COLLECTIVE INTELLIGENCE (CROWDSOURCING) ON THE INTERNET: A collaborative approach in information and knowledge management

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Abstract

The present work proposes to investigate the practice of collective intelligence (crowdsourcing) on the Internet by scientific institutions that develop or not sustainable actions, in order to characterize their use of the virtual environment in the process of knowledge generation for their own benefit. This is an empirical analysis based on a survey of data on the Internet, aiming to identify websites whose hosting organizations adopt collective intelligence practices to achieve their objectives in the generation of knowledge, necessarily of a scientific nature and / or related to sustainable development. As a result, it was possible to identify the adoption of this practice by several organizations, in which their level of dependence on the virtual environment as well as the virtual environment's contribution to the accomplishment of their projects are observed.

Keywords: crowdsourcing; knowledge; information; collective intelligence; Internet; collaborative work.

1. Introduction

Information and knowledge are notoriously recognized in their importance for the development of our society. Information, as part of the process of communication between individuals, is the input of knowledge that constitutes the main pillar of support for progress (CASTELLS, 2002, JANNUZZI, FALSARELLA, SUGAHARA, 2016).

The role of knowledge in society has changed over time, but significant modifications have taken place

with greater emphasis in the twentieth century. Scientific and technological propositions and discoveries, generated in extraordinary volume, give society opportunities for meaningful social, political and economic changes (CASTELLS, 2002).

One of the crucial achievements of this evolution was the lowering of costs and facilitation of the transference of information, since information and communication technologies release emitters and receivers from sharing the same physical space for their communication (CASTELLS, 2002). In this context, the advantageous conquest of new ways of acquiring knowledge through networks and information systems is unquestionable.

This accelerated pace of progress and changes in society, while stimulating the production of knowledge, also contributes to the emergence of new forms of human behavior and new forms of human institutions, through networks and information systems that allow the reduction of barriers of communication in time and space. This environment gains a significant dimension in face of exponential growth in Internet use.

It is from this perspective that a form of relationship that is called collective intelligence configures itself, mentioned in several studies as crowdsourcing, and is practiced in different situations and in different environments of society, its essence being the collaborative work (ESTELLÉS-AROLAS; DE-GUEVARA, 2012). Crowdsourcing can be understood as the act of an organization "[...] 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 "(HOWE, 2008, p.1).

This expansion of frontiers, which enables a more participative collective knowledge, arouses the interest of several organizations that begin to adopt collective intelligence to incite actions, to search for solutions or to expand contents in a collaborative way (SCHENK; GUITTARD, 2011) such as actions for the sake of sustainability as well as in scientific research. Considering that organizations increasingly seek to treat knowledge as a manageable resource, working it through what is known as knowledge management, characterized as the "[...] deliberate and systematic coordination of people, technology, processes and the structure of an organization [...] achieved through the creation, sharing and application of knowledge [...] (DALKIR, 2017, translation by the authors), it can be deduced that the adoption of collective intelligence (crowdsourcing) becomes also part of this management.

If an organization seeks to make knowledge manageable and, from among different sources, also seeks collaborative knowledge and making use of collective intelligence in its actions, then all the actions of this organization that respond to this situation can be contextualized in the knowledge management practiced by it. Thus, it is in this context that it becomes relevant to investigate the conjuncture in which this collective knowledge is being developed - collected, identified, managed, and stimulated in its adoption of the use of the Internet as mediating environment to obtain information.

When navigating the virtual environment, it is possible to observe that many organizations are practicing the concept of collective intelligence through Internet sites as a way of collecting information for generation of knowledge. Among these organizations, there is the presence of institutions and researchers that adopt collective intelligence practices to search for scientific knowledge and / or for sustainable development actions. Therefore, it is in this context that the following question is elaborated: How are organizations of scientific interests related or not to sustainable actions making use of collective intelligence on the Internet

for generation of knowledge?

From this question, the present research aims to investigate the practice of collective intelligence (crowdsourcing) on the Internet by scientific institutions that develop or not sustainable actions, in order to characterize their use of the virtual environment in the knowledge generation process.

2. Information Knowledge

Knowledge is an element of fundamental importance for the evolution of human society in its different forms of organization (family, educational, governmental, commercial, research, etc.). These organizations, characterized as human systems, foster knowledge from information assimilated by individuals of a system, who also become sources of new information, contributing to the survival and evolution of this system with generation of new knowledge. This fact can be identified in the words of Cintra et al. (2002) when they say that "[...] all knowledge begins with some kind of information and constitutes information[...]" (CINTRA et al, 2002, p.10, translation by the authors). From their words, it can be affirmed that it is information that is responsible for generating knowledge.

