



Crowdsourcing: A Social Networking Approach to Outsourcing

by Carl Adams and Isabel Ramos

Crowdsourcing is the term used to describe a new Web-based business model that harnesses the creative solutions of a distributed network of individuals through what amounts to an open call for proposals. Typically a company posts a problem through an open call, and a vast number of individuals offer solutions to the problem. The winning ideas are awarded some form of a reward, and the company mass produces the idea for its own gain.

Jeff Howe, a US journalist, presented the term “crowdsourcing” for the first time in 2006 in an article in *Wired* magazine,¹ though the concepts of open sourcing activity have been in use for well over a decade. Examples include the creation of Linux and Wikipedia and, even further back, the use of requests for comments in the development of Internet protocols.² Howe categorizes crowdsourcing into four models:³

1. Collective intelligence
2. Crowd creation
3. Crowd voting
4. Crowd funding

The *collective intelligence* model implies that companies ask people inside and outside the company to help solve problems and suggest new products. The *crowd creation* model is used by businesses such as Current TV and Frito-Lay to create news segments and video ads. The *crowd voting* model implies that people vote for their favorite innovation proposals or products. The *crowd funding* model presupposes that some funding is provided to individuals to create intellectual assets. Examples include new music labels and microloans to individuals.

Despite the exciting new venues that are emerging for innovation and mass collaboration, we are still in relatively early days for the wide-scale adoption of crowdsourcing by the business community. To understand some of the characteristics, potential, and problems of crowdsourcing, it would be useful to consider some examples.

EXAMPLES OF CROWDSOURCING

Prospecting for Gold

The potential of crowdsourcing is demonstrated by the “Goldcorp Challenge,” issued by then Goldcorp Chairman and CEO Rob McEwen. The company gave the general public access to Goldcorp’s core intellectual property (i.e., all the information on their 55,000-acre gold mining property) and offered half a million dollars in prize money for a competition to identify where further gold was likely to be. The contestants identified 110 targets for gold, with over 80% of the new targets yielding substantial quantities. This turned Goldcorp from a US \$100 million to a \$9 billion company.⁴

Spotting Sunspots

In June 2009, *Sky at Night* magazine initiated a crowdsourcing event when it invited amateur astronomers to participate in recording sunspot activity.⁵ The problem the magazine was addressing was the lack of recent sunspot activity. Sunspot activity goes in cycles of approximately 11 years, and at the time of the event, we were going through a minimum in the cycle, a situation that had persisted for a few years. Effectively, it was one of the longest “sunspot droughts” in modern times, hence the interest in the astronomy community.

To get the amateur astronomy public involved, *Sky at Night* highlighted the problem and the need for collating information. They provided a guide to observing sunspots and prominences (including how to build a solar projection box), instructions for collecting and sending images, and the mechanism for collecting that information. (As we can see, a crowdsourcing event requires a focus, planning, management, and resources.) [what was the upshot?]

Classifying Galaxies

A further example from the field of cosmology is the Galaxy Zoo project (<http://galaxyzoo.org>), which engaged the general public in classifying about one

million galaxies collected through the Sloan Digital Sky Survey telescope. Classifying so many galaxies is a real challenge for the cosmology community, whose members are fairly limited in number. The original Galaxy Zoo was launched in July 2007, with the expectation that it would take a few years for visitors to the site to work through the million images. However, within 24 hours of launch, the site was receiving 70,000 classifications an hour. More than 50 million classifications were received by the project during its first year, from almost 150,000 people. (Having multiple classifications of the same object is important for assessing the reliability of the classification.) These classifications are now on Galaxy Zoo II, which captures more detail about each galaxy, such as color, shape, and — if the galaxy is a spiral — the direction of the arms. Interestingly, the Galaxy Zoo classifications made by members of the public turn out to be as good as those completed by professional astronomers.

In addition to the forum, there are also Galaxy Zoo blogs and Galaxy Zoo Twitter. Many of the Galaxy Zooites — about 200,000 of them — seem to enjoy the challenge, and a brief look through the tweets shows that some find classifying galaxies an addictive game. What this example demonstrates is the speed with which crowdsourcing events can take off and the fact that very large tasks can be tackled (robustly classifying one million galaxies!) through crowdsourcing. It also shows that nonexperts can perform as well as the experts.

