

Document downloaded from:

<http://hdl.handle.net/10251/56904>

This paper must be cited as:

Estelles Arolas, E.; González-Ladrón-De-Guevara, F. (2012). Towards an integrated crowdsourcing definition. *Journal of Information Science*. 32(2):189-200.  
doi:10.1177/0165551512437638.



The final publication is available at

<http://dx.doi.org/10.1177/0165551512437638>

Copyright SAGE Publications (UK and US)

Additional Information

# Towards an integrating crowdsourcing definition

*Journal of Information Science*  
XX (X) pp. 1-16  
© The Author(s) 2011  
Reprints and Permissions:  
[sagepub.co.uk/journalsPermissions.nav](http://sagepub.co.uk/journalsPermissions.nav)  
DOI: 10.1177/016555150000000  
[jis.sagepub.com](http://jis.sagepub.com)



**Enrique Estellés Arolas**

Department of Management, Technical University of Valencia, Valencia, Spain

**Fernando González Ladrón-de-Guevara**

Department of Management, Technical University of Valencia, Valencia, Spain

## Abstract

“Crowdsourcing” is a relatively recent concept that encompasses many practices. This diversity contributes to the fact that its limits are blurred, and it is usually identified with any type of Internet-based collaborative activity, such as co-creation or user-innovation. Varying definitions of crowdsourcing exist and therefore, some authors present certain specific examples of crowdsourcing as paradigmatic, while others present the same examples as the opposite. In this paper, existing definitions of crowdsourcing are revised to extract common elements and to establish the basic characteristics of any crowdsourcing initiative. Based on these existing definitions, an exhaustive and consistent definition for crowdsourcing is presented and contrasted in ten cases.

## Keywords

Crowdsourcing; definition; innovation

## 1. Introduction

As indicated by Jeff Howe [1], the word crowdsourcing is used for a wide group of activities that take on different forms [2, 3]. The adaptability of crowdsourcing allows it to be an effective and powerful practice, but makes it difficult to define and categorize. Besides this, no theoretical knowledge base from which one could glean support and information about crowdsourcing exists [4]. Nor is there an agreed definition; instead there are a variety of definitions, which look at crowdsourcing from differing points of view including problem resolution [5, 6] or innovation applied to business process improvement [7, 8].

Depending upon the perspective and the definition used, certain initiatives classified by some authors as crowdsourcing, are not classified as such by others. For example, Buecheler et al. [9] consider Wikipedia to be an example of crowdsourcing, as Huberman et al. [10] do of YouTube, while Kleeman et al. [11] declare the opposite in both cases. The abundance of definitions also means that crowdsourcing cannot be coherently classified, as occurs in Andriole [12], where crowdsourcing is identified with other web 2.0 technologies.

In the search for a common definition, an etymological analysis does not prove to be useful. The name crowdsourcing is formed from two words, crowd, making reference to the people who participate in the initiatives, and the word sourcing, which refers to a number of procurement practices aimed at finding, evaluating, and engaging suppliers of goods and services. Following this approach, authors such as Jeff Howe affirm that crowdsourcing “is a business practice that

### Corresponding author:

Enrique Estellés Arolas.  
Technical University of Valencia. Camino de Vera S/N, 46022  
[kikeestelles@gmail.com](mailto:kikeestelles@gmail.com)

means literally to outsource an activity to the crowd” [13]. However, to adopt the etymological significance as a definition is too discriminatory [1].

The objective of this article is to form an exhaustive and global definition to describe any given crowdsourcing activity. In order to obtain this definition, existing definitions in the literature will be analyzed.

Furthermore, the elements required to obtain a clear idea of the minimum conditions that need to be completed by a crowdsourcing initiative are identified. This definition also allow us to:

1. Distinguish those activities that can be considered crowdsourcing.
2. Formalize an incipient theoretical base for crowdsourcing [4].

## 2. Methodology

The methodology used to obtain a global definition for crowdsourcing follows three stages: the search for documentation on crowdsourcing via a systematic review of the literature with its corresponding filter, the creation of an exhaustive definition based on commonly detected elements, and the testing of its validity.

### 2.1. Search for information and filtering of documents

A systematic review of the literature is undertaken, following the Delgado approach [14] based on Petitti and Egger et al. [15,16]. After selecting four databases and establishing concrete search criteria, documents are searched for to form an initial repository. The repository is expanded to include those documents referenced in the most prolific author’s articles and those documents that reference the most cited author.

For the filtering of the documents, only those with an original definition for crowdsourcing are selected.

### 2.2. Preparation

To create a cohesive definition, Tatarkiewicz’s approach is followed [17]. Tatarkiewicz was a Polish philosopher and historian of art and philosophy who developed a global definition of the concept “art” from definitions created by other authors. After collecting all definitions, Tatarkiewicz set aside all of them that were centered on particular manifestations of art. The reason was that these could not be a total reconstruction of the concept, taking into account only certain features while ignoring the rest. Next, a definition that encompasses all the other definitions was obtained through the union of sentences referring to the intention and effect of the art.

Also taken into account was the work of Cosma and Joy [18] that utilizes a survey to achieve a definition of “source-code plagiarism” by extracting elements that can be later combined to form a definition.

In this paper, from the original definitions of crowdsourcing, the elements designated by Tatarkiewicz as *differentia specifica* are obtained. These include elements whose characteristics differentiate crowdsourcing from other collaborative activities based on ICT.