The information-knowledge relationship is based on the information management process. Information management is closely linked to the use of information, since it is its use that guides the entire process, i.e. each of the procedures performed in management is based on the use of information. Using information implies receiving this information from some emitter, and for it to be assimilated - possibly used – thus exercising its power of action, it must meet the informational needs manifested by the receiver (JANNUZZI; TALAMO, 2004).

In spite of the notorious relevance attributed to information management, it is possible to observe in the literature that discusses it that the concept attributed to the term usually takes on descriptive characteristics of the procedures, not emphasizing its main role in human information systems. In other words, the role of information management is to obtain, based on the supply of information, pertinent answers to the informational need in order to create conditions for effective use of information in generation of knowledge (JANNUZZI; TALAMO, 2004).

As aforementioned, knowledge is recognized as a resource of fundamental importance for the evolutionary process of society in general, even favoring it to occur in a sustainable way (JANNUZZI; FALSARELLA; SUGAHARA, 2016). It is in this context that discussion about knowledge management gains a significant dimension in the scientific field, producing studies about management procedures of this intangible and subjective resource that is characterized by involving cognitive processes in assimilation of information.

Knowledge management models observed in the literature usually present, in common or similar, in their totality or not, stages such as creation, acquisition, organization, internalization, sharing, implementation and revision of knowledge, with specific distinctions according to particularities of each proposal: those that favor acquisition of knowledge already stored and those that focus on its creation from primary information - information that has not yet been scientifically analyzed (MISHRA; BHASKAR, 2011; JANNUZZI; FALSARELLA; SUGAHARA, 2016; MARCONI; LAKATOS, 2017).

The search for information to generate knowledge can occur informally, from unstructured information such as the exchange of information between individuals in social gatherings, or in a formal way, based on

structured information, available in sources that are organized in stocks such as databases, libraries, statistical data institutions, etc. (JANNUZZI; TALAMO, 2004). In this context, it is possible to observe that society has been confiding in the use of increasingly sophisticated information and communication technologies (ICTs) to search for knowledge, since within a new dimension of time and space they facilitate access to information (CASTELLS, 2002).

The use of information and communication technologies to search for information in order to generate knowledge has become more and more present. It is observed that different organizations have sought to generate primary data from different individuals, who constitute source of information within a collaborative practice, characterizing the use of collective intelligence (crowdsourcing).

By observing the process of knowledge management, it is possible to affirm that the use of information and communication technologies can favor the practice of collective intelligence in stages such as creation, acquisition and organization. The purposes of these stages are in harmony with the principles of collective intelligence, since it is used, in the case of creation, as a concept in the search for information in order to generate knowledge, in the case of acquisition, as the search for knowledge already consolidated and, in the case of organization, as filtering agent of the extensive informational volume in cyberspace. Thus, collective intelligence, as a collaborative practice in the construction and management of knowledge, associated to the use of information and communication technologies, is clearly a valuable resource that adds greater dynamism and differentiated dimensions to organizations that make use of it.

3. Technology, interactivite society and collective intelligence

In the twentieth century, computers, as media technologies, revolutionized the means of communication hitherto known and used in society. The communication process, in turn, has absorbed and adapted to the introduction of new technologies that have emerged and expanded over the years. Since then, computers have connected to each other in the form of a colossal and multiple network - of global proportions - that is supported by the Internet as the channel that enables this interconnection. It is observed the integration of several communication modalities - oral, written and audiovisual - in a single interactive electronic system with global reach (CASTELLS, 2016).

Computer-mediated communication (CMC) via Internet enables a mass-proportion audience to be reached, but with receivers with a higher degree of segmentation and that receive content at different times, depending on the individual's interest in that content and on personal choice of when accessing the message. In relation to the communication process, the CMC allows users to interact actively: those who until then were configured as receivers can also send messages, which makes computer-mediated communication a two-way system (CASTELLS, 2016). From this configuration it is understood the concept of an interactive society, in which individuals can establish speeches through means that traditionally only emitted messages. There is, therefore, an open channel of communication between emitter and receiver, which enables the roles to become inverted in the message response period. Thus, the Internet shows itself as a vehicle of interactive communication, which enables a massive connection through it (CASTELLS, 2016).

