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Enabled Innovation: Instruments and Methods of Internet-based Collaborative Innovation

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Abstract: *Crowdsourcing has become a widely applied practice in the context of innovation and problem solving. The paper provides first an overview of the state-of-the-art in crowdsourcing in terms of definitions used, application areas, players involved as well as processes and tools. Then potential future forms of crowdsourcing are discussed. Finally, based on the results of the first two parts future research questions are extracted.*

Introduction and Motivation

Since the moment we started to use Internet broadly in everyday life and in business, its use has continuously resulted in decrease of transactional costs for communication, coordination and collaboration on a global scale (Downes & Mui 2000). For example, even with the rather limited capabilities in terms of speed and visualization of the early Internet in the 1990s, it enabled global online communities. For the first time people from all over the world were able to get together virtually without time and space limits in order to discuss topics of common interest and even to cooperate, to collaborate and to be creative together. Existing niche phenomena as open source communities and open source software, which are based on community collaboration and production, started to flourish (von Hippel & von Krogh 2009). Such open source communities are run completely by and for users. They have entirely redefined the process of software development and have resulted in software innovations (see also von Hippel 2001).

The second evolution phase of the Internet broadly called Web 2.0 (O'Reilly 2005), or the participatory and social web, enforced this trend of decreasing transaction cost for communication, collaboration and cooperation. In addition, the possibilities for users to interact, get involved, participate and to create content increased tremendously. Even more, this evolution towards Web 2.0 happened in parallel with other technical developments that according to von Hippel (2005) improved radically and rapidly the users' ability to innovate. Examples of such technical developments are: the emergence of high quality and affordable digital cameras, smartphones with embedded digital cameras, affordable software for content manipulation and easy-to-use tools and components for innovation such as programming tools for software and sophisticated design tools for various types of products. The ever increasing

number of Internet users all over the world was able to create pictures, videos, to blog and to create so called user generated content in different forms. A new participatory culture spread on the WWW. Users do not passively consume content any more, but extensively contribute to its creation. New types of online platforms such as for instance Wikipedia, YouTube and Facebook emerged, which are summarized under the term social media. Social Media support creation, upload, sharing (Stanoevska-Slabeva 2008) and collaborative creation of user generated content.

With the help of such platforms people all over the world can share ideas and comments, can create together knowledge, can improve, discuss and rate existing ideas and concepts in real time, and can collaboratively even implement innovations. Taking advantage of the improved Internet technologies as well as platforms for supporting and enabling the creation of user generated content, users started to unite and to consolidate in new global creative communities. One well known example of such platforms is Wikipedia. All these advances resulted in “... *the democratization of the opportunity to create ...*” (von Hippel 2005).

Those new developments affected also the relationships between companies and their stakeholders. The lower transaction costs enabled companies to define the relationships to different stakeholders in a new way. As transaction costs were diminishing, companies were able to outsource processes to external players (Downes & Mui 2000). In general, different stakeholders were becoming more and more closely involved in different processes of companies. Or as (Malone et. al. 1989) describe it: “*Information technology will lead to an overall shift toward proportionately more use of markets—rather than hierarchies—to coordinate economic activity.*”

One major change happened in the relationship of companies to customers. Terms as prosumers, open innovation, crowdsourcing denote the changing

relationships of companies to their customers and the participatory users on the web. From passive consumers of defined products, customers are becoming increasingly part of innovation processes in companies. The Internet as a communication medium is the basis for new tools and platforms that are enabling efficient collaboration as well as collection and sharing of contributions from a large number of customers and users on a global scale. With the help of such platforms companies are increasingly involving customers and users into their innovation processes. The form and intensity of this involvement varies; starting from crowdsourcing of ideas, for example for new products, over rating of such ideas, to collective implementation of such ideas. Global Internet-based collaborative innovation processes contribute increasingly to innovation processes in companies.

The goal of this article is to provide an overview of the available body of knowledge related to Internet-enabled innovation and concentrates on three aspects:

1. To provide an overview of the state-of-the-art in Internet-based innovation in terms of used definitions in literature, as well as published concept, approaches and tools.
2. To illustrate potential future trends in crowdsourcing on the example of user initiated crowdsourcing as well as crowdsourcing practices in the media industry.
3. To identify and summarize potential future trends and future research directions in Internet-based collaborative innovation.

In accordance with the article's goals, its content is structured as follows: *Chapter 2* provides an overview of definitions and relates different terms denoting user innovation. In the remaining chapters, the paper focuses on crowdsourcing. *Chapter 3* provides a comprehensive state-of-the art overview of literature related

to user innovation in crowdsourcing. *Chapter 4* illustrates potential future trends on two examples. *Chapter 5* includes a discussion of results and concludes the paper with a proposal for future research directions.

Internet-based Collaborative Innovation:

Definition and Classification

In general Internet-based innovation is a broad term summarizing any kind of innovation approaches which is enabled in an efficient and global manner by information and communication technologies and where the users, i.e. customers or the online crowd are the main innovators. Several different terms have been used in literature to denote the new active users and customers and their involvement in innovation processes: prosumers and lead-user innovation, crowdsourcing, open innovation and open source software innovation. Below all terms are explained shortly based on definitions in literature and related to each other.

Prosumers and Lead-User Innovation

Most of the concepts for Internet-based innovation are based on or draw from the concept of active customers that are at the same time producers. i.e. *prosumers*. The vision to involve customers in the production process has a long tradition and goes back to Alvin Toffler (cited in Klein & Totz 2004), who introduced the idea to involve consumers as co-producers, i.e. prosumers, into the value chains of companies in 1972. Under the pressure of increasing price competition in the 90s, and enabled by the Internet, companies started to involve customer through digitalized processes to voluntarily take over part of the value generation. A well known example are banks, which based on e-banking involved the customers in

services such as cash collection through automated teller machines, self-processing of payments and similar.