### 2.3. Integrating crowdsourcing definition

The elements designated as *differentia specifica* are transformed from the authors’ points of view into a conceptual perspective. In this way, the final components of the definition are obtained [16] and the integrating definition is stated.

2.4. Verification

To check the validity of the definition, the approaches of Vukovic [19] and Aliakbarian et al. [20] will be followed. In Aliakbarian et al. [20], to verify the definition proposed for “P2P network”, the definition is applied to five cases checking if all the elements of the definition are satisfied. In Vukovic [19], the requirements for the development of a general-purpose crowdsourcing service in the Cloud are analyzed. Then, a taxonomy is proposed for the categorization of crowdsourcing platforms through the evaluation of cases against the set of identified features.

In this paper, the formulated definition is applied to ten Internet initiatives (some considered crowdsourcing, others not) to see if the definition discriminates correctly, taking into account in each case the presence of the distinctive characteristics.

3. Results

In this section, the results obtained over the previous stages are described: the information sources consulted, document filter criteria, identified elements and characteristics, formulated definition, and formulated definition verification.

3.1. Information search and filtering of documents

For the information search, five databases are consulted: ACM, IEEE, ScienceDirect, SAGE, and SpringerLink using search criteria with “crowdsourcing” as one of the keywords. Of these, SpringerLink is set aside because it was not possible to search solely via keyword. The first search resulted in 132 documents (Table 1).

Table 1. Consulted databases.

Document type	ACM	IEEE	ScienceDirect	SAGE	Total
Conference paper	81	30	0	0	111
Journal paper	0	6	8	7	21
TOTAL	81	36	8	7	132

To complete this document repository, all of those documents that made reference to the most cited document [8] are searched, as are all the references of the most prolific author, Maja Vukovic. Of these, those with the word “crowdsourcing” in the title are added to the document repository, with 30 from the first group and 13 from the second. Using this approach, 43 new documents are added to make a final document repository of 175 documents. A summary of these documents can be seen in Table 2.

Table 2. Summary of documents found.

Document type	Search #1	Search #2	Total
Conference paper	111	16	127
Journal paper	21	13	34
Workshop	0	3	3

Book	0	1	1
Technical report	0	4	4
Working paper series	0	4	4
Book chapter	0	1	1
Book	0	1	1
TOTAL	132	43	175

From these 175 documents, 36 original definitions of crowdsourcing were found, which appear in Table 3. The most frequently cited definitions are the ones proposed by Howe [1], Brabham [21], and Wikipedia [22].

**Table 3. Collected definitions of crowdsourcing. Source: author**

Document	Page	Definition: Crowdsourcing is...
Alonso and Lease [23]	1	... the outsourcing of tasks to a large group of people instead of assigning such tasks to an in-house employee or contractor.
Bederson and Quinn [24]	1	... people being paid to do web-based tasks posted by requestors.
Brabham [6]	75	... an online, distributed problem solving and production model already in use by for profit organizations such as Threadless, iStock...
Brabham [8]	79	... 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.
Buecheler et al. [9]	1	... a special case of such collective intelligence.
Burger-Helmchen and Penin [7]	2	... one way for a firm to access external knowledge.
Chanal and Caron-Fasan [25]	5	... the opening of the innovation process of a firm to integrate numerous and disseminated outside competencies through web facilities. These competences can be those of individuals (for example creative people, scientists, engineers...) or existing organized communities (for example OSS communities).
DiPalantino and Vojnovic [26]	1	... [a set of] methods of soliciting solutions to tasks via open calls to large-scale communities.
Doan et al. [5]	2	... a general-purpose problem-solving method.
Grier [27]	1	... a way of using the Internet to employ large numbers of dispersed workers.  ... an industry that's attempting to use human beings and machines in large production systems.
Heer and Bostok [28]	1	... a relatively new phenomenon in which web workers complete one or more small tasks, often for micro-payments on the order of \$0.01 to \$0.10 per task.
Heymann and	1	...getting one or more remote Internet users to perform work via a

Garcia-Molina [29]		marketplace.
Howe [30]	-	...a web based business pattern, which make best use of the individuals on the internet, through open call, and finally get innovative solutions.
Howe [13]	-	... the application of Open Source principles to fields outside of software.
	-	... the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and general large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaborative), but is also often undertaken by sole individual. The crucial prerequisite is the: use of an open call format, and the wide network of potential laborers.
		... a business practice that means literally to outsource an activity to the crowd.
Howe [1]	-	... 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.
	-	... just a rubric for a wide range of activities.
	-	... the mechanism by which talent and knowledge is matched to those of need it.
Kazai [31]	-	... an open call for contributions from members of the crowd to solve a problem or carry out human intelligence tasks, often in exchange for micro-payments, social recognition, or entertainment value.
Kleeman et al. [11]	22	... a form of the integration of users or consumers in internal processes of value creation. The essence of crowdsourcing is the intentional mobilization for commercial exploitation of creative ideas and other forms of work performed by consumer.
	5	... outsourcing of tasks to the general internet public.
	6	... a profit oriented form 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 firms production process for free or significantly less than that contribution is worth to the firm.
La Vecchia and Cisternino [32]	425	... a tool for addressing problems in organizations and business.
Ling [33]	1	... a new innovation business model through internet.
Mazzola and Distefano [34]	3	... 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.