The space where this communication and other social interactions occur - with information flows and generation of knowledge, supported by the Internet and all the social networks and links that are constituted

through it - is named cyberspace (LÉVY, 2015). It is observed that, today, society is increasingly interconnected in cyberspace, impacting how social relations are built and shaped, since it allows the shortening of physical and geographical distances among its users. According to Lévy apud Szabó and Gonçalves da Silva (2007: 45, translation by the authors), "the growth of cyberspace is associated with three factors: interconnection, the construction of virtual communities and collective intelligence."

Given the new configurations of sociability made possible by electronic communication and the emergence of new modalities of social ties, different authors around this theme question the real impact of the Internet on the level of social interaction among its users, debating about the possibility of the Internet decreasing levels of social interaction in the "real" world in favor of virtual communities and thus leading to an even greater isolation of people from society. Castells (2016) refutes this proposal inasmuch as he asserts that virtual communities do not contradict those that happen in the physical environment: they simply work concomitantly on another plane of "reality". Computer-mediated communication is useful in many different contexts, and is also favorable for the formation of weak and multiple social ties, including those between individuals previously unknown to each other and that would have difficulties to meet on the physical plane, but who can choose to do so on the virtual plane (CASTELLS, 2016).

In cyberspace, this ability to interact and build networks between individuals allows a large amount of information available on the worldwide computer network to be filtered based on specific needs, where virtual communities would not only work towards attending them, but also contribute collectively to the production of knowledge as a whole (COSTA, 2009).

Individuals unite in cyberspace around common interests, constituting virtual communities or social networks, as suggested by Costa (2009). Virtual communities differ from content portals in that these have a published content already defined by an editorial, while communities are self-organized: everyone can contribute, publish, and interact with one another. Collective intelligence is then the result of these informational processes in cyberspace that proceed and are intended for multiple purposes. (SZABÓ and GONÇALVES DA SILVA, 2007)

Thus, with a broader collective of people who begin to produce and share knowledge as well as filter the large amount of information available in cyberspace according to specific needs, it is observed that the cognizance that contributes to the generation of collective knowledge in the virtual environment is lead towards a place called by Lévy (2015) as a space of knowledge. The collective intelligence produced in this space is characterized, therefore, by the diffusion of access to contribution, since the knowledge can come from all that make use of the cyberspace - which is no longer territorialized – as a place of interaction and sharing of subjective competences, in constant process of shared learning and knowledge generation.

4. Methodological aspects

This is an exploratory research, an advised method when one aims at "providing an approximate overview of a certain fact" (GIL, 2008, p. 43), which, in this case, it is the use of collective intelligence for research through the Internet. With regard to qualitative data, the research is characterized as a documentary survey, because the collection of data is based on its publication on the Internet, and as such, it constitutes the primary source of the research input, since it has not yet received an analytical treatment, that is, it does

not originate from publications already analyzed scientifically (GIL, 2008; MARCONI; LAKATOS, 2017). The selection of research sources met the following criteria / procedures:

1) The use of Google as an Internet search tool. This decision was made by the fact that the institutions make use of this channel in its most traditional and comprehensive way aiming to contact a great number of people available to meet their objectives;

2) Use of keywords crowdsourcing research; crowdsourcing project; crowdsourcing science;

3) Assessment if the website was in continuous operation;

4) Assessment if the website that makes use of collective intelligence represents scientific research and is related or not to sustainable actions.

The research sample is characterized as intentional, since "... the elements that form the sample are intentionally related according to certain characteristics established in the plan ..." (RICHARDSON, 2017, p. 160, translation by the authors), which, in this case, the plan is the use of collective intelligence to obtain data in order to generate knowledge for the institution. The most popular examples as well as others less accessed and of different fields were selected at the time of search (April / 2018). At the beginning of this study, it was established that a volume of 13 sites could already provide important elements for this research. The reading and treating of the data obtained was defined by content analysis, method which proposes to work with the "information contained in the messages" (BARDIN, 2016, p.41, translation by the authors) which was considered adequate under the following aspects:

• Contextualization of the selected websites, according to their field of action and themes;

• Characterization of the dependency level of the organizations on virtual environment and its contribution to the accomplishment of their objectives;

• Categorization of websites, according to their proposition – scientific, either related or not to sustainable development - and stages of knowledge management.

