Crowdsourcing: How to Benefit from (Too) Many Great Ideas

This article focuses on how companies can cope with the enormous volume and variety of data (big data) that is acquired on crowdsourcing platforms from the worldwide community of Internet users. We identify the challenges of implementing crowdsourcing platforms and show how CIOs and other organizational leaders can build the absorptive capacity necessary to extract business value from crowdsourced data.[1,2]

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The Power and Challenges of Crowdsourcing

Digitization and the Internet have empowered firms to tap into the creative potential, knowledge and broad-based experience of a huge crowd of contributors. For instance, the gold producer GoldCorp made its geographical databases available to the public and offered a prize for anyone who could tell it where to find gold. The results of this open call enabled GoldCorp to increase its gold production from 53,000 to 504,000 ounces a year while it cut production cost from $360 to $59 per ounce. As a consequence, the value of GoldCorp increased from $100 million to $9 billion.[3] InnoCentive provides an online platform that enables organizations to present engineering problems that they are unable to solve in-house to a community of hobby scientists. On average, InnoCentive's hobby scientists solve 30% of these problems.[4] Similarly, TopCoder, a pioneer of community-driven open innovation, provides a community of software coders who frequently produce more effective software algorithms at lower cost than traditional software creation approaches.[5] All three are examples of *crowdsourcing* and

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2   An earlier version of this article was presented at the pre-ICIS SIM/MISQE workshop in Orlando, Florida, in December 2012. We thank Sabine Matook and John Mooney, who provided invaluable feedback on a previous version of this article, and two anonymous reviewers for their very helpful comments.

3   For more details on GoldCorp's crowdsourcing approach, see Tapscott, D. and Williams, A. D. *Wikinomics: How Mass Collaboration Changes Everything,* Portfolio, 2008.

4   For more information on InnoCentive, see Jeppesen, L. B. and Lakhani, K. R. "Marginality and Problem-Solving Effectiveness in Broadcast Search," *Organization Science* (21:5), 2010, pp. 1016-1033.

5   For more on TopCoder, see Lakhani, K. R. et al. "Prize-Based Contests Can Provide Solutions to Computational Biology Problems," *Nature Biotechnology* (31:7), 2013, pp. 108-111.

illustrate how companies have successfully managed to absorb the volume and variety of crowdsourced data to create business value.

The fundamental idea of crowdsourcing is that a crowdsourcer (which could be a company, an institution or a non-profit organization) proposes to an undefined group of contributors (individuals, formal or informal teams, other companies) the voluntary undertaking of a task presented in an open call. The ensuing interaction process unfolds over IT-based crowdsourcing platforms.[6] The power of crowdsourcing lies in aggregating knowledge from a multitude of diverse and independent contributors. Crowdsourcing enables crowdsourcers to obtain solutions that are beyond the boundaries of their established mindset.[7]

There are two types of crowdsourcing: *tournament* and *collaboration*. In collaboration-based crowdsourcing, contributors create collectively a common solution (e.g., an entry in Wikipedia). Such solutions are the result of many small contributions that individually have minimal value. By contrast, tournament-based crowdsourcing involves the submission and collection of independent solutions (e.g., ideas, prototypes, business plans). The crowdsourcer selects one or a few of the contributions in exchange for financial or non-financial compensation. Tournament-based and collaboration-based crowdsourcing can be combined—for example, by using collaborative evaluation and improvement of individual contributions in tournament-based crowdsourcing.[8]

Successful crowdsourcing platforms easily attract tens of thousands of contributors who create a huge volume of data of high variety. Crowdsourcers are often overwhelmed by this big data and find that creating business value from it is a time-consuming, resource-intensive and costly challenge, in particular if they lack the

capabilities and routines for making sense of, and then using, crowdsourced data. For instance, IBM employed 50 senior executives for several weeks to evaluate all 50,000 ideas that were submitted by its employees for further developing IBM products in one of its "Innovation Jams."[9] Similarly, it took Google almost three years and 3,000 employees to condense and translate the 150,000 proposals submitted to its "Project 10 to the 100" to 16 idea clusters, to evaluate these idea clusters, to develop appropriate projects for the most promising idea clusters and, finally, to start the projects.[10]

This article addresses how companies can cope with the enormous volume and variety of big data acquired via Internet-based crowdsourcing platforms. Based on our analysis of three crowdsourcer firms (one of which provides two crowdsourcing platforms), we show how CIOs and other organizational leaders can develop an effective *absorptive capacity* to enable them to generate knowledge and value from crowdsourced data.