Testing Software on Demand

Another example, this time from the software development and testing domain, shows further attributes of crowdsourcing. uTest (www.utest.com) claims to be the world's largest marketplace for software testing services, with a global community of over 18,000 testers from more than 150 countries. Not bad for a company that was only formed in late 2007!

uTest builds a virtual testing team from scratch for customers, effectively throwing the testing open to their testing community. Testers participate in the projects or stages that interest them and for which they have the right skills. uTest's pricing model is based on pay-for-performance; that is, paying for approved bugs, completed test scripts, and usability surveys. Testers earn grading points for each bug identified or each recommendation for fixing bugs. In addition, higher-grade testers attract more money per bug identified or fixed.

Given the range of different testing projects (Web, mobile, gaming, and desktop applications), a certain amount of learning and skill maintenance is required. uTest provides forums and online meeting and exchanging facilities that help spread knowledge and develop a sense of community for the testers. Another community-building feature testers enjoy is uTest's quarterly "Bug Battle" competitions, in which thousands of testers worldwide vie to find bugs in popular applications (and thereby earn prize money). For instance, in uTest's second Bug Battle, over 1,000 testers scoured Facebook, LinkedIn, and MySpace to discover which of the top three social networking platforms was the buggiest. uTest awarded \$3,000 in prize money to the top testers and those who had found the most critical bugs.

There is clearly much opportunity for crowdsourcing to provide commercial services in the same way that outsourcing/offshoring did, and the assignments can be very large.

Developing Open Source Software

As our examples show, there is clearly much opportunity for crowdsourcing to provide commercial services in the same way that outsourcing/offshoring did, and the assignments can be very large. We have seen this in the development of open source software, such as Linux in all its variations.⁶ As with the other examples of crowdsourcing outlined above, open source software contributors seem to find much enjoyment in participating in the community of developers as well as engaging in a satisfying intellectual exercise,⁷ though there are likely to be many other motivations as well.

INNOVATION BROKERING FOR MSMEs: A PROPOSAL

We've seen the benefits crowdsourcing can offer an organization, but how does one get started? Fortunately, brokering companies (brokers) have emerged to deal with a growing demand for creativity and solutions.^{8,9} Brokers require a strong presence on the Web and intelligent platforms that facilitate innovation management, implement security mechanisms for the confidential exchange of information, and ensure anonymity between those who provide innovation challenges — seekers — and those who provide the

solutions — solvers.¹⁰ These platforms are part of the Web 2.0 and are integrating concepts and technologies of so-called Web 3.0.¹¹

Companies such as Innocentive, yet2.com, Nine Sigma, IdeaWicket, IdeaConnection, and YourEncore are examples of established crowdsourcing innovation brokers that focus on brokering for medium and large companies. However, one of the areas of greatest potential for innovation brokering may be when use can be made of micro, small, and medium enterprises (MSMEs). MSMEs provide a huge source of innovation and entrepreneurial capital. They are usually most reactive to changes in the business environment, are often the main innovation engines, and historically have led societies out of periods of recession when the larger corporations contract.¹²

In another article,¹³ Isabel and her coauthors have identified some of the possible benefits of innovation brokering systems aimed at utilizing MSMEs, as well as some of the challenges. MSMEs are always focused on ensuring their sustainability and growth. Sustainability and growth of MSMEs are often related to their ability to rapidly detect and take advantage of opportunity windows. For this to happen, MSMEs may require competencies and technologies that they do not possess internally.

Crowdsourcing innovation brokers can help MSMEs access external ideas and solutions, structured

knowledge repositories, and networking along the value chain. These brokers can also bring to the intellectual property (IP) market ideas and inventions generated by MSMEs. However, these brokers must address different support needs than the brokers specializing in the innovation needs of large companies. The service must be flexible, accessible, in close proximity to served companies, and trustable.¹⁴

Clearly innovation brokering aimed at MSMEs requires more support in mixing and matching capabilities. Such a system is being implemented at the University of Minho, Portugal, and is represented in Figure 1.¹⁵

The expectation is that new business models will emerge for crowdsourcing innovation brokering focused on MSMEs, though there is yet much to understand and develop as these evolve. Some of the biggest challenges are the sharing of IP, developing sustainable business models, and creating mechanisms to capture the collective memory and to foster creativity and knowledge co-construction among the members of both the solver and seeker communities.