5. Data results and analysis

The survey on the use of the Internet as a means for the practice of collective intelligence in generation of knowledge by scientific institutions obtained the following results:

Table 1 - Institutions that make use of collective intelligence as source of information

Institution	Category	Online adress/URL
Catalyst for Collaborative Solutions – Stanford University	Scientific Institution	https://catalyst.stanford.edu
Climate CoLab – MIT	Scientific Institution / Sustainable Development	https://www.climatecolab.org/
Caribbean Storms 2017	Scientific Institution	https://www.scientificamerican.com /citizen-science/caribbean-storms-

		2017/
Connecticut Turtle Atlas	Scientific Institution	https://www.scientificamerican.com/citizen-science/connecticut-turtle-atlas/
The Plastic Tide	Scientific Institution / Sustainable Development	https://www.scientificamerican.com/citizen-science/the-plastic-tide/
Small World of Words	Scientific Institution	https://www.scientificamerican.com/citizen-science/small-world-of-words/
Globe at Night - National Optical Astronomy Observatory	Scientific Institution	https://scistarter.com/project/169-Globe-at-Night
Gender and Tech Magazines - Bard College	Scientific Institution	https://crowdcrafting.org/project/genderandtechmagazines/
Floating Forests	Scientific Institution	https://www.zooniverse.org/projects/zooniverse/floating-forests
EMammal	Scientific Institution	http://emammal.si.edu/
Snapshots at Sea	Scientific Institution	https://www.zooniverse.org/projects/tedcheese/snapshots-at-sea
African American Civil War Soldiers	Scientific Institution	https://www.zooniverse.org/projects/usct/african-american-civil-war-soldiers
Brain Match	Scientific Institution	https://www.zooniverse.org/projects/simexp/brain-match

SOURCE: the authors.

The institutions selected for this research presented different propositions in the use of collective intelligence. They use their website to provide a collaboration channel to network users for data collection and / or knowledge sharing. Namely:

Table 2 - Proposals for users' collaboration by the institutions

INSTITUTION	Proposal for use of collective intelligence
Catalyst for Collaborative Solutions – Stanford University	Collaboration for scientific research. The proposal is to explore unusual interdisciplinary solutions to the world's most pressing problems and become an internationally recognized model of a high impact interdisciplinary research ecosystem.

Climate CoLab – MIT	Collaboration action for sustainable development. The proposal is to be an open platform for solving complex social problems, beginning with global climate change.
Caribbean Storms 2017	Collaboration for scientific research. The proposal is to analyze satellite images of areas hit by Hurricane Irma and Hurricane Jose in order to help rescue workers in finding locations that need assistance.
Connecticut Turtle Atlas	Collaboration for scientific research. The proposal is to help scientists track turtles in the US state of Connecticut to better understand threats to their habitat. From receiving data through the web and a smartphone application, participating volunteers can identify important habitats for turtles, locate areas of nest abundance, detect roads with high traffic-related mortality, and assist with various aspects of research and development in the field work related to turtles.
The Plastic Tide	Collaborative action for sustainable development. The proposal is to help scientists find out where the millions of tons of plastic that are dumped every year in the oceans go, from the analysis of database images and identification of residues such as fragments, fishing lines, beverage bottles or other plastic waste.
Small World of Words	Collaboration for scientific research. The proposal is to help researchers to discover through the completion of a questionnaire how the meaning of words is stored in memory.
Globe at Night - National Optical Astronomy Observatory	Collaboration for scientific research. The proposal is to raise awareness about light pollution by observing and measuring the night sky.
Gender and Tech Magazines - Bard College	Collaboration for scientific research. The proposal is to find out how gender inequality in technology can be reflected in technology journals, which is done by examining the frequency with which women are represented in technology journals and how they are represented.
Floating Forests	Collaboration for scientific research. The proposal is for volunteers to use photos of the space given to them to understand how algae forests grow and change over time.
EMammal	Collaboration for scientific research. The institution spreads cameras at strategic locations for wildlife registration and volunteers can collaborate using the software available to view photos, identify animals and send them to the institution for review and storage.
Snapshots at Sea	Collaboration for scientific research. The proposal is that volunteers use photos that will be given to them to identify and account for marine mammals.