Table 1 summarizes the characteristics of the crowdsourcer cases we investigated and their crowdsourcing platforms. Names of the involved companies and their platforms are disguised to maintain confidentiality. (Details of the research conducted for this study are in the Appendix.) Based on our case research, we present six recommendations for organizations seeking to improve their crowdsourcing effectiveness.

Implementing Crowdsourcing: The Case of BetaCorp's IdeaZone

BetaCorp's IdeaZone highlights the typical challenges of establishing crowdsourcing platforms. This case illustrates that the seeds of most of the challenges of dealing with crowdsourced data are planted in the early stages of a platform.

IdeaZone was started as a pilot project in 2009 and was later institutionalized as one of BetaCorp's standard programs for customer interaction. BetaCorp is a multinational software

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6   For a sophisticated definition of crowdsourcing, see Estellés-Arolas, E. and González-Ladrón-de-Guevara, F. "Towards an Integrated Crowdsourcing Definition," *Journal of Information Science* (38:2), 2012, pp. 189-200.

7   The benefits of crowdsourcing as a problem-solving approach are discussed by Afuah, A. and Tucci, C. "Crowdsourcing as a Solution to Distant Search," *Academy of Management Review* (37:3), 2012, pp. 355-375.

8   The different modes of crowdsourcing are discussed in Zhao, Y. and Zhu, Q. "Evaluation on crowdsourcing research: Current status and future direction," *Information Systems Frontiers,* 2012.

9   Bjelland, O. M. and Wood, R. C. "An inside View of IBM's 'Innovation Jam,'" *MIT Sloan Management Review* (50:1), 2008, pp. 32-40.

10   http://googleblog.blogspot.de/2009/09/announcing-project-10100-idea-themes.html.

Table 1: Crowdsourcers and their Crowdsourcing Platforms

Company	AlphaCorp	BetaCorp		GammaCorp
Crowdsourcing Platform	Brainstorm	IdeaZone	Steampunk	Planet CoCreate
Number of Employees	500	61,000		7,000
Target Group of Crowdsourcing Platform	Employees and customers	Customers	Employees	Customers
Focus of Crowdsourcing Platform	Developing innovative products	Developing and testing ideas for creating new products	Developing prototypes and products	Collecting concepts for improving products
Dominating Type of Crowdsourcing	Collaboration	Tournament	Collaboration	Tournament
Contributors (platform users)	35,000	10,000	200	2,000

manufacturer with a mature and established product-oriented organizational structure. Ten years ago, BetaCorp began to build a global ecosystem of online communities. Today, this ecosystem has more than three million users and consists of a plethora of forums, wikis, blogs and social networks.

BetaCorp launched IdeaZone for two reasons. First, employees requested a centralized channel for collecting customer and end-user feedback from the community ecosystem. Prior to IdeaZone's launch, employees had to extract customer feedback from various sources and could not communicate with customers directly without organizing user group meetings. Thus, IdeaZone was started as an open channel to collect and discuss new ideas for improving BetaCorp with customers and end-users. Second, IdeaZone was designed to have various evaluation functionalities not available on existing platforms. The aim of IdeaZone was to help BetaCorp employees test and prioritize customer and user feedback.

IdeaZone was started as a grassroots project by the managers of the community ecosystem. The entire project was initially independent of BetaCorp's IT department and started without official approval; corporate concerns about intellectual property, IT security and public

relations (i.e., public visibility of negative feedback) probably would have prevented the launch of IdeaZone. Top management was not involved until the IdeaZone platform was rolled out. The platform was licensed from a third-party provider IdeaZone was integrated into BetaCorp's community ecosystem IT infrastructure.

After launching IdeaZone, the major challenge for its initiators was to create internal awareness of the platform and to overcome the reluctance of employees to participate in it. Due to the grassroots character of the project, some employees feared that any time and effort they invested in using the platform might not be recognized or rewarded. The platform initiators overcame this challenge by actively recruiting a group of employees who were highly motivated to use crowdsourcing (most of them were so-called "digital natives") and supporting them in the execution of successful flagship projects stemming from crowdsourced ideas.

Based on these early successes, IdeaZone quickly gained momentum. The standalone nature of the platform allowed BetaCorp to adapt it to the needs of its external contributors and BetaCorp employees. During this phase, IdeaZone was developed into a platform on which employees from most business units posted tasks for the crowd of external contributors in a