CROWDSOURCING SOFTWARE AND SUPPORT MECHANISMS

There are a variety of support mechanisms for crowdsourcing currently available (see Table 1). At a basic level, there are the general wikis and Web 2.0

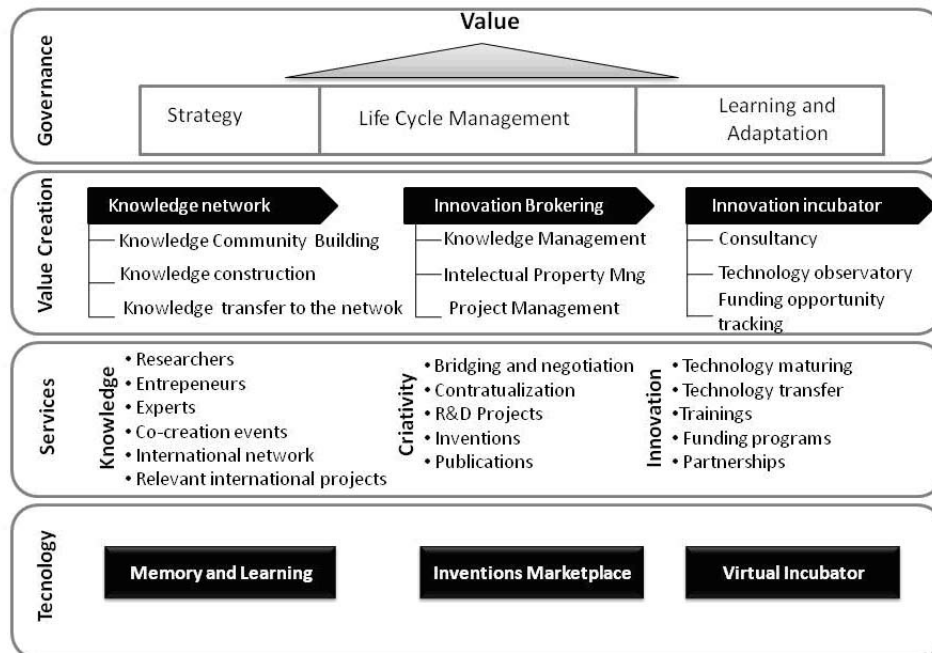


Figure 1 — PERCEPTUM, a crowdsourcing innovation-brokering service. (Source: Ramos et al.)

technologies (blogs, forums, etc.) that allow the sharing of ideas and information. There are also proprietary systems that allow hosting of assignments, the distribution of tasks, and collation of responses. They may well also draw upon an existing community of contributors. In addition, brokering systems are available that can moderate work done by contributors and handle payment or reward mechanisms. Larger organizations have more resources, so they can provide some of the infrastructure and functionality of brokering. Deciding which set of support mechanisms to use will depend on the resources available, the type of crowdsourcing activity required, the likely access to a suitably large community of possible contributors, and the motivation of and incentives for the contributors.

THE EVOLUTION FROM OUTSOURCING TO CROWDSOURCING

From an historical perspective, one could argue that there has been evolution from inhouse provision of services, to outsourcing, then to offshoring, with crowdsourcing being the next stage. IT outsourcing expert Rob Aalders writes:

The debate on outsourcing raises serious questions. Should we outsource a core function? Why should someone else be able to manage part of our business better? Does outsourcing save money? What risks does outsourcing raise? What benefits does it bring?¹⁶

Similar questions must also be asked about crowdsourcing. Table 2 shows how attributes of service provision differ according to the sourcing approach being used.

Table 1 — Support Mechanisms for Crowdsourcing

Mechanism Type	Description	URL
Wikis		
	Widely used variations, such as Wikipedia	www.wikipedia.com
General		
Web 2.0 software — blogs, social networking groups/sites, online communities, virtual communities	Whole range of Web 2.0 technologies and use practices to draw upon	
Proprietary Systems		
Chaordix crowdsourcing platform	Facilities for people to submit, discuss, refine, and rank ideas or provide other contributions	www.cambrianhouse.com, www.chaordix.com
Mechanical Turk	Provides micro-task capabilities for organizing and allocating assignments/ tasks among a large number of users	http://developer.amazonwebservices.com/connect/entry.jspa?externalID=694&categoryID=25
Microsoft: Task Market	Ability to post tasks for a wider community to contribute to; limited uptake so far	www.dubstudios.com/2008/07/14/microsoft-launches-into-crowdsourcing/ http://taskmarket.com/
Brokering systems		
	Similar to the proprietary systems, but offers more of a brokering service; includes features such as payment or reward mechanisms and moderating of work done (e.g., uTest) (NOTE: Innovation brokering services aimed at MSMEs will need to provide more support in mixing skills and capabilities, as well as sharing the intellectual property rights [IPR].)	www.utest.com Aimed at MSEM's: www.Innocentive.com, www.yet2.com, www.ninesigma.com, www.ildeawicket.com, www.ideaconnection.com, www.yourencore.com, PERCEPTUM
DIY		
	Organizations developing their own infrastructure to host the community of contributors (e.g., Galaxy Zoo project, Goldcorp Challenge)	http://galaxyzoo.org