African American Civil War Soldiers	Collaboration for scientific research. They are building a comprehensive database of the 200,000 soldiers who formed the United States Colored Troops (USCT), where images of soldiers' military service records obtained by photography and scanning are transcribed. From them, individual detailed information such as name, age, height, place of birth and enlistment, as well as evidence of battles fought, injuries and causalities suffered, honors received, and promotions conquered are collected. The idea is that the interface offered allows users to collaborate by highlighting such evidence, drawing the attention of scholars and the public.
Brain Match	Collaboration for scientific research. Images of brains are used to study brain disorders, where researchers align and analyze them, comparing images of different brains to conclude whether there is matching anatomy or to detect subtle differences between brains. This process is called a registry and is a complex, error-prone task. While a researcher usually visually checks for a brain match after doing the registry, there are no established guidelines for judging the quality of the record done. Therefore, the proposal is for volunteers to collaborate to assess the quality of the brain record (how well the brain images correspond), with the intention of generating consistent assessments among users, improving the quality of brain registries.

SOURCE: the authors.

The data analysis seeks to indicate the level of contribution fostered by the virtual environment based on three characteristics: comprehensiveness; knowledge acquisition, and virtual environment dependency. The Comprehensiveness feature is intended to identify whether collaboration has unrestricted participation or is specific to its knowledge; the Knowledge Acquisition feature seeks to point out the purpose of the required collaboration, i.e. whether this collaboration refers to identification of content or problem solution; finally, Virtual Environment Dependency tries to characterize whether the level of reach of the research developed is greater by virtual means or the same as in a physical environment.

Table 3 - Characteristics of the Collaborative Process

CHARACTERISTICS	**Comprehensiveness**	**Knowledge Acquisition**	**Virtual Environment Dependency**

INSTITUIÇÃO	Unrestricted	Restricted	Identification of Problem Solution	High level	Medium level	Low level
Catalyst for Collaborative Solutions		■		■		■	
Climate CoLab – MIT	■			■	■		
Caribbean Storms 2017	■		■		■		
Connecticut Turtle Atlas		■	■		■		
The Plastic Tide	■		■		■		
Small World of Words	■		■		■		
Globe at Night - NOAO	■		■		■		
Gender and Tech Magazines - Bard College	■		■		■		
Floating Forests	■		■		■		
EMammal	■		■		■		
Snapshots at Sea	■		■		■		
African American Civil War Soldiers	■		■		■		
Brain Match	■		■		■		

SOURCE: the authors.

Based on the proposals and projects of selected scientific institutions, this analysis points out the contribution of the electronic environment to the feasibility of using crowdsourcing, since this was made possible by the evolution in media technologies, the multimedia system and the advancement in the field of communication brought by computers and the use of the Internet, as explained by Castells (2016). The two-way communication between network users and traditional media means of emitting information - contextualized in the form of the so-called interactive society - laid the groundwork for today's collective intelligence to operate as a channel of speech that is purposely open between institutions and individuals so that they can contribute collectively with tacit information that will build a knowledge that would be in the future explicitly explained and used by the institutions.

Based on the concepts of Jannuzzi, Falsarella and Sugahara (2016) and Castells (2016) it is possible to relate information as a message sent in the field of tension between emitter - that would be the institutions and organizations - and receiver - that would be the individuals. The message will be decoded, assimilated and recoded from users' individual cognitive filters, which were receivers and become emitters by forwarding the recoded and re-signified information to institutions - analogically, now emitters. In this perspective, this communicative process is related to the gathering of information and construction of knowledge itself that analogically would be the message that had been captured and suffered interference and modification.

As pointed out by Lévy (2015), this informational flow and generation of knowledge occur in cyberspace and, associated to the evolution in social configurations, bring an interconnection between individuals with

the shortening of physical and geographical distances (SZABÓ, GONÇALVES DA SILVA, 2007), as observed in the current relationships and in the projects listed above that allow the contribution of users regardless of their locations, beliefs or relation between themselves and the institution.

In this perspective, the conception of social capital that has the potential to filter the gigantic supply of information in the computer network according to specific needs is perceivable (COSTA, 2009) and is complementary to the proposal of collective intelligence as a collaborative approach in information and knowledge management. This is what is observed in the analysis of the projects of the thirteen selected scientific institutions, of which eleven use unrestricted collective intelligence, allowing more democratic access to contribution since individuals with Internet access from any location could collaborate with the project development and filtering of information for submission to institutions. Given that the channel used for crowdsourcing is the Internet, as explained by Lévy (2015), it is feasible to use the border expansion of the space that it offers along with access to a greater diversity of knowledge to favor this collaborative form of search.