Oliveira et al. [35]	413	... a way of outsourcing to the crowd tasks of intellectual assets creation, often collaboratively, with the aim of having easier access to a wide variety of skills and experience.
Poetz and Schreier [36]	4	... outsource the phase of idea generation to a potentially large and unknown population in the form of an open call.
Reichwald and Piller [37]	58	... interactive value creation: in terms of isolated activity of individual as directed toward one unit of the product, involving a cooperation between firm and users in the development of a new product.
Vukovic [19]	1	... new on-line distributed problem solving and production model in which networked people collaborate to complete a task.
Vukovic et al. [38]	539	... a new online distributed production model in which people collaborate and may be awarded to complete task.
Wexler [39]	11	... focal entity's use of an enthusiastic crowd or loosely bound public to provide solutions to problems.
Whitla [40].	15	... a process of outsourcing of activities by a firm to an online community or crowd in the form of an "open call".
	16	... a process of organising labour, where firms parcel out work to some form of (normally online) community, offering payment for anyone within the 'crowd' who completes the tasks the firm has set.
Yang et al. [41]		... the use of an Internet-scale community to outsource a task.

These 36 definitions come from 28 distinct articles published between 2006 and 2011 (2006, 2; 2008, 6; 2009, 4; 2010, 8; 2011, 8). The authors with multiple definitions of the term are Howe, Brabham, Kleeman et al., Grier, Vukovic, and Whitla.

### 3.2. Preparation

From the textual analysis of these definitions and the revision of the literature [1,7,42], three elements are identified (Crowd, 1; Initiator, 2; Process, 3). From which, eight characteristics are extracted constituting the *differentia specifica* [17].

About the crowd:

1. Who forms it. (a)
2. What they have to do. (b)
3. What they get in return. (c)

About the initiator:

1. Who it is. (d)
2. What they get in return for the work of the crowd. (e)

About the process:

1. The type of process it is. (f)
2. The type of call used. (g)
3. The medium used. (h)

The results obtained for each characteristic are described below, as well as the partial synthesis that will form part of the proposed definition.

### 3.2.1 Who forms the crowd (a)

The majority of the authors agree in defining the crowd in a general manner, providing information such as composition, type of people, heterogeneity, or the skills possessed.

Reference is made to the crowd as a generic mass of individuals: general Internet public [11], large group of people [1,13,23,36], individuals [11,25], people [24,38], or members of the crowd [31]. Some authors specify further the origin or grouping of the crowd: users (referring to a firm), consumers [11], voluntary users [34], Internet-scale community [41], or organized and online communities [25,40].

Based on the sources consulted, it is possible to distinguish two crowd characteristics: number of people and their typology.

Regarding the number, the majority of the authors make reference to an indeterminate and large group of individuals, a group of people that do not necessarily know each other, and a loosely bound public according to Wexler [39]. The only exception is the online communities, where there is a greater possibility of the people knowing each other.

Regarding the type of people, this is obtained by describing the crowd. Kleeman et al. [11] identify the crowd as users or consumers, considered the essence of crowdsourcing. Schenk and Guittard [3] identify the nucleus of the crowd as amateurs (students, young graduates, scientists or simply individuals), although they do not set aside professionals. Authors such as Grier [27] and Heer and Bostok [28] identify the crowd as web workers. According to Howe [1], Crowdsourcing certainly requires a smart, well-trained crowd.

#### **Who forms the crowd - conclusion**

Fifty percent of the definitions coincide when the crowd is profiled as a large group of individuals. The optimum number of people will depend on the crowdsourcing initiative, due to the fact that the information needs to be filtered and evaluated [32]. There are initiatives, such as in the case of Boeing, where the optimal size is approximately 100 people [44], while in others it is thousands, like in the Lego case [1]. There are also cases where the size of the crowd is limited, e.g., those within a company, those that deal with confidential information, or those that are directed towards customers of a certain company.

In relation to the knowledge possessed by the individuals within the crowd, each initiative will need a specific one, thus limiting the number of participants. In the case of Amazon Mechanical Turk, a website where any given person can make micropayments in return for generally repetitive work, the proposed tasks do not generally require people with special skills. The same thing occurs in cases where the users have to give an opinion on a given product [45]. However, the tasks proposed on Innocentive or StarMind, websites that allow organizations to propose R&D problems whose resolution implies an economic recompense need a more educated crowd. This is demonstrated by Buecheler et al. [9] who identify 66% of the participants of StarMind as PhD students, postdoctoral, researchers, professors, etc. In the case of Boeing, when they looked for help to design the 787 Dreamliner, they did not ask to the general crowd, but instead asked 100 of their suppliers [44]. The reason is that those suppliers had knowledge that the others did not have.

The heterogeneity of the crowd will depend upon the type of initiative considered. Some will require the wisdom of crowds like a heterogeneous crowd [46] where each person brings their



personal knowledge. In other cases, the heterogeneity will not be so important, such as in the translation tasks proposed by Amazon Mechanical Turk.

Therefore, we can conclude that the crowd will refer to a group of individuals whose characteristics of number, heterogeneity, and knowledge will be determined by the requirements of the crowdsourcing initiative.