In order to denote the involvement of customers in the innovation process, von Hippel (1978, 1986) described the important role of the user in innovation and introduced the term *lead-user innovation*. According to him (von Hippel 2005) lead-users have the following two characteristics: “... *they are ahead of the majority of users in their populations with respect to an important market trend, and they expect to gain relatively high benefits from a solution to the needs they have encountered there.*” (von Hippel 2005). Thus, lead-user innovation is related to available products, and is based on the experience of the user with the product and his background.

Other concepts related to Internet-based innovation that require active users and customers are crowdsourcing, open innovation, open source software development and user innovation communities.

Crowdsourcing

The term crowdsourcing was introduced by Howe (2006) in order to denote the new phenomena of outsourcing to the crowd. Howe (2006) provided also the very first definition of crowdsourcing as follows: “... *crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined and generally large network 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 in the wide network of potential laborers.*”

More recently in his blog, Howe (2008, 2009) consolidated the definition in the following form:

- *“The white paper version: crowdsourcing is the act of taking a job traditionally performed by a designed agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call.”*
- *“The sound bite version: The application of open source principals to fields outside of software.”*

Based on the original definition of Howe (2006) other authors provide extended definitions that concretize the generic terms used by Howe. For example, (Gassmann et. al. 2010), specify the tasks that are sourced from the crowd as being mostly knowledge generating and problem-solving tasks, but also repetitive tasks. They furthermore, concretize that the open call is supported through a Website.

Both definitions point to the distinguishing features of crowdsourcing:

- It is initiated and coordinated by a company that outsources an existing task or has a problem that needs a solution.
- It is directed to the crowd and not to companies and individual users.
- The usual way to initiate crowdsourcing is through an open call over the Internet.

According to Surowiecki (2005), a crowd can be defined as a large set of anonymous individuals. Implicit in this definition is the idea that a firm cannot build its own crowd. The strength of the crowd is the possibility to choose from the contribution of many contributors with different backgrounds, qualifications and talents.

Open Innovation

According to Chesbrough, Vanhaverbeke & West (2006) “[...] *open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation respectively.*” With this definition the authors imply two types of open innovation knowledge flows: 1) inside-out or outbound knowledge flows involve knowledge developed within the firm and made accessible to other firms; 2) outside-in or inbound flows refer to knowledge developed in the environment and being integrated by the firm.

Open Source Software Communities

While crowdsourcing and open innovation are initiated by companies other forms of Internet-based innovation can be completely initiated and carried out by users. One of the earlier phenomena of user-initiated Internet-based innovation is open source software communities. They emerged in the late 80s, but spread more intensively after the broad diffusion of Internet. According to (von Hippel and von Krogh, 2009), “*Open source software is software that is made freely available to all. Open source software development projects are Internet-based communities of software developers who voluntarily collaborate to develop software that they or their organizations need ... Well-known examples of open source software having many users are the GNU/Linux computer operating systems, Apache server software and the Perl programming language.*”

The characteristics of open source software communities can be summarized as follows (see also von Hippel & von Krogh 2009):

- They are initiated by one or several users that need certain software for intellectual, personal or business reasons. Thus, open source software communities have no connections to companies.

- The users participate voluntarily and for free in the software development process.
- The functioning of open source software communities is enabled by online platforms providing specific functionalities for cooperative development of software.
- During their existence, open source software development communities create certain organizational and communication structures that enable an efficient and successful coordination of all development activities as well as management of the various software releases.
- The final product is a specific software that can be further developed and used for free not only by members of the development community, but also by any user and company.

User Innovation Communities

The concept of user innovation communities was introduced by (von Hippel 2001, 2005). He introduced the term to denote user innovation communities that function according to similar principles as open source software communities, but are not restricted only to software or information products, but can also incorporate user development of physical products. Thus, user innovation communities refer to a broader phenomenon compared to open source software communities. According to (Von Hippel 2005), user innovation communities are defined “... as meaning nodes consisting of individuals or firms interconnected by information transfer links which may involve face-to-face, electronic, or other communication. These can, but need not, exist within the boundaries of a membership group. They often do, but need not, incorporate the qualities of communities for participants, where ‘communities’ is defined as meaning networks of interpersonal ties that provide sociability, support, information, a sense of belonging, and social identity ...”

von Hippel (2001) furthermore defines the basic preconditions necessary to be in place for a user community to be possible: 1) at least some users have sufficient incentive to innovate; 2) at least some users have an incentive to voluntarily reveal their innovations and the means to do so; and 3) user-led diffusion of innovation can compete with commercial production and distribution.

Relationship among Different Concepts of Internet-based collaborative Innovation

The phenomena of an active customer, i.e. prosumer, and the active Internet user as the main member of the crowd as well as a participatory culture are the basic prerequisites for Internet-based collaborative innovation. All types of Internet-based innovation imply an opening up of the innovation processes of companies towards contributions from outside the company. Even though the phenomena denoted by terms related to Internet-based innovation have many similarities and are often used in literature interchangeably, they also have differentiating features. One basic difference is given by applying the criterion of who is initiating the innovation process. While open innovation is mainly company-initiated, open source software development and user innovation communities are purely user-initiated innovation processes. Crowdsourcing is mainly initiated by companies as well, but can also be initiated by users. There are also some differentiating features among the concepts within these categories of Internet-based innovation.

The differences among open innovation and crowdsourcing, as mainly company initiated approaches can be summarized as follows: The first is that open innovation is applied within innovation processes, while crowdsourcing is applied also within other processes in companies as for example marketing (see for example Whitla, 2009). The second difference is that open innovation also

implies knowledge flows between firms while crowdsourcing refers to links between a firm and the crowd as a large set of anonymous contributors. According to (Schenk and Guittard, 2011) crowdsourcing can be considered “... as a way to implement outside in knowledge flows with the crowd as a particular knowledge provider.” Thus, it can be considered as a subset of open innovation. The third distinguishing feature is the intensity of dependence on information and communication (ICT) technologies. While certain forms of open innovation are based on conventional means of communication, crowdsourcing is more dependent on ICT as a necessary mean for attracting and hosting the activities of the crowd and for coordinating and aggregating the contributions of a large number of users.