Figure 1: Absorption Challenges
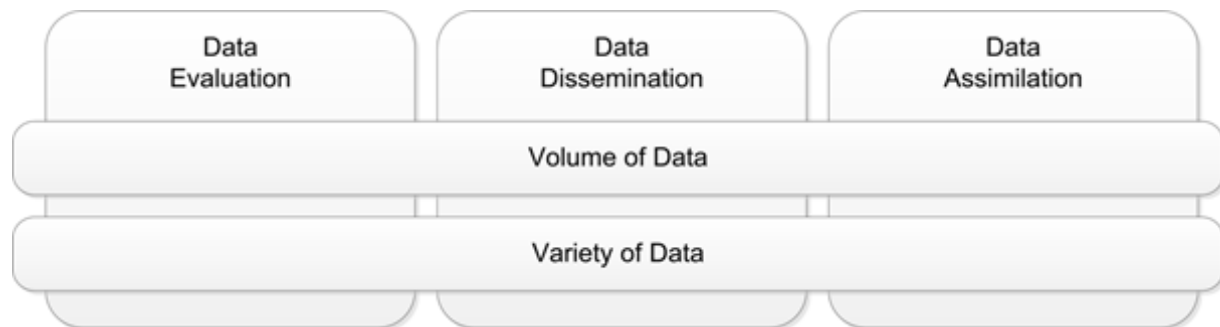
challenge-like fashion. Once the adoption of the platform and the various processes by which the different business units used it stabilized, the platform was technically integrated into the community ecosystem and BetaCorp's IT infrastructure. Today, IdeaZone is run by BetaCorp's IT department as a shared service. As such, IdeaZone serves as an open channel to all business units.

When the initiators launched IdeaZone, they envisioned implementing 10% of the crowdsourced contributions. So far, about 12,000 contributions have been collected (several times more than expected), of which 5% have been delivered or are under implementation for 32 different BetaCorp products. Business units systematically analyze and aggregate the contributions to identify new trends and shifting customer requirements, thus improving the strategic flexibility of BetaCorp. Employees also submit their own early-stage ideas to IdeaZone to see how contributors react and how their ideas stack up against other contributions. Business units now consider IdeaZone as a primary means of communicating with customers.

Challenges of Absorbing Crowdsourced Data

Having built up a successful crowdsourcing platform such as BetaCorp's IdeaZone, effectively exploiting crowdsourced data remains a challenge. In particular, the volume and variety of crowdsourced data inhibit the ability of companies to evaluate, disseminate and assimilate it, as depicted in Figure 1.

Volume of Data

Crowdsourcing platforms can collect data from very large numbers of contributors. The collected data is of three types:

1. *Contributions:* ideas, prototypes or business plans that are suggested solutions for the posted task

2. *Metadata:* examples include evaluations, comments or tags for individual contributions

3. *Data on contributors:* for example, personal characteristics, activity, preferences, evolving social networks on the platform and the quality of contributions (based on peer feedback).

The challenge of crowdsourcing is not only the sheer volume of data generated, but also the rate at which that data is created. For instance, AlphaCorp's Brainstorm gathered more than 8,000 contributions during the first weekend after its roll-out.

Variety of Data

To maximize contributor creativity, crowdsourcers usually do not put any format and structure constraints on potential contributions. This is particularly the case for tournament-based crowdsourcing where crowdsourcers are looking for existing solutions and well-developed prototypes that will address a given problem. As a consequence, contributions may lack focus and specificity. Contributions for the same task may differ dramatically in format, ranging from text-based descriptions to graphic visualizations to fully developed prototypes. Further, open calls attract contributors with highly diverse backgrounds who may propose very different solutions for the same task. Thus, the quality of

contributions may vary considerably; typically there are a very few "extreme solutions" of high value and many solutions of moderate or low value.[11] Low-quality contributions tend to be highly ambiguous and unspecific, containing very little information the crowdsourcer can act on.

Data Evaluation

For crowdsourcers, the volume and variety of contributed data complicate idea evaluation. While the high volume makes it impossible to evaluate all the data manually, its variety inhibits automation of the evaluation task. Moreover, crowdsourcers may lack sufficient background knowledge to evaluate the data in all its richness. As a consequence, crowdsourcers apply various evaluation mechanisms, such as asking contributors to rate the quality of contributions from others. However, the design and use of such evaluation mechanisms is highly challenging. For instance, poorly designed rating scales can produce close to random results.[12]

Additionally, crowdsourcers are sometimes not aware that evaluation of contributions is also a very time-consuming task for contributors. As a consequence, many contributors evaluate only a small number of contributions, which means that many contributions do not have enough evaluations to be reliable. This problem is compounded if evaluation scales are misused by contributors. For instance, AlphaCorp recognized that contributors assessed contributions positively even though they apparently had no opinion about them. Faced with just a binary scale (i.e., thumbs up/thumbs down), some contributors positively assessed all 15,000 contributions on the platform. Thus, evaluation mechanisms may produce highly ambiguous results that cannot be interpreted clearly.