### 3.2.2 What the crowd has to do (b)

In regards to what the crowd has to do, two tendencies are detected; one more general and one more concrete. The general tendency includes two groups of authors. The first considers that the crowd should just undertake tasks [19,23,26,28,35,40,41], specifying at times the difficulty or size of these tasks [28], a given characteristic such as being done via the web [24], or of being human intelligent tasks [31]. The second refers to the fact that the crowd has to solve problems [5,6,8,31,32,34], in many cases for companies. The authors also make reference in a general way to what the crowd should undertake: a function or activity [13,30], a job [1], or simply to contribute to the firm [11].

About the specific tendency, authors such as Reichwald and Piller [37] make reference to the development of a new product, Kleeman et al. [11] speak of the exploitation of creative ideas, and Poetz and Schreier [36] contemplate idea generation. Beside the collected definitions, authors such as Giudice [47] are more concrete in the way they propose rating, recommendation, or text comments.

#### **What the crowd have to do - conclusion**

In principle, any non-trivial problem can benefit from crowdsourcing [5]. This includes tasks that range from purely routine poor cognitive tasks, to complicated tasks [11], passing through creative tasks or those related to innovation [37] where uniqueness has value per se [3]. Independent from the complexity of the problem, Vukovic [38] and Herr and Bostok [28] emphasize that a generic crowdsourcing task must be divisible into lower level tasks, each one of which can be accomplished by individual members of the crowd.

It is important to indicate that the tasks undertaken need to have a clear objective. For example, in Innocentive it is to solve a problem for a company and in Threadless it is to design t-shirts. Therefore, the use of free services, unless there is a secondary purpose, does not imply a crowdsourcing action. In this way, a user uploading a video to Youtube and sharing it is not a crowdsourcing initiative, while it is when a user uploads a video to any given platform to participate in initiatives such as those of Doritos and Pepsi at the Superbowl [48].

In this way, it can be concluded that the crowd will need to carry out the resolution of a problem through the undertaking of a task of variable complexity and modularity that will imply the voluntary contribution of their work, money (in the case of crowdfunding), knowledge, and/or experience. It is considered that a problem is comprised of any given situation of need held by the initiator of the crowdsourcing activity, e.g., the translation of a fragment of text or opinions about products.

### 3.2.3 What does the crowd get in return (c)

Given that this characteristic is one of the most important in crowdsourcing, it is surprising that few definitions mention it. While Vukovic [38] mentions the existence of recompense, and Kazai [31] talks about social recognition and entertainment value as recompense, the rest of the authors that talks about the recompense identify it with money [11,24,28,31,40].

In reference to the level of recompense, Herr and Bostok [28] and Kleeman et al. [11] specify the recompense to micro-payments of the order of \$0.01 to \$0.10 per task, as occurs in the case of Amazon Mechanical Turkey. In other cases such as Innocentive, the prizes can even reach the level of a million dollars. Kleeman et al. [11] indicate that the task should be done for free or for significantly less than the contribution is worth to the firm.

#### **What does the crowd get in return - conclusion**

One of the characteristics that differentiates the crowd is the fact that they have to be compensated because they are acting voluntarily [32]. Some authors suggest that the best situation would be that in which the reward is not material and that instead the motivation to participate is similar to that in Open Source Communities: passionate about the activity and participating for fun [49].

In this way, the recompense would vary depending on the crowdsourcer, but would always look to satisfy one or more of the individual needs mentioned in Maslow's pyramid [50]: economic reward, social recognition, self-esteem, or to develop individual skills. Although certain authors such as Kazai [31] also speak of entertainment as a type of motivation, it's important to mention that entertainment is present in any of the hierarchical levels proposed by Maslow [51].

On the other hand, it is important to highlight that the use of a free service cannot be considered recompense, as seen in Delicious or Youtube. This is because in those cases the user does not have to undertake a concrete task (except for the registration) to be able to use the services.

Therefore, it can be concluded that the user will obtain satisfaction of a given necessity, whether it be economic, social recognition, self-esteem, or the development of individual skills.

#### **3.2.4 Who is the initiator (crowdsourcer) (d)**

With respect to the person that initiates crowdsourcing processes (referred to as the crowdsourcer going forward), the majority of authors identify this individual, implicitly or explicitly, as a company [7,11,23,25,30,32-34,37,40]. Only Howe [30] and La Vecchia and Cisternino [32] also include institutions or organizations without specifying if they are companies or not. In this sense, Brabham [6] is much more specific and makes reference to for-profit organizations. Lastly, Bederson and Quinn [24] refer to requestors, without specifying any characteristics.

#### **Who is the crowdsourcer - conclusion**

Although it is certain that the crowdsourcer is in many cases a company (Converse, Sony, L'Oreal, etc.), it can also be a public organization, such as the FBI [52] or the European Union [53], writers, such as Jeff Howe who used crowdsourcing to design the cover of one of his books [1], or individuals, such as those cases of crowdfunding where any given type of professional can seek funding. This is to say that crowdsourcing does not only suggest a business model for companies, but is also a potential problem solving tool for the government and the non-profit sector [8].

Therefore, it can be concluded that the crowdsourcer can be any given entity that has the means to carry out the initiative considered, whether it is a company, institution, non-profit organization, or an individual.

#### **3.2.5 What the initiator gets in return (e)**

The majority of the authors agree that crowdsourcers will get the result they seek for a given task [1,13,19,26,28,29,31], with some being more direct and indicating that this result implies the resolution of a problem [5,6,32,34,39]. The rest of the authors can be considered as being a part of

one of three groups: those that identify what the crowdsourcer gets with knowledge, those that identify it with ideas, and those that identify it with a given type of added value.

