost.	+ Diversity * Open Call * [Incentives Provision] * [Financial Incentives] # Innovation # Problem Solving = Online Environment = Provide Result Submission % Reduce Monetary Costs
Ross, J., Irani, L., Silberman, M., Zaldivar, A., & Tomlinson, B.	2864	Amazon Mechanical Turk (MTurk) is an online crowdsourcing system that allows users to distribute work to a large number of workers. This work is broken down into simple, one-time tasks that workers are paid to complete.	+ Largeness * Financial Incentives # Micro Tasks # Simple Tasks # Simple for Humans = Online Environment = Provide Task Broadcast
Saunders, D. R., Bex, P. J., & Woods, R. L.	16	Crowdsourcing, first named by Howe, refers to the practice of advertising small self-contained tasks on the Web, usually to be worked on via the Internet, such as within a Web browser. Workers are typically compensated on the basis of the work they complete, rather than by a contract for a fixed amount of work. For the employer, the absence of the traditional relationship with employees, in many cases not knowing their identities or qualifications, is balanced by the	+ [Not Known to Crowdsourcer] + [Competence] * Financial Incentives # Micro Tasks # In-house

		speed and cheapness with which a large number of tasks can be completed.	= Online Environment = Provide Task Broadcast % Reduce Time Costs % Reduce Monetary Costs
Schenk, E., & Guittard, C.	5	Crowdsourcing is a form of outsourcing not directed to other companies but to the crowd by means of an open tender (open call) via an Internet platform. It is important to emphasize that the call should not be limited to experts or preselected candidates.	+ [Competence] + Undefinedness * Open Call # Outsourcing Task # Outsourced = Online Environment
Schmidt, L.	1	Crowdsourcing seemingly offers viable solutions for human subjects researchers. It provides access to a huge population of people who are interested in participating in web-based or mobilebased tasks at their own convenience in exchange for money.	+ Largeness + Motivation * Financial Incentives # Problem Solving = [Online Environment]
Seltzer, E., & Mahmoudi, D.	7	Crowdsourcing, or the issuance of a challenge to a group of experts and nonexperts found outside the organization, using an Internet-based platform.	+ [Competence] # Outsourcing = Online Environment
Singer, Y., & Mittal, M.	1157	The advancement of the internet in the past decade created a platform for a new form of labor markets known as crowdsourcing markets where cognitive work can be distributed to hundreds of thousands of geographically disparate workers.	+ Largeness + Spatial Diversity = Online Environment = Provide Task Broadcast
Sloane, P.	3	Crowdsourcing is one particular manifestation of OI. It is the act of outsourcing a task to a large group of people outside your organization, often by making a public call for response.	+ Largeness * [Open Call] # Outsourcing Task
Stewart, O., Lubensky, D., & Huerta, J. M.	30	Crowdsourcing is generally described as a web-based activity that harnesses the creative contributions of a diverse large network of individuals (the crowd) through an open call requesting for their participation and contributions.	+ Diversity + Largeness * Open Call # Individual Contribution = Online Environment
Stolee, K. T., & Elbaum, S.	1	The basic idea behind crowdsourcing is to allow a client to leverage a global community of users with different talents and backgrounds to help perform a task (e.g., solve a problem, classify data, refine a product, gather feedback) that would not be feasible without a mass of people behind it.	+ Spatial Diversity + Expertise Diversity + Largeness # [Problem Solving] # [Co-creation]
Tarasov, A., Delany, S. J., & Mac Namee, B.	1	Crowdsourcing, a type of participative activity where a task is proposed to a group of individuals, is widely used to collect ratings for data to be used in supervised machine learning.	+ Largeness = Provide Task Broadcast
Tidball, B., & Stappers, P.	1	Crowdsourcing is widely viewed as an online production model capable of completing work and developing solutions.	# Co-creation # Problem Solving = Online Environment
Treiber, M., Schall, D., Dustdar, S., & Scherling, C.	1	Crowdsourcing has emerged as an important paradigm in human problem solving techniques on the Web. More often than noticed, software services outsource tasks to humans which are difficult to implement in source code.	# Problem Solving # Outsourcing Task # Complex for Computers = Online Environment
Venetis, P., Garcia-Molina, H., Huang, K., & Polyzotis, N.	989	Thus, there has been a lot of recent interest in crowdsourcing, where humans perform tasks for pay or for fun.	* [Financial Incentives] * [Entertainment Incentives]
Vukovic, M.	686	Crowdsourcing is emerging as the new on-line distributed problem solving and production model in which networked people collaborate to complete a task… Crowdsourcing Platform is a trusted broker ensuring that providers successfully complete the task requests and that requestors pay for the charges. Crowdsourcing Platform issues authentication credentials for requestors and providers when they join the platform, stores details about skill-set, history of completed requests, handles charging and payments, and manages platform misuse. Crowdsourcing platform can execute crowdsourcing requests in a number of different modes, by advertising them on the marketplace, allowing providers to bid for them, or in the form of a competition, where requestor identifies criteria to be used for selection of the winning submission.	+ Diversity + Collaboration + Competence * Financial Incentives * [Open Call] # Problem Solving # Co-creation = Online Environment = Provide Result Verification = Provide Payment Mechanism = Provide Authentication