Table 2 — Evolution Toward Crowdsourcing

Attributes	Inhouse Tasks	Outsourcing Tasks	Offshoring Tasks	Crowdsourcing Tasks
Task participants	Host employees, inhouse contractors	Employees and/or contractors of outsourcing company Sometimes onsite or at the outsourcing company	Employees and/or contractors of offshoring company	Wider open global community Mix of experts and nonexperts
Location of task workforce/ participants	Host sites Country of host organization	Host site or outsourcing company/contractor sites Country of host organization	Offshoring company contractor sites International, specified locations/countries	Global, nonspecified
Motivation of workforce/ participants	Pay, bonuses, working conditions, company incentives, promotion opportunities	Devolved to outsourcing company Working conditions for onsite workers	Devolved to offshoring company	Motivation by competition, gaming, payments, reputation
Task control and management	Managed inhouse; traditional management, hierarchical, and matrix structures	Managed by tendering process and contract — SLAs Devolved micromanagement Controlled by testing to SLA	Managed by tendering process and contract — SLAs Devolved micromanagement Controlled by testing to SLA	De-collation and collation of tasks and subtasks Management by motivation Open management
Benefits	Full control Retaining and developing expertise Flexibility of not being tied into SLAs	Ability to focus on core tasks and business activity Access to expertise and capability Cost containment and savings Low management and operation overheads	Ability to focus on core tasks and business activity Access to expertise and capability Cost containment and savings Low management and operation overheads Cost benefits from lower wages and operating cost	Access to vast knowledge and skill base Access to wider sources of innovation and IP generation Ability to focus on core tasks and business activity Low management and operation overheads
Problems	Potential higher costs Need to maintain skill levels and wider capability Dilutes attention from core business activity High management and operation overheads	Lack of control Lock-in to SLAs and limitations on flexibility Remoteness of providers Differences in company motivations and culture	Lack of control Lock-in to SLAs and limitations on flexibility Remoteness of providers Differences in company motivations and culture Differences in national cultures and working practices	Lack of control Different and uncertain management overheads Increased uncertainty over time and quality of tasks IP rights sharing and management

By examining these, organizations can decide if crowdsourcing would be an appropriate evolution for them. Core to outsourcing activity is the service-level agreement (SLA),¹⁷ which defines the key attributes of the service provision, such as costs, timing, and quality of service. Crowdsourcing is very different from the inhouse or outsourced provision of services with respect to such attributes as time scales, resources and costs, outputs, risks, and the participants involved.

CHALLENGES AND OPPORTUNITIES

Crowdsourcing could offer considerable benefits to many organizations; in particular, access to a vast knowledge community outside of an organization's usual working environment. The problems that can be tackled range from small repetitive tasks to quite large and complex innovation and creativity tasks.

That said, there are considerable challenges to crowdsourcing, such as determining how to pay an appropriate price for work done or to share in any IP generated. It is also possible that IP could be lost, especially if it is information-based. Different organizations develop different models to share in newly created IP. Some allow the crowdsourcing "worker" to participate in the profits of an innovation's commercialization, other pay for the IP and require a complete transfer of IP rights, and still others buy the licenses of patents. The way organizations share IP with those who generate it depends on their business models, innovation strategy, and internal culture.