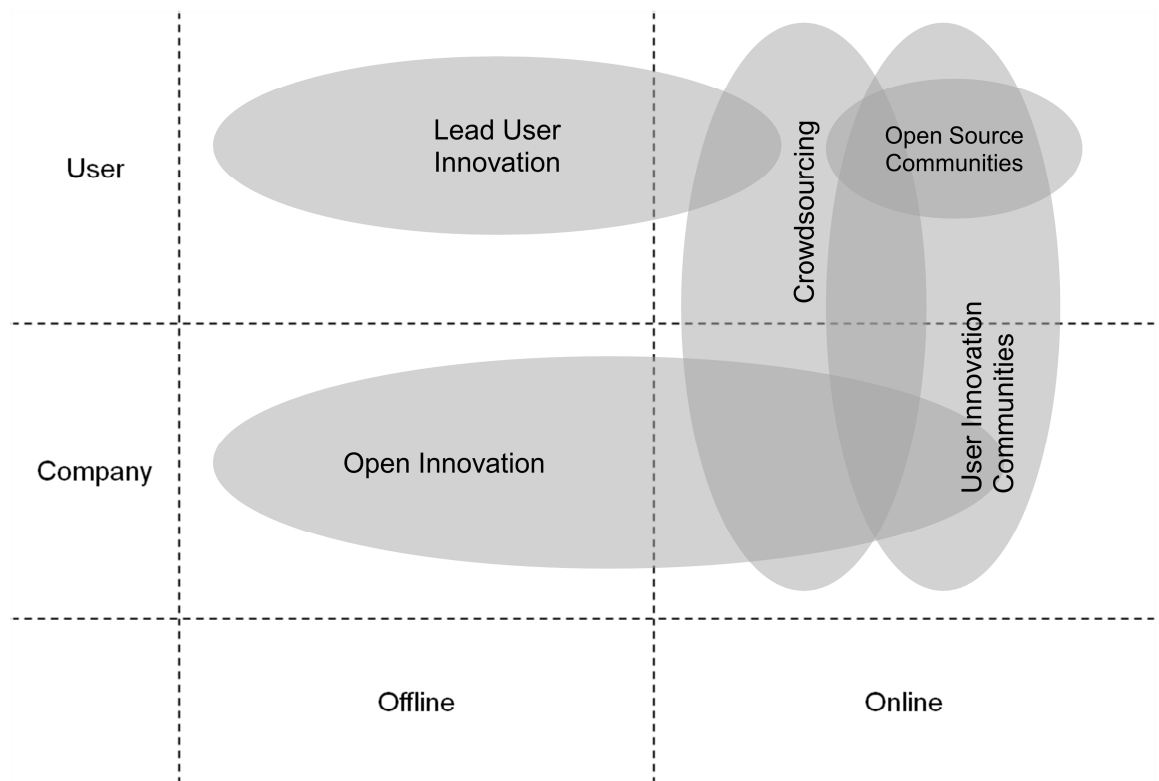


Figure 1: Interrelationships among different approaches for Internet-based innovation

The differences among the user-initiated Internet-based innovation approaches have been sketched in their definitions above. The concept of user innovation communities compared to the concept of open source software communities is a broader term that refers not only to co-creation of digital products, but also physical products.

Figure 1, relates all concepts together in a matrix where the vertical axis denotes the potential initiators and the vertical axis the environment in which the innovation processes happen. Since crowdsourcing is the main form of purely Internet-based collaborative innovation, that is part of many other forms of Internet-based innovation and can be both company- and user initiated, the remaining part of the paper will focus on it.

State-of-the-art in Crowdsourcing

The goal of the state-of-the-art analysis of research in the field of crowdsourcing is to provide an extensive overview of the available body of knowledge related to it and to illustrate current developments on published single examples. The state-of-the-art analysis will focus on classifying crowdsourcing and providing an overview of available knowledge on relevant aspects of crowdsourcing. It is based on an extensive and systematic literature research and review. Besides providing an overview, the literature review will also provide the bases for identification of future research trends in crowdsourcing in particular and Internet-based innovation in general.

Classification of Crowdsourcing Approaches

In literature two basic approaches to classify crowdsourcing can be identified: 1) based on the type of task that is crowdsourced. A representative classification in this context is the classification provided by Howe (2008), and 2) based on the

initiator of crowdsourcing. A representative classification according to this criterion is given by (Gassmann et. al. 2009). Both classifications are summarized below.

The classification of Howe will be taken as starting point to relate also classification of other authors. By applying the criteria, type of task outsourced to the crowd, Howe (2008) classifies crowdsourcing in three main categories:

- The first category is the *idea game* which is essentially just a massive call for ideas. A broadly published example of an idea market is the IBM Jam (for a detailed description see (Bjelland & Wood 2008)). In 2006 IBM initiated a global idea jam related to the question how to best use and efficiently commercialize existing technological developments in the company. The global 'Innovation Jam' took place in two three-day phases in 2006. It involved 150,000 IBM employees, family members, business partners, clients (from 67 companies) and university researchers. Participants from 104 countries jammed and conversations continued 24 hours a day. In its press releases IBM described the Innovation Jam as "*the largest online brainstorming session ever*". The discussion and sourcing for ideas was pre-structured in six major categories of emerging technologies and each of the categories comprised several subtopics. The task of the crowd was to brainstorm about potential new ways how technology developed at IBM might be applied by IBM to enhance existing or develop new products. More than 46,000 ideas were posted. Phase Two of the Innovation Jam was devoted to 'refining' ideas from the first phase. The Innovation Jam uncovered and mobilized support for substantial new ways of using IBM technology.

This kind of crowdsourcing is considered as 'selective crowdsourcing' by (Schenk & Guittard 2011). The company initiating the process of

crowdsourcing has to choose one solution from all solutions provided by the crowd. Selective crowdsourcing in general implies a winner takes it all mechanism where only the creator of the winning solution is rewarded.