			= Provide Enrolment = Provide Skill Declaration = Store History of Completed Tasks = Manage Platform Misuse = Provide Task Broadcast
Vukovic, M., Lopez, M., & Laredo, J.	2	Crowdsourcing has emerged as the new on-line distributed production model in which people collaborate and may be awarded to complete a task.	+ Diversity + Collaboration * [Incentives Provision] = Online Environment
Welinder, P., & Perona, P.	25	Crowdsourcing, the act of outsourcing work to a large crowd of workers, is rapidly changing the way datasets are created.	+ Largeness # Outsourcing Task
Wexler, M. N.	11	Crowdsourcing can be understood as a focal entity's use of an enthusiastic crowd or loosely bound public to provide solutions to problems.	+ Motivation + [Not Known to Each Other] # Problem Solving
Whiting, S., Perez, J. R., Zuccon, G., Leelanupab, T., & Jose, J. M.	1	Crowdsourcing is a broad term used to describe any technique of obtaining data from multiple people on a large-scale.	+ Largeness
Whitla, P.	15	Crowdsourcing is a newly developed term which refers to the process of outsourcing of activities by a firm to an online community or crowd in the form of an 'open call'. Any member of the crowd can then complete an assigned task and be paid for their efforts.	* Open Call * Financial Incentives # Outsourcing Task = Online Environment = Provide Task Assignment
Wiggins, A., & Crowston, K.	1	Crowdsourcing is an ill-defined but common term referring to a set of distributed production models that make an open call for contributions from a large, undefined network of people.	+ Largeness + Undefinedness * Open Call # Co-creation
Wu, W., Tsai, W. T., & Li, W.	58	Crowdsourcing has captured the attention of the world recently. Numerous tasks or designs conventionally carried out by professionals are now being crowdsourced to the general public who may not know each other to perform in a collaborative manner… The proliferation of crowdsourcing practices indicates a new peer-production paradigm, where large numbers of regular end-users are empowered as co-creators or co-designers, and their creative energy is coordinated to participant in large projects without a traditional organisation.	+ [Not Known to Each Other] + Collaboration + Largeness # Co-creation # Traditional Operation = Coordinate Crowd
Yang, J., Adamic, L. A., & Ackerman, M. S.	246	Crowdsourcing, or the use of an Internet-scale community to outsource a task, has garnered considerable interest in the popular press.	# Outsourcing Task = Online Environment
Yi, J., Jin, R., Jain, A. K., & Jain, S.	47	Crowdsourcing utilizes human ability by distributing tasks to a large number of workers.	+ Competence + Largeness = Provide Task Broadcast
Yu, B., Willis, M., Sun, P., & Wang, J.	2	Crowdsourcing, with its low cost of recruiting participants and almost immediate access to a large number of Internet users, provides an attractive option for participatory design and evaluation of medical pictograms.	+ Largeness * Financial Incentives = Online Environment % Reduce Monetary Costs
Zhang, Y., & van der Schaar, M.	2140	Soliciting solutions to various tasks using online labor markets has become increasingly popular in recent years. The term "crowdsourcing", a form of "peer production" that outsources works to a large group of people, was recently coined to refer to such approaches. Numerous crowdsourcing websites, such as Yelp, Yahoo! Answers and Amazon Mechanical Turk, can be viewed as systems where small tasks (typically on the order of minutes or seconds) and performed in exchange for rewards awarded to the users who performed them.	+ Largeness * Incentives Provision # Problem Solving # Outsourcing Task # Micro Tasks = Online Environment
Zhao, Y., & Zhu, Q.	1	Crowdsourcing seeks to mobilize competence and expertise, which are distributed among the crowd, and has different forms… A typical process of crowdsourcing works in the following way. An organization identifies tasks and releases them online to a crowd of outsiders who are interested in performing these tasks on the organization's behalf, for a stipulated fee or any other incentives. A vast number of individuals then offer to undertake the tasks individually or in a collaborative way. Upon completion, the individuals	+ Competence + Expertise Diversity + Largeness + [Collaboration] + Motivation * [Financial Incentives] * Incentives Provision

involved submit their work to the crowdsourcing platform, and the organization then assesses the quality of the work.	# Outsourcing Task # [Individual Contribution] # [Collaborative Contribution] = Online Environment = Provide Task Broadcast = Provide Result Submission = Provide Result Verification = Provide Quality Threshold

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