In the first case, Howe [1] indicates that crowdsourcers obtain talent and knowledge, and Burger-Helmchen and Penin [7] indicate that they obtain external knowledge. Other authors also include knowledge, but in an implicit form. For example, Oliveira et al. [35] indicate that crowdsourcers obtain access to skills and experience, and Chanal and Caron-Faran [25] make reference to disseminated outside competencies. The authors of the second group identify the achieved object with ideas, with Kleeman et al. [11] going further and discussing commercial exploitation of creative ideas and making a sale of its products [11][40]. Kleeman et al. [11] could be also included in the third group, whose authors identify the achieved object with a given type of added value: value creation [41], increased profits, and product and service innovations [38].

#### **What they get in return - conclusions**

Many authors refer to specific cases, such as Del Giudice [47] who indicates that social feedback is obtained. For this reason, those cases should not be taken into account in the preparation of the definition.

It can be concluded that the crowdsourcer will obtain the solution to the problem via the fulfilment of a given action or task by the crowd. The crowdsourcer will benefit from the work of the crowd, from its experience, from its knowledge, and also, in the case of crowdfunding, from its assets.

#### **3.2.6 What type of process it is (f)**

In regards to the type of process addressed by crowdsourcing, there are authors who identify it as an outsourcing process, such as in the case of Amazon Mechanical Turkey [11,35,36,40] and others as a problem solving process [6,34] via a distributed online process [34], such as in the case of Innocentive. Others indicate that it is a production model [6,38] with an example being Threadless, while there are others who identify it as a business model or practice [13,33] or a strategic model, relating crowdsourcing directly to the business area [8]. There are also authors that identify crowdsourcing as an open innovation process [25], as a process of organizing labour [40], or as a client integration process [11].

#### **What type of process it is - conclusion**

From all the previous affirmations various common points can be taken: crowdsourcing is an online process that is distributed by the very nature of the Internet and it always involves the participation of the crowd. The rest of the characteristics depend on the proposed initiative.

In this sense, each one of the definitions makes reference to a distinct type of crowdsourcing initiative: it will be a production of goods model in the case of Threadless, but not in the case of Innocentive. In a similar way, crowdsourcing will be an open innovation process in Innocentive but not in the case of Amazon Mechanical Turk, where it is an outsourcing process. The majority of the examples of crowdsourcing suppose a business model, but not always (e.g. FBI, or the European Union).

It can be concluded that crowdsourcing will be a participative distributed online process that allows the undertaking of a task for the resolution of a problem.

#### **3.2.7 What type of call to use: Open call (g)**

With respect to the type of call used to propose tasks to the crowd, only seven documents make reference to the use of an open call [1,11,26,30,31,36,40].

### Conclusion - What type of call to use: Open call

In agreement with the bibliography consulted, there are authors who consider that the call to bring together the potential participants should not be limited to experts or preselected candidates, or that participation should be non-discriminatory [3]. Everybody can answer the call: individuals can participate in addition to firms, non-profit organizations, or communities of individuals [7]. With this in mind, the call should be molded to the concrete crowdsourcing initiative. Whitla [40] clearly explains this by indicating that the call can be of one of three types:

1. A true open call where any given interested party can participate.
2. A call limited to a community with specific knowledge and expertise.
3. A combination of both, where an open call is made, but those who can participate are controlled.

In conclusion, it can be said that to get in touch with the crowd a flexible open call will be used.

### 3.2.8 Which medium is used (h)

All the authors that mention the utilized medium make reference to the Internet, explicitly [1,6,8,11,19,24,25,27,29,33,38,40,41], or implicitly, like Howe [30] when he speaks of a web-based business pattern or Herr and Bostok [28] when they speak of web workers.

#### Which medium is used - conclusion

With respect to this characteristic there is unanimity: the medium used by crowdsourcing is the Internet. In fact, the importance of the Internet in crowdsourcing has been emphasized by a multitude of authors [1,7,11,12], some of them even affirm that web 2.0 is the technological basis upon which crowdsourcing is developed and operates [2,38] given the level of collaboration that can be achieved [1,2].

### 3.3. Integrating crowdsourcing definition

From the analysis undertaken, and fusing the previous partial elements, a definition that covers any type of crowdsourcing initiative has been created. It achieves the previously mentioned objectives of the study, discerns whether a given activity is crowdsourcing or not, and formalizes a theoretical base through the reduction of semantic confusion. The definition is as follows:

“Crowdsourcing is a type of participative online activity in which an individual, organization, or company with enough means 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 that what the user has brought to the venture, whose form will depend on the type of activity undertaken.”

### 3.4. Verification

As can be seen below, the definition will be applied to ten initiatives present on the Internet, some of them crowdsourcing, others not, assessing the eight characteristics of the definition [19,20]. To this end, ‘+’ will be assigned to a characteristic that clearly appears; ‘+/-’ to those characteristics that appear, but not clearly; and ‘-’ to those characteristics which do not appear.

In Table 4, the assessment of each characteristic in each case can be seen. The selected examples are: Wikipedia (collaborative online encyclopedia), Innocentive (an online platform where money is offered in exchange for the solution of problems), Threadless (an Internet t-shirt company,

whose designs are created and selected by users), Amazon Mechanical Turk (a platform where crowdsourcers can propose tasks that are offered in exchange for money), ModCloth (an Internet clothing shop that allows its users to give opinions on and vote for clothing designs before their sale), Youtube (an Internet video platform), Delicious (a social bookmarking system), Fiat Mio (an initiative begun by Fiat through which a car has been created following the suggestions of users), iStockPhoto (an Internet image sale platform), and Flickr (a platform that allows the uploading and tagging of photographs).