- The second form is the *problem solving or crowd casting network* in which someone with the problem broadcasts it to a large undefined network of potential solvers. For example, the shoe company 'Fluevog' is crowdsourcing designs for new shoes. Another example is the online platform InnoCentive on which companies can source for solutions for scientific problems. These two crowdsourcing examples are also selective crowdsourcing. However, according to (Schenk & Guittard 2011), this type of crowdsourcing can also be 'integrative' or consolidating crowdsourcing. The goal of integrative crowdsourcing is to create a complete solution by integrating complementary contributions from the crowd. An important aspect of integrative crowdsourcing is the definition of clear interfaces among single complementary contributions.
- The third category is the *prediction market or information market* in which investors from the crowd buy and sell futures related to some expected outcome such as the presidential election or the Oscar for the best picture (Howe, 2006). The prediction market is applied for questions related to assessment of future scenarios (for an extensive literature review on prediction markets see also Tziralis and Tatsiopoulos, 2007). One example of a prediction market is the Hollywood Stock Exchange (HSX). HSX is an online simulation, where registered users can trade in movie stocks. *"Participants start with a total of 2 million so-called Hollywood dollars, and can manage their portfolio by strategically buying and selling stocks"* (Elberse & Jehoshua Eliashberg 2003). HSX participants trade in movie stocks based on their information about the star power, trailers or other advertising

products (e.g. press releases) in the prerelease period. Single movie stocks and ranking lists of price changes on the HSX are an explicit aggregation of the opinions of the involved HSX participants and opinion leaders. The HSX ranking lists are an important predictor of the first weekend and overall box-office sales of a movie.

The second representative classification of crowdsourcing approaches is provided by (Gassmann et. al. 2010) and is based on potential initiators as classification criteria of the crowdsourcing activities. According to these criteria, the authors identify five different crowdsourcing approaches:

1. Crowdsourcing initiated and supported by *intermediary platforms*. (Gassmann et. al. 2010) further divide this category of crowdsourcing in the following subcategories: intermediary platforms for research and development, for marketing and design, for freelancers and for idea-generation.
2. *User initiated crowdsourcing*, which is further subdivided in user websites and open source software communities.
3. *Company initiated platforms*, which are platforms that are created and maintained by companies. Such platforms are typically integrated within the companies' online activities. They are further divided in the following subcategories: product ideas and problem solutions as well as branding and design.
4. *Idea market places*. An example for this type of crowdsourcing is the company Spreadshirt which allows users to design their own spreadshirt designs and produces only those spreadshirts that are mostly liked by the participating customers. Other such similar examples are Threadless or CafePress.

5. *Public crowdsourcing initiatives*, that means initiatives that are similar to the previously mentioned ones but which are initiated by public authorities. One example mentioned by the authors (Gassmann et. al. 2010) is the idea-generation campaign, which was initiated by the Irish government in order to collect ideas from the population regarding the question how to achieve higher economic growth.

Application Areas of Crowdsourcing—What can be crowdsourced?

An interesting question is what at all is crowdsourcable? Is any task or problem suitable for crowdsourcing? Or phrased in another way, for which tasks can companies expect a successful implementation of crowdsourcing? According to (Schenk & Guittard 2011) in general crowdsourcing is a priori not relevant for production tasks. They rather consider it to be relevant “... *to perform information on knowledge related tasks involving low fixed equipment costs. In general, crowdsourcing makes it possible to mobilize competences and expertise which are distributed among the crowd. Competence generally refers to the ability of an individual to achieve a set of tasks.*” (Schenk & Guittard 2011).

(Gassman et. al. 2010) list in their definition three types of tasks that are subject to crowdsourcing: problem solving, idea generation and repetitive tasks. However they do not describe the suggested types of task in more detail. A more detailed exploration of the suitable tasks for crowdsourcing is provided by (Schenk & Guittard 2011). According to them, crowdsourcable tasks can be classified based on the required competences of the individuals in the crowd into three types: simple, complex and creative tasks.

Simple tasks. According to (Schenk & Guittard 2011), simple tasks are easy to describe and do not require a high cognitive effort and expertise to be understood

by a broad, anonymous mass of individuals. Moreover, their completion requires a relatively low involvement from individuals. When simple tasks are concerned, the added value of crowdsourcing does not stem from individual abilities but from the low cost realization of tasks on a large scale. Therefore, financial incentives in crowdsourcing of simple tasks do not go beyond micro payments.

An example of a simple task crowdsourcing is the OpenStreetMap project, where geographic data is collected and pooled together in order to establish a world map under the creative common license. In this project, contributions are voluntarily and incentives may include self-benefits from the system or the satisfaction of contributing to a public good (Schenk & Guittard 2011).

Complex tasks. According to Cambell (1988), complex tasks are characterized by the following features: multiple potential outcomes, multiple potential solution path and presence of uncertainty. Their understanding and performance requires special expertise, problem solving abilities and involves knowledge intensive activities. According to (Schenk & Guittard 2011), the notion of scale does not enter into account (as opposed to simple tasks crowdsourcing), but the firm facing an unsolved complex problem hopes to benefit from expertise and problem solving skills of individuals within the crowd.

Crowdsourcing of complex tasks only makes sense when the required expertise and skills are distributed among the anonymous individuals of the participating crowd. Thus, the required expertise and the relevant incentive schemes are typically problem-specific. This kind of crowdsourcing typically involves a higher remuneration. Complex tasks are related to new product development in innovation projects where the problem solving can be regarded as a complex process.

A specialized intermediary for crowdsourcing of complex tasks is the platform InnoCentive (Lohse 2010). The InnoCentiv platforms is an intermediary which on the one hand, supports companies to publish their complex tasks within research and development activities and, on the other hand, was able to create a Solver-Community consisting of more than 200,000 experts and scientists.

Creative tasks. Creative tasks are where creativity and uniqueness have the highest priority. Typical examples of creative tasks are the design of logos or similar marketing material. The main goal of a company crowdsourcing creative tasks is not to have a problem solved but to rather benefit from the creative power of the interdisciplinary crowd. (Schenk & Guittard 2011) suggest that regarding creative tasks incentives or participants can be very heterogeneous, ranging from monetary driven to passion-driven involvement. As a matter of fact, observation of crowdsourcing platforms for creative tasks indicate that remuneration associated with crowdsourcing of creative tasks is of an intermediate amount, usually of a few hundred dollars (Brabham 2008, 2009).