Data Dissemination

Disseminating crowdsourced data involves identifying and selecting appropriate employees and business units that will be responsible for assimilating the data and subsequently implementing the idea. This is an important step in the absorption of crowdsourced data as

inappropriate recipients may not understand the data or may just ignore it. Due to its variety, data from crowdsourcing platforms might be of relevance to several business units. Thus, finding the right employees for each promising contribution is challenging. Some individuals may not be open to crowdsourced ideas (the "not invented here problem"). Sometimes, employees might not feel responsible for using the crowdsourced data. And some employees might become overwhelmed and suffer from information overload.

Data Assimilation

The assimilation of crowdsourced data is the process of transforming crowdsourced data into valuable information the crowdsourcer firm can act on by combining the data with the existing knowledge of the firm. The process involves the firm in developing concepts or business cases for commercializing crowdsourced ideas. At GammaCorp, for example, each contribution that is selected for implementation goes through the standard resource-allocation process involving analysis of technical and economic feasibility, strategic fit and an estimate of potential revenues. However, given the characteristics of crowdsourced data, the assimilation process may be arduous and lengthy. Selected contributions and their related data may have to be aggregated, translated and modified so they can be assessed against internal prerequisites such as corporate strategy and resource constraints.

Developing Absorption Capabilities for Crowdsourced Data

To deal with crowdsourced data and the associated absorption challenges, crowdsourcers need to build *absorptive capacity*—the capability to transform crowdsourced data into knowledge and business value. Thus, absorptive capacity depends on a company's processes for evaluating, disseminating and assimilating crowdsourced data so that it can create business value. To build absorptive capacity for crowdsourcing and overcome the absorption challenges, companies

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11   For a deeper discussion of extreme solutions, see Jeppesen, L. B. and Lakhani, K. R., op. cit., 2010.

12   For a more detailed discussion, see Riedl, C., Blohm, I., Leimeister, J. M. and Krcmar, H. "The Effect of Rating Scales on Decision Quality and User Attitudes in Online Innovation Communities," *International Journal of Electronic Commerce* (17:3), pp. 7-37, 2013.

Table 2: Crowdsourcing Absorption Capabilities

Capability	Description
Platform Design	Designing a crowdsourcing platform that maximizes the quality of the contributions
Filter Design	Creating filtering processes that enable crowdsourcers to eliminate weak contributions early
Organizational Integration	Integrating crowdsourcing platforms into the organizational processes and structures of the crowdsourcer
Information Exchange	Managing the information exchange between contributors and the crowdsourcer's employees
Community Building	Attracting a critical mass of contributors and integrating them into a community of contributors

need to develop five distinct capabilities, which are summarized in Table 2.[13]

Platform Design

Crowdsourcing platforms shape how contributors generate contributions and how they interact with other contributors and contributions. Platforms structure the creative processes of the contributors and define the structure, format and quality of crowdsourced data. Thus, a well-designed platform appropriately supports the crowdsourcer, improves the value of crowdsourcing and eases the dissemination and assimilation of crowdsourced data by mitigating the challenges of its volume and variety.

AlphaCorp, for example, asked its contributors to provide new ideas for improving its products and found it could greatly improve the quality of contributions by asking contributors to provide both need and solution information. Need information describes wishes and requirements. Solution information describes how a need could be fulfilled or a problem solved.[14] AlphaCorp includes "rationales" and "solutions" on its crowdsourcing platform. Rationales contain a problem description, whereas solutions cover possible implementations that will solve the problem (see Figure 2). By entering need and solution information separately, contributors think not only about the problems but also about how to fix them. This separation helps contributors to present their contributions in a manner that better suits the mindset of the crowdsourcer's employees, who are predominantly interested in how existing problems and customer needs can be solved most effectively. Thus, the crowdsourced idea can be better understood, leading to improved evaluation, dissemination and assimilation.

Promoting collaboration among contributors is also important for improving the quality of contributions. Data pools, in which all contributions and their related metadata are visible to all contributors, enable contributors to explore, comment on and edit existing contributions (e.g., via wikis). AlphaCorp and BetaCorp supported collaboration by connecting potential collaborators during the contribution process. AlphaCorp's Brainstorm platform pools contributions so that contributors can add their rationales to existing solutions (see the Filter Design subsection below for more details). This pooling sparks intense discussions about the merits of the different solutions. Similarly, BetaCorp uses web conferences to enhance collaboration between contributors. For example, BetaCorp's Steampunk platform allows contributors to host brainstorm sessions in which peers collaboratively improve contributions. Both approaches build discussion groups and teams around single contributions, thus inducing collaboration-based crowdsourcing. Collaboration-based crowdsourcing improves the quality and understandability of crowdsourced data which, in turn, reduces the evaluation, dissemination and assimilation challenges.