The characteristics of the definition, to be evaluated in each case, have been mentioned previously:

- There is a clearly defined crowd (a)
- There exists a task with a clear goal (b)
- The recompense received by the crowd is clear (c)
- The crowdsourcer is clearly identified (d)
- The compensation to be received by the crowdsourcer is clearly defined (e)
- It is an online assigned process of participative type (f)
- It uses an open call of variable extent (g)
- It uses the Internet (h)

**Table 4. Verification of the definition. Source: author**

	<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>
Wikipedia	+	+	+	-	-	+	-	+
Innocentive	+	+	+	+	+	+	+	+
Threadless	+	+	+	+	+	+	+	+
AMTurk	+	+	+	+	+	+	+	+
ModCloth	+	+	+/-	+	+	+	+	+
You Tube	+	-	-	+/-	-	-	-	+
Delicious	+	-	-	+/-	-	-	-	+
Fiat Mio	+	+	+/-	+	+	+	+	+
iStockPhoto	+	+	+	+	+	+	+	+
Flickr	+	-	-	+	-	-	-	+

According to Table 4, some clear cases of crowdsourcing exist including Innocentive, Threadless, AMTurk, and iStockPhoto. In the cases of ModCloth and Fiat Mio, all the characteristics are easily identifiable with the exception of the recompense to be received by the crowd, which does not impede the initiatives being considered crowdsourcing. In these cases, recognition given by the company to the opinions of the users can be identified as the recompense. In the case of Wikipedia, three characteristics are not identified: the crowdsourcer, the benefit it receives, and the existence of an open call. In this case, Wikimedia, the company behind Wikipedia, does not act like a crowdsourcer and it does not receive a benefit from the work of the crowd. Regarding the open call, although everyone can participate in Wikipedia, there is not an explicit open call. For these reasons, and according to other authors [53], Wikipedia cannot be considered a crowdsourcing example.

In the cases of Delicious, Youtube, and Flickr, it can be clearly seen that they do not fulfill all the characteristics. Using Delicious as an example, regarding the crowd, there is no task with a clear goal and they do not receive any recompense [40]. Regarding the crowdsourcer, it can be said that there is a company behind the platform, but it does not conform to what we understand to be a crowdsourcer. This is due to the fact that they do not propose a task whose resolution will lead to a clear benefit. Furthermore, it cannot be said to be a participative process in which all the users are seeking the same end goal. The use of the site is mainly individual; then the platform makes use of the collective intelligence to interconnect and exploit the information. Lastly, there is no open call; it is a free service usable by anyone.

#### 4. Conclusion and future work

The term “crowdsourcing” is a term in its infancy, which, as new applications appear, is undergoing a constant evolution. Following the analysis of a group of scientific articles, it has been shown that distinct definitions of crowdsourcing exist, clearly illustrating the lack of consensus and a certain semantic confusion.

This article provides a wide definition that covers the majority (if not all) of existing crowdsourcing processes. Through the analysis of all the authors’ definitions, eight characteristics common to any given crowdsourcing initiative were found: the crowd, the task at hand, the recompense obtained, the crowdsourcer or initiator of the crowdsourcing activity, what is obtained by them following the crowdsourcing process, the type of process, the call to participate, and the medium. For each one of these elements an analysis based on the collected definitions was undertaken and a conclusion formulated, attempting to make each element as global as possible while trying to maintain the upmost precision as well. The coordination of these conclusions has allowed the creation of a global definition that spans any of the crowdsourcing initiatives compared.

From this global definition, each type of concrete crowdsourcing activity (crowdvoting, crowdfunding, etc.) will require a more precise definition of each one of the eight elements. For example, in the case of crowdfunding, the task of the crowd will be to give money, while in the case of crowdvoting, it will be to vote for and give opinions on certain products.

There are other areas in crowdsourcing where little consensus exists, such as in the classification of distinct types of activities within crowdsourcing. With this in mind, some work analyzing, recompiling, and summarizing, with the goal of unifying some of the positions may be of interest.

Another area where consensus does not exist is in the relationship between crowdsourcing and other associated concepts such as Open innovation, Outsourcing, or Open Source Development. While some authors unequivocally identify crowdsourcing with Open Innovation [25], others state the exact opposite [3]. Also in this case, it would be interesting to undertake a study of all the terms that are linked regularly with crowdsourcing to establish the similarities and differences with the objective of better profiling the concept of crowdsourcing and defining a theoretical framework, as has been attempted in this article.

#### 5. References

- [1] J. Howe, *Crowdsourcing: How the Power of the Crowd is Driving the Future of Business*. (Business Books, Great Britain, 2008).