At least one of the above described types of tasks or even all three types can be identified in many industries. Thus, crowdsourcing is spreading among all industries and there is a growing body of literature describing case studies and crowdsourcing projects in various industries: for example, in the film industry (Geisler, Willard et al. 2011), in the creative industries (Berthon, Pitt et al. 2008), in retail (Dubach et al. 2011), (Friesike et al. 2010), in high tech industries (Bjelland & Wood, 2008).

An emerging application field of crowdsourcing is also science (see Howe 2006). Several published case studies show that, data collection and analysis tasks in different scientific disciplines can be outsourced to the crowd (Dickinson,

Zuckerberg et al. 2010). This new trend is called 'Citizen Science'. For example, users have proven to provide valuable contributions in the analysis of satellite pictures with high efficiency (Fritz & McCallum et al. 2009), (Viotti et al. 2010).

Meanwhile, crowdsourcing is applied in public hearings as well. (Brabham 2009) describes the application of crowdsourcing by the German Enquete Kommission des Deutschen Bundestages Internet und Gesellschaft. Another emerging application is also crisis management (Goodchild and Glennon 2010; Zook et al. 2010).

There is a growing body of literature that describes crowdsourcing in different industries and applications. A considerable number of articles describe the application of crowdsourcing to the collection of geographic information. For example the contribution of the crowd to collect and aggregate real world data and to aggregate it in a online map system such as Openstreetmap, has proven very helpful to quickly create a critical mass of such information (Haklay & Weber 2008).

Also a considerable body of knowledge deals with the application of crowdsourcing by companies (Vukovic 2009, La Vecchia, Cisternino et al. 2010, Osamuyimen, David et al. 2010). Interesting in this context is the differentiation of La Vecchia et al. 2010, who distinguish among two models of crowdsourcing: a 'contest' model and a 'marketplace' model.

Players Involved in the Crowdsourcing Process

The two main players in crowdsourcing are on the one side companies, who provide the problem that needs to be crowdsourced and users, i.e. the crowd, the individual participants that provide the solutions. As a third player, there are also

intermediaries who enable the process of crowdsourcing by providing specific platforms and services for companies and for the users.

All three players take over different roles and tasks in the CS process. The companies typically provide the problem, which is outsourced to the crowd. Even though most crowdsourcing initiatives are directed towards an unknown crowd, big globally active companies can apply crowdsourcing also within the company and direct it to employees. With other words, global enterprises have crowds of employees at their disposal. Involving everybody from the executive level to the operational level represents a new form of expertise sharing and competitive intelligence that encourages a type of informality helping to reduce existing or perceived barriers, hierarchies and distances. Good examples are the Lufthansa wiki and Wal Mart Blog, both calling for ideas to reduce energy consume.

In order for a company to be able to use crowdsourcing it has to have an open innovation culture open for extant contributions into the own innovation process. Another important aspect of the companies as a player in crowdsourcing is also their willingness to accept the solutions as a result of the crowd activities.

Companies can apply crowdsourcing in two ways: 1) As an ongoing activity, or 2) as single activities that are initiated once or from time to time. Examples for ongoing activities are Tschibo (Friesike et al. 2010), Starbucks and others. A successful example of a single crowdsourcing activity is the idea sourcing for the kiosk of the future of the company Valora Retail (Dubach et. al. 2011). Permanent crowdsourcing activities are typically supported by an own platform that is set up and managed by the company itself, while single activities are rather executed in cooperation with intermediaries.

The second player which intermediates between the companies and the crowd are specific intermediary platforms (see also Füller et. al. 2010). Examples of such intermediary platforms are InnoCentive (Lohse 2010), Jovoto in Germany,

Atizo (Hirsing & Hirschmann 2010) and similar platforms. Intermediaries provide the platform where companies can place their requirements while users can provide their solutions. Depending on the type of the problem, the intermediaries provide different kind of support, starting from helping the company to describe the problem to different possibilities for the crowd to contribute. One of the most important services of intermediaries regarding the crowd is also assuring that relevant participants can contribute to a specific problem of a company. An example in this context is Jovoto, a platform in Germany, which cultivates a crowd of designers and other creative users and by specializing in this area, provide the guarantee that the right crowd with right qualifications and background will participate in the crowdsourcing endeavor. At the same time, the platform provides the necessary tools and instruments for the users in order to enable an efficient participation. This basically means registration possibilities, then search for requests by companies, different kind of design tools for contributions, then different possibilities for communication among the crowd, evaluation of content and similar. With this, the intermediaries play an important role, in particular providing opportunities for crowdsourcing also to companies that don't embrace this as a continuous process but from time to time use it in order to solve very specific problems. Some companies have created their own platform as for example Migipedia¹, the crowdsourcing platform of the retailer Migros in Switzerland.

The third and most important player in crowdsourcing is the crowd. In the literature the need to attract the right crowd has been stressed as one important key success factor (see for example Howe 2006). For example in case of crowdsourcing of design tasks, a higher potential for getting interesting results is by having a high number of representatives which have a creative background

¹ www.migipedia.ch

(see also Howe 2006). In this context one important role is played also by intermediaries that are able to attract crowds with specific background. See for example: Jovoto.com a crowdsourcing platform for designers.

Further aspects that are considered as important and related to the users are:

- Are the members of the crowd known to each other and can they see each other's contributions? For some types of crowdsourcing as for example prediction or information market, the analysis of the user behavior has shown that the results are better if members of the crowd don't know each other and cannot see the contributions of others' (see Howe 2006).
- Motivation to participate is also an important aspect broadly discussed in literature see for example (Brabham 2008, Brabham 2009), (Kleemann et. al. 2008). (Proulx, Heaton et al. 2011) discuss the conflict among self responsibility, an empowerment of the user and the need to follow the rules of a platform.