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13 An excellent discussion of how such capabilities form absorptive capacity can be found in Jansen, J. J. P., Van den Bosch, F. A. J. and Volberda, H. W. "Managing Potential and Realized Absorptive Capacity: How Do Organizational Antecedents Matter," *Academy of Management Journal* (48:6), 2005, pp. 999-1015.

14 A more detailed discussion of need and solution information can be found in Von Hippel, E. *Democratizing Innovation,* MIT Press, 2005.

Figure 2: AlphaCorp Brainstorm Toolkit

Finally, crowdsourcing platforms must motivate contributors. AlphaCorp's platform not only spurs collaboration, but also a sense of competition among contributors striving for the best solution. As a consequence, contributors often submit additional material that improves their contributions and increases their reputation and value. Other effective mechanisms for motivating contributors include gamification features such as rankings and point systems.[15] BetaCorp awards points for each contributor activity; point rankings show the most active contributors. BetaCorp uses this approach to engage contributors in making evaluations and

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15   Gamification is the enrichment of products, services and information systems with game-design elements to positively influence motivation, productivity and behaviors of users. For more details, see Blohm, I. and Leimeister, J. M. "Gamification. Design of IT-Based Enhancing Services for Motivational Support and Behavioral Change," *Business Information Systems Engineering* (5:4), 2013, pp. 275-278.

comments so that existing contributions can later be evaluated more reliably.

Filter Design

To improve their absorptive capacity, crowdsourcers need to establish filter mechanisms that help them evaluate contributions early during the absorption process. Filters enable them to focus their limited resources on the most promising contributions and thus leverage the effectiveness of crowdsourcing. Good filter design identifies reliable contributions and aggregates them for evaluation. Filter design involves developing technical and organizational evaluation and aggregation mechanisms for crowdsourced data.

However, poorly designed filter mechanisms are vulnerable to evaluation biases (such as a contributor giving a thumbs-up rating to all contributions) that may lead to erroneous selection decisions. Crowdsourcers must therefore carefully design evaluation mechanisms. For instance, AlphaCorp improved the quality of the evaluation process by introducing an additional neutral rating option instead of just a thumbs-up/thumbs-down rating so contributors could indicate that they had not read a contribution.

Research shows that crowdsourcers should use multi-criteria filtering scales comprising several dimensions, such as novelty, relevance and feasibility, as such scales are more accurate than single-criteria scales such as a thumbs up/ thumbs down. Approximately 20 evaluations per contribution are necessary for creating reliable quality rankings.[16]

Duplicates (multiple contributions that contain the same content) and spam (contributions that do not contain valuable information for the crowdsourcer) hinder the effective evaluation of contributions. Both detract attention from the most promising contributions and diminish the effectiveness of filtering mechanisms.[17] AlphaCorp eliminates duplicates and spam by using a multi-step procedure for new submissions. Each new

contribution is initially subject to a duplication check. Contributors have to enter the titles of their contributions, which are automatically compared with existing contribution rationales. If there is a match, contributors are invited to add their solutions to those. Next, new contributions enter a "sandbox." To get out of the sandbox, two other contributors must confirm the novelty and value of a contribution (i.e., confirm that it's not a duplicate or spam). Then, validated contributions are evaluated with a rating scale (using a simple on-screen slider). Finally, inappropriate contributions can be marked for further investigation by moderators, who may be employees of AlphaCorp or important contributors who participate in the management of the crowdsourcing platform (see the Community Building subsection below).

Filter mechanisms have to be accompanied by appropriate selection rules. Such rules help crowdsourcers filter contributions by systematically selecting the most promising among many thousands. Selection rules thus define the type of contributions crowdsourcers will see. For instance, BetaCorp's selection rules extract "polarized" contributions—those receiving a high share of both positive and negative evaluations. Such contributions have some features that are highly valued by some contributors, while other contributors think they are of little value. The intense discussions such contributions spur among contributors mean that they will likely provide some really valuable insights. To evaluate this type of contribution, both AlphaCorp and GammaCorp not only use ratings, but also analyze contributors' comments to better interpret the ratings. Moreover, they consider the number of comments as an implicit measure of quality.

Organizational Integration

It is important that crowdsourcers integrate their crowdsourcing platforms into their organizational processes and structures. Dissemination and assimilation require that crowdsourced data be explicitly integrated into the working processes of employees. To achieve this, responsibilities for the crowdsourcing platform and its data must be clarified. For instance, BetaCorp employees who want to post tasks on IdeaZone have to commit to devoting at least two working hours per week to responding

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16 For a more detailed discussion, see Riedl, C., Blohm, I., Leimeister, J. M. and Krcmar, H., op. cit., 2013.