- [2] M. Vukovic and C. Bartolini, Towards a Research Agenda for Enterprise crowdsourcing. In: M. Tiziana and S. Bernhard (eds) *Leveraging Applications of Formal Methods, Verification, and Validation* (Springer, Berlin/Heidelberg, 2010) 425-434 [Lecture Notes in Computer Science 6415].
- [3] E. Schenk and C. Guittard, Crowdsourcing: What can be Outsourced to the Crowd, and Why? *Technical Report* (2009) Available from: <http://halshs.archives-ouvertes.fr/halshs-00439256/> (accessed: 1 September 2011).
- [4] D. Denyer, D. Tranfield, J.E. Van Aken, Developing design propositions through research synthesis, *Organization Studies* 29(3) (2008): 393.
- [5] A. Doan, R. Ramakrishnan and A.Y. Halevy, Crowdsourcing systems on the World-Wide Web, *Communications of the ACM* 54(4) (2011) 86-96.
- [6] D. C. Brabham, Moving the crowd at iStockphoto: The composition of the crowd and motivations for participation in a crowdsourcing application, *First Monday* 13(6) (2008)
- [7] T. Burger-Helmchen and J. Penin, The limits of crowdsourcing inventive activities: What do transaction cost theory and the evolutionary theories of the firm teach us?. In: *Workshop on Open Source Innovation*, Strasbourg, France (2010).
- [8] D. C. Brabham, Crowdsourcing as a Model for Problem Solving: An Introduction and Cases, *Convergence: The International Journal of Research into New Media Technologies* 14(1) (2008) 75-90.
- [9] T. Buecheler, J.H. Sieg, R.M. Fuchsli, R. Pfeifer, Crowdsourcing, Open Innovation and Collective Intelligence in the Scientific Method: A Research Agenda and Operational Framework. In: H. Fellerman et al (eds), *Artificial Life XII. Proceedings of the Twelfth International Conference on the Synthesis and Simulation of Living Systems, Odense, Denmark, 19-23 August 2010*, 679-686.
- [10] B.A. Huberman, D.M. Romero, D.M. and Wu F. Crowdsourcing, Attention and Productivity. *Journal of Information Science* 35(6) (2009) 758–765
- [11] F. Kleeman, G.G Voss and K. Rieder, Un(der)paid Innovators: The Commercial Utilization of Consumer Work through crowdsourcing, *Science, Technology and Innovation Studies* 4(1) (2008) 5-26.
- [12] S.J. Andriole, Business impact of Web 2.0 technologies, *Communications of the ACM* 53(12) (2010) 67-79.
- [13] J. Howe, The rise of crowdsourcing, *Wired* 14(6) (2006)
- [14] M. Delgado, *Revisión sistemática de estudios: Metaanálisis* (Signo, Barcelona, 2010).
- [15] D. B. Petitti, *Meta-analysis, Decision Analysis and Cost-Effectiveness Analysis* (Oxford University Press, New York, 2000).
- [16] M. Egger, G.D. Smith and D. Altman, *Systematic reviews in health care. Meta-analysis in context* (BMJ Books, London, 2001).
- [17] W. Tatarkiewicz, *History of Six Ideas: An Essay in Aesthetics* (Springer, 1980)
- [18] G. Cosma and M. Joy, Towards a Definition of Source-Code Plagiarism. *IEEE Transactions on Education* 51(2) (2008) 195-200
- [19] M. Vukovic, Crowdsourcing for enterprises. In: *Proceedings of the 2009 Congress on Services – I, IEEE Computer Society (Washington, DC, USA 2009)*. 686-692.
- [20] S. Aliakbarian, A.M. Rahimabadi, P.H. Sadeghi and N.S. Mirsatari, Neighbor Definition in P2P Networks. In: *Proceedings of 2006 International Conference on Communications, Circuits and Systems*. (Guilin, 2007) 1562-1565

- [21] D. C. Brabham, Crowdsourcing the public participation process for planning projects, *Planning Theory* 8(3) (2009) 242-262.
- [22] Wikipedia, *Crowdsourcing* (2011). Available from: <http://en.wikipedia.org/wiki/Crowdsourcing> (accessed 15 August 2011)
- [23] O. Alonso and M. Lease, Crowdsourcing 101: Putting the WSDM of Crowds to Work for You. In: *Proceedings of the fourth ACM international conference on Web search and data mining, WSDM '11* (ACM, New York, 2011) 1-2
- [24] B. B. Bederson and A.J. Quinn, Web workers Unite! Addressing Challenges of Online Laborers. In: *Proceedings of the 2011 annual conference extended abstracts on Human Factors in Computing Systems, CHI '11* (Vancouver, 2011)
- [25] V. Chanal and M.L. Caron-Fasan, How to invent a new business model based on crowdsourcing: The crowdspirit ® case. In: *EURAM* (Ljubjana, Slovenia, 2008)
- [26] D. DiPalantino and M. Vojnovic, Crowdsourcing and all-pay auctions. In: *Proceedings of the 10th ACM conference on Electronic commerce, EC '09* (2009) 119-128.
- [27] D. A. Grier, Not for All Markets. *Computer* 44(5) (2011) 6-8
- [28] J. Heer, and M. Bostok, Crowdsourcing graphical perception: using mechanical turk to assess visualization design. In: *Proceedings of the 28th international conference on Human factors in computing systems, CHI'10* (ACM, New York, 2010) 203-212.
- [29] P. Heymann and H. Garcia-Molina, Turkalytics: analytics for human computation. In: *Proceedings of the 20th international conference on World wide web, WWW '11* (ACM, New York, 2011) 477-486.
- [30] J. Howe, *Crowdsourcing: A definition*. *Crowdsourcing: Why the Power of the Crowd is Driving the Future of Business*. Weblog, 2 June. Available at [http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing\\_a.html](http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html) (accessed 27-7-2011)
- [31] G. Kazai, In Search of Quality in crowdsourcing for Search Engine Evaluation. In *Proceedings of the 33<sup>rd</sup> European conference on Advances in Information retrieval* (Springer-Verlag, Berlin/Heidelberg, 2011). [Lecture Notes in Computer Science 6611, 165-176]
- [32] G. La Vecchia and A. Cisternino, Collaborative workforce, business process crowdsourcing as an alternative of BPO. In: *Proceedings of First Enterprise crowdsourcing Workshop in conjunction with ICWE 2010* (Springer-Verlag, Berlin/Heidelberg, 2010) 425-430
- [33] P. Ling, An Empirical Study of Social Capital in Participation in Online crowdsourcing, *Computer* 7(9) (2010) 1-4.
- [34] D. Mazzola and A. Distefano, Crowdsourcing and the participation process for problem solving: the case of BP. In: *VII Conference of the Italian Chapter of AIS. Information technology and Innovation trend in Organization*. (Napoles, Italy, 2010)
- [35] F. Oliveira, I. Ramos, L. Santos, Definition of a crowdsourcing Innovation Service for the European SMEs. In: F. Daniel et al. (eds.) *Current Trends in Web Engineering* (Springer, Berlin/Heidelberg, 2010) 412-416
- [36] M.K. Poetz and M. Schreier, The Value of crowdsourcing: Can Users Really Compete with Professionals in Generating New Product Ideas?. *Journal of Product Innovation Management* (2009) Forthcoming. Available at SSRN: <http://ssrn.com/abstract=1566903>
- [37] R. Reichwald, F. Piller, *Interaktive Wertschöpfung. Open Innovation, Individualisierung und neue Formen der Arbeitsteilung* (Gabler, Wiesbaden, 2006).