The Crowdsourcing Process

Existing literature delivers various attempts to give an overview of crowdsourcing related processes identifying and analysing the underlying characteristics. Malone et al. (2010) adopted a biological metaphor determining the genome of collective intelligence systems as the combination of building blocks he refers to as genes. Thus, he delivers an instrument to characterize real examples. Geiger et al. (2011) developed a taxonomy framework of crowdsourcing partitioning the process in five phases from the preselection of contribution to the remuneration. Different combinations of process characteristics describe single different crowdsourcing examples. Doan et al (2011) identified nine dimensions related to crowdsourcing. An aggregated view on the crowdsourcing process is provided by (Gassmann et. al. 2010), who

consider 5 steps: 1) Preparation, 2) Initiation; 3) Execution; 4) Evaluation; and 5) Exploitation.

Before the company can start with the specific crowdsourcing processes, a strategic decision has to be taken to crowdsource or not. Companies have to evaluate if crowdsourcing is suitable for identified tasks and problems and if it can be integrated in their existing innovation as well as research and development processes. In case a positive decision is taken in favor of crowdsourcing, further aspects that need to be clarified are as follows:

1. What are the tasks and problems that crowdsourcing is going to be applied for and is crowdsourcing going to be an ongoing activity or just single projects from time to time?
2. Is an own crowdsourcing platform justifiable or rather the cooperation with an intermediary the right solution?

Based on the strategic decisions above, the specific crowdsourcing policy and governance framework for a company is created. In context of this framework, single crowdsourcing processes take place.

According to (Gassman et. al. 2010), the specific activities in the five processes phases of crowdsourcing can be summarized as follows (see figure 2):

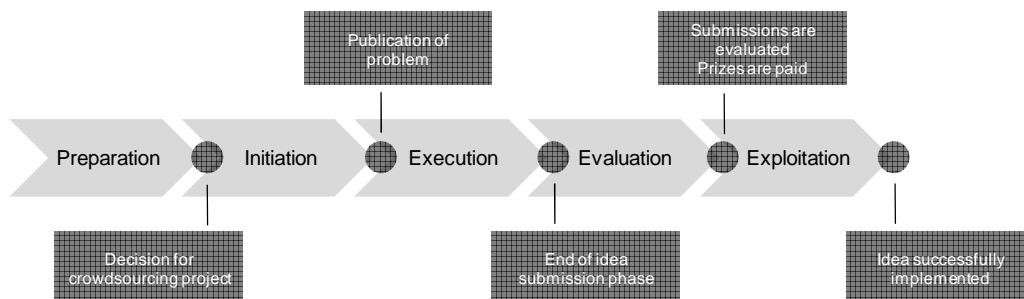


Figure 2: The crowdsourcing process according to (Gassmann et. al. 2010)

- In the preparation phase, the problem or task is identified that is going to be crowdsourced. Furthermore, necessary contracts with intermediaries are defined.
- In the initiation phase of the crowdsourcing process, all preparation activities take place. The concrete wording of the description of the task or problem is defined (see for example Dubach et. al. 2011), the evaluation criteria and procedures are selected, the online publication is prepared and eventually a crowdsourcing platform is developed and set up, and further awareness creating activity are identified and prepared.
- In the execution phase the requests by the company is published and the crowd provides their solution proposals. The company might provide support in form of: clarification, answers to participants' questions and other kind of support to the participating individuals (see for example Dubach et. al. 2011). In this phase, a critical success factor is also the prevention of malfunction and misuse of the platform. Furthermore, an intensive quality control is necessary (see for example O'Neil 2010, and Giles 2005).
- After all contributions are collected, they are assessed and evaluated by the company in the evaluation phase. Depending on the number of contributions, this can be a resource and zime consuming process. Thus, the availability of sufficient resources inb the company is a critical success factor (Dubach et. al. 2011). The evaluation phase ends with the selection of the winning contribution of the crowd and the remuneration of the winners.
- In the exploitation phase, the company translates the solution provided by the crowd in products, services and/or their features and involves them to the innovation and implementation process.

Summary of Findings Regarding Crowdsourcing

Crowdsourcing is becoming an established process with established value chains, platforms and procedures (Gassmann et. al. 2010). In the participatory society in which we live today, crowdsourcing has the potential to become the usual way of communicating with customers and users. In its basic form, crowdsourcing is initiated by companies. It requires a well defined task or activity that is outsourced to the crowd. Crowdsourcing is enabled by platforms on which the contributions by the crowd can be collected, classified and evaluated. The crowd provides ideas and evaluates them and can also creatively participate in the implementation of the ideas. The main steps in a crowdsourcing process are to define the problem and structure it, to publish the problem and acquire the crowd, to collect contributions, to quality check, classify and evaluate the contribution, to select the winners and to remunerate the contributors.

The critical success factors for crowdsourcing as it is currently applied are the following: careful selection and clear definition of the task that needs to be crowdsourced, acquiring the right crowd, defining a motivational and remuneration strategy for users and an open innovation culture in the company (see also Howe 2006 and Gassmann et. al. 2010).

What are the major limitations of crowdsourcing as it is defined right now? First of all, the biggest limitation comes from the way how crowdsourcing happens today. It is applied to already well identified and defined innovation problems and requirements from within the companies. This means that the specific problems that is crowdsourced stems from the company and is shaped from the internal cognizance of the company. Many examples show that crowdsourcing for pre-defined problems can provide very interesting and innovative results, which companies might not have developed on their own

without the contributions from the crowd (see for example Dubach et. al. 2011 or Bjelland and Wood 2008). However, because these solutions are oriented already to a pre-defined problem, crowdsourcing will hardly result into disruptive, i.e. ground breaking and radical innovation ideas that go beyond the existing imagination of the companies. It will remain within the cognitive limits of the internal cognizance and innovation processes. Given this, the question is how can companies overcome this limitation? Is bottom-up crowdsourcing, without a precisely defined problem or task possible? Furthermore, will the companies remain the only initiators of crowdsourcing in the future?

New Trends in Internet-enabled Innovation

This chapter illustrates potential future trends and developments in crowdsourcing based on two examples: the example of user initiated crowdsourcing and the example of crowd harnessing in the media industry.