17 An extraordinary discussion of challenges of idea evaluation is provided by Di Gangi, P. M., Wasko, M. M. and Hooker, R. E. "Getting Customers' Ideas to Work for You: Learning from Dell How to Succeed with Online User Innovation Communities," *MIS Quarterly Executive* (9:4), 2010, pp. 213-228.

to crowdsourced contributions, commenting on them or assimilating them by readjusting internal projects based on the new insights. This commitment emphasizes that working with the platform is the only way of benefitting from it, and that it is employees' responsibility to actively make use of crowdsourced data. Similarly, GammaCorp changed the job profiles of some marketing and R&D employees to include responsibilities for monitoring the crowdsourcing platform and implementing platform-derived ideas.

Integrating a crowdsourcing platform into organizational processes and structures means that most employees consider the platform as just another of the information systems they use in their daily jobs. To minimize the effort of using a crowdsourcing platform, it could be integrated into existing information systems. For instance, GammaCorp integrated its crowdsourcing platform into its central knowledge management system. Thus, contributions and insights stemming from crowdsourced data become part of the corporate "collective memory." This improves dissemination and assimilation of crowdsourced data and blurs the distinction between internal and external contributions, increasing the acceptance of crowdsourced data.

Assimilation is also supported by training sessions on the value of crowdsourcing. During the launch of IdeaZone, BetaCorp invested substantial time in convincing critical employees of the benefit of expressing their ideas on the platform. Employees had be taught how to deal with a significantly expanded set of social interactions. Many employees may be unsure at first about how to handle negative feedback from other contributors, but they can be coached to be open-minded and understanding.

To encourage employee participation, efforts must be made to mitigate any perceived career risks from engagement in crowdsourcing. This could involve using C-level executives as promoters or allowing time to work on projects triggered by crowdsourced data. At BetaCorp, employees working with Steampunk receive "Thank God it's Friday" time that can be freely allocated to their own projects. Similarly, GammaCorp provides a fixed amount of resources (up to one person year for each posted task) for turning crowdsourced ideas into action.

Information Exchange

Managing the exchange of information between the crowdsourcer's employees and the contributors is crucial for the effective dissemination and assimilation of contributions. Providing contributors with feedback on their contributions is key to long-term success and to the development of future contributors. Thus, AlphaCorp and BetaCorp actively manage contributor expectations by, first, creating realistic expectations on the implementation of contributions. Additionally, they use "status signaling mechanisms" to track the stage of a contribution in the absorption process (e.g., "under review" or "implemented"). AlphaCorp also posts "developer comments" provided by the specific developer working on the implementation of a contribution. These comments are highly visible on the platform; they are viewed by many contributors and highlight AlphaCorp's engagement. Additionally, both these crowdsourcers make active use of blogs to explain certain decisions (e.g., why a highly popular contribution has not been implemented) and to be transparent.

Similarly, the crowdsourcer's employees must be actively encouraged to engage with the platform and crowdsourced data. AlphaCorp's and GammaCorp's platform managers aggregate information from contributors and present it in internal workshops. They use various internal communication channels to promote crowdsourced ideas and related contributions. For instance, they use newsletters or "crowdsourcing reports" in which the most promising contributions are highlighted. BetaCorp has "crowdsourcing mentors" who organize local events to promote Steampunk and the most promising contributions emerging from the platform. These mechanisms support assimilation of crowdsourced data by ensuring that it is recognized as valuable, as well as improving its evaluation and dissemination.

Finally, AlphaCorp and GammaCorp created opportunities for direct exchange between their employees and contributors by inviting contributors to company events. They also used various IT-related communication channels to extend the events' reach, including web conferences and social media such as

Twitter.[18] Similarly, BetaCorp actively uses web conferences for integrating contributors during the assimilation process. These conferences help resolve complex problems that may not have been solved by comment-based discussions because of the variety of crowdsourced data. As a by-product, contributor motivation is increased, and because there are more opportunities for discussing and refining crowdsourced contributions, the process of assimilating data is enhanced.

Community Building

Crowdsourcing relies on a community of contributors with self-organizing social structures. This requires the continuous acquisition of new contributors and the creation of common values and norms, especially empathy and trust. A strong community improves absorptive capacity because fewer resources will be needed for platform management, as these activities are performed in a self-organizing manner by the contributors themselves.

The key to building a vibrant crowdsourcing platform is to attract a critical mass of contributors so that a self-energizing cycle develops. The more contributors participating, the more attractive a crowdsourcing platform becomes for others, possibly leading to more crowdsourced contributions and a healthy inflow of the evaluations, comments or tags that are necessary for data evaluation. Attaching platforms to existing online communities is a highly successful practice, as demonstrated by BetaCorp's IdeaZone. BetaCorp integrated "feedback buttons" into some of its products, which also led to the acquisition of new contributors.