- [38] M. Vukovic, L. Mariana and J. Laredo, PeopleCloud for the Globally Integrated Enterprise. In: D. Asit et al. (eds) *Service-Oriented Computing*. (Springer-Verlag, Berlin/Heidelberg, 2009)
- [39] M. N. Wexler, Reconfiguring the sociology of the crowd: exploring crowdsourcing, *International Journal of Sociology and Social Policy* 31(1) (2011) 6 - 20
- [40] P. Whitla, Crowdsourcing and Its Application in Marketing, *Contemporary Management Research* 5(1) (2009) 15-28
- [41] J. Yang, L.A. Adamic and M.S. Ackerman, Crowdsourcing and knowledge sharing: strategic user behaviour on taskcn. In: *Proceedings of the 9th ACM conference on Electronic commerce* (ACM, New York, 2008) 246-255.
- [42] S. Geerts, *Discovering crowdsourcing: theory, classification and directions for use*. (Technische Universiteit Eindhoven, 2009)
- [43] C. Guittard and E. Schenk, *Crowdsourcing: modalités et raisons d'un recours à la foule* (2009) Available from: <http://marsouin.infini.fr/ocs2/index.php/frontieres-numeriques-brest2009/frontieres-numeriques-brest2009/paper/viewFile/60/8> (accessed 30 of August 2011)
- [44] J. Alsever, *For Boeing, It Takes a Village to Build a New Airplane* (2007). Available from <http://www.bnet.com/article/for-boeing-it-takes-a-village-to-build-a-new-airplane/57965> (accessed 18 of August 2011)
- [45] Inc, *Using crowdsourcing to control Inventory* (2010). Available from <http://www.inc.com/magazine/20100201/using-crowdsourcing-to-control-inventory.html>. (accessed 18 of August 2011)
- [46] J. Surowiecki, *The wisdom of crowds* (Anchor Books, New York, 2005).
- [47] K. D. Giudice, Crowdsourcing credibility: The impact of audience feedback on Web page credibility. In: *Proceedings of the 73rd ASIS&T Annual Meeting on Navigating Streams in an Information Ecosystem, ASIS&T '10 (2010)*. 47(1) 1-9
- [48] Superbowl, *Crash the SuperBowl*. Available from <http://www.crashthesuperbowl.com/> (accessed 18 August 2011).
- [49] O. Stewart, J.M. Huerta and M. Sader, Designing crowdsourcing community for the enterprise. In: *Proceedings of the ACM SIGKDD Workshop on Human Computation, HCOMP '09* (ACM, New York, 2009) 50-53.
- [50] A.H. Maslow, A Theory of Human Motivation. *Psychological review* 50 (1943)
- [51] A. J. Veal, *Leisure and tourism policy and planning* (CABI Publishing, 2002)
- [52] FBI - Federal Bureau of Investigation, *Cryptanalysts: Help Break the Code* (2011). Available from [http://www.fbi.gov/news/stories/2011/march/cryptanalysis\\_032111](http://www.fbi.gov/news/stories/2011/march/cryptanalysis_032111) (accessed: 15 July 2011)
- [53] ECMT - European Commission for Mobility and Transport, *Door-to-Door in a click* (2011). Available from [http://ec.europa.eu/transport/its/multimodal-planners/index\\_en.htm](http://ec.europa.eu/transport/its/multimodal-planners/index_en.htm) (accessed 15 July 2011)
- [54] D. C. Brabham, Crowdsourcing: A model for leveraging online communities. In: A. Delwiche & J. Henderson (Eds.), *The Routledge Handbook of Participatory Culture* (in press).