User-initiated Crowdsourcing

According to the basic definition of crowdsourcing, its main initiators are companies. However, existing online platforms which support the creation sharing and collaborative creation of user generated content in many cases provide suitable environments where users can become the initiators of crowdsourcing as well. This can be illustrated on the example of the relaunch of 'Snacketti-Zwiebelringe', the onion rings product of the company Zweifel in the Swiss market (see also Kowalski, 2011 and Lüscher, 2010).

In summer 2009, two Facebook users established independent of each other a group on Facebook dedicated to the request and wish to have the product Snacketti-Zwiebelringe (onion rings) back on the Swiss market. The same product

was produced earlier by the company Zweifel. It was taken off the market 14 years ago because the market was not considered big enough by the company. Within 1 year of the launch of the groups, the groups were able to recruit together 12,000 'likers' and contributors. The voices requesting the onion rings back on the market became louder and more demanding.

The company Zweifel at first only observed what was going on at the two groups. As the groups became more popular and were able to recruit a critical mass of users, they started to communicate with the groups and considered the request on strategic level. As soon as the company started to think about the request of the users on a strategic level, they started also to communicate the different steps of the process within the two groups. Finally the users were informed that Zweifel has decided to start the production of onion rings and to introduce the product again to the Swiss market. In September 2010, 380 users, members of the two groups, participated on the opening event of the production of the onion rings.

This example of the onion rings is not the only one, where users initiate and coordinate crowdsourcing processes. In the same period in 2010 for example, about 20,000 Facebook users requested and were able to bring back on the market the product 'Yogi Drink Apfel' produced by the company Emmi. These two and other similar examples show that crowdsourcing might not be the privilege only of companies. Users empowered by Social Media platforms as well as quick and efficient communication means increasingly take over the initiative. Even more, specialized intermediaries such as CrowdTogether.com are emerging that intermediate the process of crowdsourcing among users. Thereby, the initiatives of the users are not limited to co-creation and crowdsourcing of knowledge, ideas and information. For example, the user-founders of localmotors.com claim to build the car of the future and have attracted a community of users that support

them by providing car designs and other contributions. Users increasingly take over the initiative and create ideas for products that they want and impose their requirements on the companies.

In the future, it might be possible that there will be a growing number of examples of this kind of user initiated crowdsourcing which is initiated independent of the companies. How can companies profit and basically take advantage of this development? First of all, these processes don't take place in an organized way as the typical crowdsourcing initiated by companies. They pop up and can become a big issue per chance, depending on the fact if the initiative by single users gets enough supporters in Social Media. Second, such independent initiatives might not be completely in line with the strategy of the company. While company initiated crowdsourcing usually originates out of the strategic directions of the company, user initiated crowdsourcing is independent of the strategic visions of a company. Given this, it can impose on the company requirements which have never been considered by the company. The positive aspects of this are that the company gets a clear view on what customers want.

Another aspect of user initiated crowdsourcing that might become a problem for companies is the lack of awareness for it. In order to become aware of such initiatives, it is necessary that companies have a very efficient monitoring of Social Media in place. With the help of Social Media monitoring, they can identify such initiatives early enough in order to be able to be prepared and answer in an efficient way to the requests posed by the users.

Crowd Harnessing in the Media Industry

In the media industry crowdsourcing is mainly applied for the purpose of collecting content from readers. Earlier reader contributions were paper based in the form of reader letters and comments. With the emergency of Internet and in

particular Web 2.0 and user generated content, these practices have been transferred to the Internet and increased in scale and scope. At present, a common practice at media companies is to involve so called reader reporters or even global crowdsourcing platforms as for example the platform 'Have your Say' of BBC and the similar platform of Al Jazeera (see for more details Newman 2009). These crowdsourcing practices show similar advantages and disadvantages as already described crowdsourcing platforms of companies in other industries: Media companies can chose from a growing supply of user generated content and contributions. However, they also have to cope with similar problems as other industries, such as critical mass of contributors, qualified contributors, quality control of contributions as well as selection, classification and evaluation of an increasing quantity of content provided. Another approach for aggregation of various user contributions is automatic aggregation as it is provided by Google news. However, automatically aggregated user generated content does not meet the requirements of high quality

At present, the new challenge for media companies is how to include valuable contributions of users from social media. Social media have become important agenda setters and sources of alternative information and news (see Ebermann et. al. 2009, Jarvis 2008, Newman 2009). During certain events, as for example the Iran election in 2009, social media might even be the only source of information (Ebermann et. al. 2009). As the recent Arabic revolution showed, social media have become the arena for citizen activism of any kind and by that also a prime source of information. In particular, eyewitness information is spread mainly over Social Media. Jeff Jarvis used the term eyewitness journalism to denote this phenomenon and noted in the Guardian (Jarvis 2008): "*The witnesses are taking over the news.*"

Being the main channel for eyewitness news, Social Media are fundamentally changing the way how news are broken (Newman 2009). They are "... contributing to the compression of the 'news cycle'" (Newman 2009) and are putting more pressure on editors and journalists over what to report and when. The need for selecting of relevant information and publishing in almost real time has increased tremendously. Because of their growing importance in the news and information creating cycle, many commercial and public media outlets have started to use Social Media as complementary sources of information and distribution channels (see the examples in (Ebermann et. al. 2009); (Newman 2009)). Furthermore, new approaches are being tested on how to include Social Media into routine workflow of journalists (see case study in Ebermann et. al. 2009).

In context of these developments, a new crowdsourcing or rather crowd harnessing approach that can be observed in the media practice and also by independent users is the social media content curation approach. With the term social media content curation the authors denote the new approach for creation of content based on social media that goes beyond simple and automatic aggregation. According to (Rosenbaum 2011), "... curation is about adding value from humans who add their qualitative judgment to whatever is being gathered and organized." Rosenbaum (2011) furthermore adds: "Curation is about selection, organization, presentation and evolution. While computers can aggregate content, information or any shape or size of data, aggregation without curation is just a big pile of stuff that seems related but lacks qualitative organization." According to (Rotman et. al. 2011) curation deals with large corpora of content from diverse sources and connotes the activities of identifying, selecting, verifying, organizing, describing, maintaining, and preserving existing artifacts as well as integrating them into a holistic resource. Curation thus, is a symbiosis of human and machine efforts. The

experts performing curation tasks are called curators, and in context of media content curators. Rosenbaum (2011) cites in his book Rohit Bhargava's curation manifesto, to describe a content curator as “... *someone whose job it is not to create more content, but to make sense of all the content that others are creating*”.