To tie new contributors to the crowdsourcing platform and to stimulate ongoing participation, contributors have to be integrated emotionally into the platform. To achieve this, BetaCorp's Steampunk invested significant resources in building a vital community of contributors, including the creation of a shared culture with which contributors can identify. With its rebellious attitude, Steampunk targets BetaCorp

Figure 3: BetaCorp Steampunk Vision

We Steampunks think that innovation @ [BetaCorp] is real and working. What's not working is getting resources and bringing innovation out on the market. Those steps are totally broken. We now take this into our own hands. Together we want to improve the way innovation is done, that projects can be proposed by each Steampunk, that you can find or be a resource (beside your regular projects), and that innovative stuff finally gets on the market. We give you the opportunity to propose and participate in innovative projects that allow you to make a deep dive, take your time, that you own and have an impact with, that allow you to build credibility in other areas than your daily job allows, and that aren't taken away by yet another reorg, change of manager, project cancellation or other reason. Punk!

employees who want to "fight against the encrusted structures" in a mature, multinational organization. This "outlaw" attitude resonates throughout the design of the platform and is encapsulated in a character who features prominently on the platform's homepage (see Figure 3). As a result, Steampunk contributors quickly develop and internalize a shared culture, one that helps develop a better understanding of the proposed tasks.[19] This shared culture helps BetaCorp actively set an agenda for the type of contributions it is seeking.

Emotional integration is also enhanced by building up self-organizing structures that enable contributors to engage actively in the management of the community. This integration fosters social ties among contributors as well as between contributors and employees of the crowdsourcer, which facilitates information exchange, and data evaluation and dissemination. To support these processes, AlphaCorp and GammaCorp define specific roles and rights for contributors (see Table 3). This hierarchy of roles clarifies what activities each type of contributor is allowed to perform. The more active and more recognized contributors become, the higher they rise in the hierarchy.

18   For an extensive description of how social media can improve socialization processes, see Jarvenpaa, S. L. and Tuunainen, V. P. "How Finnair Socialized Customers for Service Co-Creation with Social Media," *MIS Quarterly Executive* (12:3), 2013, pp. 125-136.

19   An excellent description of how a shared culture among knowledge management platforms can be developed is given in Teo, T. S. H., Nishant, R., Goh, M. and Agerwal, S. "Leveraging Collaborative Technologies to Build a Knowledge Sharing Culture at HP Analytics," *MIS Quarterly Executive* (10:1), 2011, pp. 1-18.

Table 3: Roles and Rights Hierarchy of AlphaCorp's Brainstorm

Role	Rights
User	Submit, evaluate and comment on ideas
Idea Reviewer	Validate new ideas in (+ User rights)
Moderator	Move ideas, change title or content of ideas (+ Idea Reviewer rights)
Developer	Provide developer comments (+ Moderator rights)
Administrator	Delete and ban users and distribute roles (+ Developer rights)

The possibilities for increasing their rights are highly motivating for many contributors and thus facilitate the emotional integration of contributors.

Recommendations for Building Effective Absorption Capacity for Crowdsourcing

Based on the absorption challenges and the capabilities that overcome them identified in our case studies, we provide six recommendations for CIOs and other organizational leaders as they set about building absorptive capacity for crowdsourcing.

1. Adopt a Broad Definition of Crowdsourcing Success

CIOs and organizational leaders should expect the business value of crowdsourcing to be multidimensional. Crowdsourcing can improve innovation (e.g., collecting ideas, customer feedback, prototypes), marketing (e.g., using crowdsourcing as a market research tool, increasing brand image and customer loyalty as contributors feel their voice has been heard), after sales service (e.g., providing peer support and new service experiences) and HR processes (e.g., recruiting new employees, employer branding for digital natives). To fully capitalize on this multiplicity of business opportunities, crowdsourcers must develop success metrics that mirror all of them.

2. Start Small and Ensure Responsiveness

Initially, the crowdsourcing platform should be built around a small group of motivated employees who are convinced of the potential of crowdsourcing and are willing to actively work with the crowd. These employees must have access to sufficient resources to implement early contributions quickly. Expedient implementation demonstrates a crowdsourcer's willingness and ability to absorb crowdsourced data and satisfies the initial expectations of the crowd. As the crowdsourcer builds its absorptive capacity, the platform can expand to other domains and to more complex tasks.