Only two of the institutions have restricted comprehensiveness projects. In Catalyst for Collaborative Solutions, the attendance restriction is for those who are not students from Stanford University, to which the project belongs. In Connecticut Turtle Atlas, participation extends to those who are interested in it, but the availability of travel to Connecticut is required - as some of the steps involved require in-person participation in proposed fieldwork.

The high dependence on virtual environment for the use of collective intelligence in research projects is almost unanimous, with one exception: Catalyst for Collaborative Solutions presents an average level of dependence, since, by restricting participation to students of the university that hosts the project, it ends up centralizing geographically the participating users, who could come to know the project and contribute to it through channels other than the Internet, such as meetings and face-to-face interviews. Nevertheless, the dependence on the virtual environment on this project is marked as a medium because of the facilitation, speed of access, and organization of the information that this environment provides, favoring the qualitative development of the research.

In relation to the knowledge management models that the selected institutions use, all aim to achieve new cognizance through the collaborative construction of knowledge, thus favoring the step of searching for knowledge to the detriment of the practice of acquisition. According to the concept of Rubenstein-Montano et al. (2001, p.7 apud Jannuzzi, Falsarella and Sugahara, 2016, p.102), the selected institutions have a descriptive structure of knowledge management, as they determine the steps to be taken to build the cognizance that will aid in specific solutions to what they are looking for, and as they characterize how knowledge management is and will be done in their projects.

Thus, in order to achieve new knowledge that they aim for, the institutions make use of collective intelligence in their search phase for collaborative construction of knowledge, based on tacit information that ordinary individuals can offer and which will then be transformed into explicit knowledge in the organization , which - according to Jannuzzi, Falsarella and Sugahara (2016) - configures the creation of knowledge itself: the information of collaborators going through the field of tension and being decoded and assimilated by scientific institutions in the form of knowledge.

In this way, most institutions use collective intelligence to identify content to the detriment of solving a specific problem, since in this way it is possible to consider a greater multiplicity of individual cognizance and to contemplate knowledge in diverse forms and areas of comprehension, such as proposed by Lévy (2015). Thus, the research extends to a larger number of participants and it is possible for the institution to have greater control over it, since the organization specifies the point at which it wants the collaborative action and, from this contribution, will continue or finish the research with its own resources.

The projects presented by the institutions mentioned in this research cover different areas of knowledge, but an emphasis is given to the greater propensity of those related to biological sciences and nature to use collective intelligence, since in these areas there is also a greater propensity to the overture to collective intelligence in the steps of knowledge management in which it can act: creation, acquisition and organization of knowledge. (JANNUZZI, FALSARELLA, SUGAHARA, 2016)

The access of users who contribute to the institutions is done via a web page, with global reach, most of which are in English. It is assumed that this is the most widely spoken language in the world so the users' approach to collaboration in the projects is facilitated.

6. Conclusions

The elaboration of the present study focused on the analysis of projects related to scientific research collaborating or not on sustainable actions. It was considered the impact that virtual environment brings to the development of these projects, mainly focusing on the use of collective intelligence as a collaborative tool for generation of knowledge.

It was observed from the collected data that the scientific institutions that make use of crowdsourcing are, in great majority, highly dependent on the virtual environment; do not restrict participation through specific criteria; and have predilection for knowledge acquisition in the form of identification of diverse contents, which is in line with the initial proposal of crowdsourcing: to mobilize participation of the collectivity, regardless of physical, scientific, cultural or socioeconomic frontiers, for the construction of a collective knowledge. Therefore, such a practice is in accord with the view that individuals carry knowledge of different forms and areas, that can be shaped in order to meet diverse demands, and it must be valued.

The use of collective intelligence is an encouragement to the sharing of knowledge housed in an individual cognitive for an explicit plan, in which an infinitely greater number of people will be able to access it, complement it and build a knowledge that belongs to many. Thus, by embracing people from different perspectives, the possibility of building more diverse and rich knowledge is increased exponentially, which facilitates the achievement of objectives proposed by projects and brings dynamism to the institutions that make use of collective intelligence.

In this sense, crowdsourcing optimizes knowledge management by supporting the functions of creating and acquiring knowledge, and by enabling the organization of the information flow, since it can be used as a sensitive intelligence to the specific particularities that must be selected from the gigantic content available in cyberspace, considering the information that is useful and can contribute to the development of the projects in question. Crowdsourcing shows itself as an immensely useful tool that enriches the knowledge process and brings benefits to both parties: individuals and institutions.

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