Social-media content curation means creating of new media genres and content based on input from social media. Curated social media content is an innovative content genre that consists of original contributions from both online sites of media outlets and social media such as tweets from microblogs, posts from social networks and videos from video sharing platforms. The selected original contributions are glued together to a story with background and context information provided by the curator (author). Social-media curated content is emerging in different formats such as books (for example the Quakebook was created based on contributions from social-media related to the earthquake in Japan), print articles, video and audio formats. Compared to the crowdsourcing platforms that require input from human contributors, curated content is assembled half-automatically from existing contributions of users in social media. Another characteristic of social media content curation is the real-time collection, selection and classification of contributions made by users.

First examples illustrate that the concept of curation or crowd harnessing is applicable also to other application areas. (Rotman et. al 2011) describe the phenomena of content curation communities based on the case of the Encyclopedia of Life. The Encyclopedia of Life (eol.org) is a cooperation project among scientists and citizen scientists and has the ambitious goal to create an encyclopedia of every known species on earth. Involved users curate existing material about species available from other sources, classify it, embed it into background and context information. The curation is performed either manually

or through extracting content automatically through APIs. One of the sources of information for the encyclopedia is also Wikipedia.

Compared to existing crowdsourcing processes, content curation introduces a new crowdsourcing or rather crowd harnessing approach. Instead of acquiring a crowd and posting a problem, already existing contributions of users in social media related to a certain topic, as for example a product, are curated. This means they are collected, evaluated, classified and aggregated. Thereby, the potential outcome is open and depends on the bottom-up contributions of users, communities or other content providers.

The question is if semi-automatic collection of content, knowledge, ideas and concepts that users worldwide publish in social media such as YouTube, Facebook, Twitter and others might be the next development step in crowdsourcing practices. Instead of pre-defining the topic for crowdsourcing, potential topics in a certain field or industry might be observed and curated by collecting and clustering the discussion taking place in social media communities. In this way the limitation, that only ideas and problems based by the internal company cognition might be overcome. Bottom up collection, classification, integration and rating of independent contributions by users might result in ideas nobody has thought of before.

Summary of Findings from User-initiated

Crowdsourcing and Crowd Harnessing

The example of user initiated crowdsourcing shows that the user is changing and his role in crowdsourcing processes is evolving. From pure solution provider, the user is becoming the initiator of crowdsourcing processes. This process is enabled on the one hand with the communication and coordination capabilities of Social Media but also increasingly by specialized crowdsourcing platforms as

CrowdTogether. These platforms are, targeting the end consumer as crowdsourcing initiator. Furthermore, not only the creation of digital goods and information is subject to user initiated crowdsourcing but also crowdsourcing for physical products.

The question now is how companies can take advantage of this new role of users in crowdsourcing. One potential scenario might be as follows: The user in the role of initiator of crowdsourcing can become a new intermediary for companies. Instead of the company initiating, guiding and coordinating crowdsourcing process, this can be outsourced or delegated to lead-users who are able to attract a community and work on the development of the products and services. This kind of relationships is similar to relationships that are currently established by companies and open source software development communities.

The crowd harnessing example shows that besides providing input in especially dedicated crowdsourcing platforms, users are also providing a lot of contributions in form of knowledge, experience, opinions, and statements in various other communication channels which are supporting and enabling a participative user. The question is if this kind of bottom up contribution is relevant enough to be harnessed and the basis for a bottom-up crowdsourcing process based on principles of curation.

Both types of user initiated crowdsourcing are based on a new role of the user and can have new implication for companies and the society.

Future Research Questions and Trends

Despite of its brief history, crowdsourcing is becoming an established practice in the dialog of companies with customers and users. However, there are still open questions that need further research. It can be expected that future research directions will tackle two main areas. One main research direction will consider

further development, improvement and sophistication of existing crowdsourcing practices and platforms. The second research direction will be related to new developments and emerging phenomena such as user initiated crowdsourcing and crowd harnessing.

In the first category of future research questions, potential concrete problems that can be considered are as follows (see also Vukovic & Bertolini, 2010):

- Better support for description and crowdsourcing of complex tasks and problems,
- Better quality checking and assurance of procedures,
- Support for semi-automatic evaluation of contributions,
- Better integration of crowdsourcing in the internal processes of companies.

The second research direction is related to the emerging phenomena of user initiated crowdsourcing and crowd harnessing. The main research question is: how should Internet-based innovation be extended or changed in order to result in ground breaking new ideas for companies. Or, how can crowdsourcing be applied for early identification of radical developments which might completely change or attack the business models of existing companies? In this context, further research questions are:

- How should Internet-based innovation be extended or changed in order to reveal disruptive developments for companies?
- Research is needed to better understand the emerging phenomenon of user initiated crowdsourcing and crowd harnessing and also to assess its potential impact on society and companies. This might be achieved with case studies of early examples and scenario analysis of potential future developments.

- Current crowdsourcing practices mainly focus on already identified problems in companies. Can crowdsourcing happen by collecting information that is published globally from Internet users related to a certain topic? Would such a completely open process of crowd harnessing result in disruptive and groundbreaking future ideas? For example, would it have been possible to extract topics that American users talk about as potential points on Obama's political agenda that go beyond legalization of hash (see Howe, 2009)? Experimental design could be one possible approach to tackle these questions.
- Can crowdsourcing and open-innovation related to customer needs be based on semi-automatrical collection, classification and analysis of customers' and competitors' conversations and contributions published in Social Media? Can the analysis of general discussions result in new ideas and solutions that are not pre-structured by the companies?

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