3. Make Crowdsourcing "Cool"

Employees of crowdsourcers are much more likely to participate actively in crowdsourcing if they perceive it as a way of achieving personal successes and building their own reputation among colleagues. Thus, positioning the crowdsourcing platform as a vanguard project for further developing the company's way of working may help motivate employees to engage in crowdsourcing. This is particularly important in the platform's starting phase.

4. Post Precise and Understandable Tasks

The more precise and the more understandable the task is for the crowd, the less likely that crowdsourcing data will exhibit high variety. The key to success is to translate specific organizational problems into task descriptions that are clear, concise and self-explanatory.

5. Use Crowdsourcing for Experimentation

The rapid response from contributors enables crowdsourcers to receive feedback on tasks and posted questions almost instantly. This means that crowdsourcers can perform several iterations at very limited cost to support organizational learning. For instance,

crowdsourcers can easily experiment with different task descriptions and formats to improve the quality of contributions. Similarly, employees can use crowdsourcing platforms as vehicles for testing, refining and prioritizing new ideas in multiple iterations without the need for expensive market research.

6. Involve the Crowd in Improving Data Quality

The huge volumes and high variety of data generated by crowdsourcing cannot be structured and filtered efficiently by employees. Thus, crowdsourcers should create collaboration-based processes in which contributors are integrated into tasks such as data structuring (e.g., adding tags, categories), filtering (e.g., identifying spam, duplicates), evaluating (e.g., voting, comments) and aggregating (e.g., rankings, trends). Contributors must be provided with incentives for engaging in collaboration-based crowdsourcing. Potential incentives could involve ranking and point systems, rights and role elevation or activity prizes.

Concluding Remarks

Crowdsourcing is a powerful approach for tapping into the collective intelligence of the broad-based community of Internet users. It can improve an organization's problem-solving capability, innovation, brand image, customer support and recruitment. This article provides recommendations on how organizations can build the absorptive capacity needed to capture this multi-faceted business value and to effectively overcome the challenges of implementing crowdsourcing and leveraging crowdsourced data.

Appendix: Research Methodology

As absorption challenges and capabilities of crowdsourcers are not well understood, we conducted multiple explorative and qualitative case studies[20] of four crowdsourcing platforms.

We selected the cases based on the size of the crowdsourcer and the crowdsourcing platform (i.e., number of contributors) to ensure we investigated a range of sizes. We focused on the software industry, where crowdsourcing is quite common (e.g., open source software). The high innovation rate of this industry makes absorptive capacity particularly important.

Between July 2009 and October 2011, we interviewed 14 key stakeholders (e.g., platform managers, R&D and marketing employees, and contributors), with each interview taking up to two hours. The interview guideline consisted of open questions on the crowdsourcing platform's vision and goals, the relationship of the interviewees with the crowdsourcer and their personal backgrounds, and the absorption challenges and capabilities. As absorption challenges and capabilities are complex constructs, we made use of the "critical incident technique,"[21] where interviewees were asked to describe situations in which they were part of data absorption or were able to directly observe these activities. We also reviewed internal documents and observed the crowdsourcing platforms for several hours a week and recorded our impressions. In addition, we created user accounts so we could observe the behavior of contributors and the crowdsourcer's employees for a period of up to 18 months.

We started our analysis by identifying the absorption challenges faced by crowdsourcers and the absorption capabilities being used to overcome these challenges.[22] Two of the researchers then identified superordinate themes for the crowdsourcers' activities in an inductive fashion. These themes were condensed to a first-coding scheme that was continually adapted to our data. Next, we constructed narratives for each case, detailing all information about the challenges and countermeasures carried out by the crowdsourcers. Finally, we analyzed the data from an absorptive-capacity perspective, which helped us to explain the

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20 For a detailed discussion of the methodology employed, see Yin, R. K. *Case Study Research. Design and Methods,* Sage Publications, 2009.

21 The critical incident technique is an interview approach suited for investigating factors that strongly influence the success or failure of working processes. For more information, see Flanagan, J. C. "The Critical Incident Technique," *Psychological Bulletin* (51:4), 1954, pp. 327-358.

22 We thank Rayna Dimitrova, Andreas Haas, Vincent Kahl, Nadiem von Heydebran and Christine Wang for their support in data collection and analysis.

relationships between challenges and absorption capabilities.[23] The coding scheme was adapted to an absorptive-capacity perspective. The intercoder reliability of the final coding system was tested with 12 interviews. This gave a Cohen's Kappa of 0.71, which indicates good agreement.[24]

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23   The theoretical framework underlying this analysis was presented at the Academy of Management Annual Meeting 2011 in St. Antonio, Texas.

24   Landis, J. R. and Koch, G. G. "The Measurement of Observer Agreement for Categorical Data," *Biometrics* (33:1),1977, pp. 159-174.