There may also be more fundamental risks to participating in crowdsourcing. The concept of "crowd" may conjure up a friendly gathering ... or an angry mob. Crowds can be brought together around a common interest, be it music, entertainment, or protest. Revolutions have been kicked off by large crowds. As author James Surowiecki observes, there are times when crowds get it wrong, sometimes quite spectacularly. Consider the herding behavior of investors on the stock markets or driving behavior on busy roads that results in traffic jams for no apparent reason.¹⁸

Crowdsourcing — like any outsourcing activity — will therefore require management and resourcing. A new set of management skills need to be learned and developed along with resourcing and evaluation models. One area that calls for special management attention is the motivation of crowdsourcing "workers." Contributions to science and open source projects seem mostly driven by nonfinancial incentives. Participation

in more commercial projects can be motivated by the prospect of monetary gains, either through competitions/prize money (e.g., the Goldcorp Challenge) or a steady income based on contribution (e.g., uTest). However, motivations can be quite complex, and even in commercial projects there are contributors who are driven by the opportunity to engage in a stimulating intellectual exercise.

Outsourcing models, which are typically based on SLAs with well-defined costs and benefits (such as cost containment/reduction), do not address the characteristics of crowdsourcing activity. There is more uncertainty, such as not knowing who will participate, when (or if) the tasks will be completed/delivered, and what the level of quality will be. Some of this uncertainty can be mitigated by using intermediaries and brokers. A company could adopt a portfolio approach, utilizing a mix of task provision approaches (i.e., inhouse, outsourcing, offshoring, and crowdsourcing) to match its risk preference. Given the potential risks and uncertainty, crowdsourcing could be applied to non-core or non-mission-critical activities, possibly as a means to develop expertise in managing such projects and to "try the water."

Examples of successful crowdsourcing projects show that when they work, they can work spectacularly well. Organizations looking for a significant change in their fortunes, innovation base, or direction could use the crowdsourcing approach as a means to achieve that.

ENDNOTES

¹Howe, Jeff. "The Rise of Crowdsourcing." *Wired*, Vol. 14, No. 6, June 2006 (www.wired.com/wired/archive/14.06/crowds.html).

²DiBona, Chris, Sam Ockman, and Mark Stone. *Open Sources: Voices from the Open Source Revolution*. O'Reilly Media, 1999.

³Howe, Jeff. *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business*. Crown Business, 2008.

⁴Tapscott, Don, and Anthony D. Williams. *Wikinomics: How Mass Collaboration Changes Everything*. Atlantic Books, 2006.

⁵*Sky at Night*, No. 49, June 2009 (www.skyatnightmagazine.com/viewIssue.asp?id=1246).

⁶Raymond, Eric S. *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*. O'Reilly Media, 2001.

⁷DiBona et al. See 2.

⁸Arora Ashish, Andrea Fosfuri, and Alfonso Gambardella. *Markets for Technology: The Economics of Innovation and Corporate Strategy*. MIT Press, 2002.

- ⁹Chesbrough, Henry, and Adrienne K. Crowther. "Beyond High Tech: Early Adopters of Open Innovation in Other Industries." *R&D Management*, Vol. 36, No. 3, June 2006, pp. 229-236.
- ¹⁰Chesbrough, Henry. "The Era of Open Innovation." *MIT Sloan Management Review*, Vol. 44, No. 3, Spring 2003, pp. 35-41.
- ¹¹Lassila, Ora, and James Hendler. "Embracing Web 3.0." *IEEE Internet Computing*, Vol. 11, No. 3, May/June 2007, pp. 90-93
- ¹²Dicken, Peter. *Global Shift: Mapping the Changing Contours of the World Economy*. Sage, 2007.
- ¹³Ramos, Isabel, Margarida Cardoso, João Vidal Carvalho, and José Ismael Graça. "An Action Research on Open Knowledge and Technology Transfer." In *Information Systems Creativity and Innovation in Small and Medium-Sized Enterprises*, edited by Gurpreet Dhillon, Bernd Carsten Stahl, and Richard Baskerville. Springer, 2009, pp. 211-223.
- ¹⁴Kolodny et al. [TK]
- ¹⁵Ramos et al. See 13.
- ¹⁶Aalders, Rob. *The IT Outsourcing Guide*. John Wiley & Sons, 2001.
- ¹⁷Aalders. See 16.
- ¹⁸Surowiecki, James. *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies, and Nations*. Abacus, 2004.

RECOMMENDED READING

- Hoffmann, Leah. "Crowd Control." *Communications of the ACM*, Vol. 52, No. 3, March 2009, pp. 16-17.
- Howells, Jeremy, Dimitri Gagliardi, and Khaleel Malik. "The Growth and Management of R&D Outsourcing: Evidence from UK Pharmaceuticals." *R&D Management*, Vol. 38, No. 2, pp. 205-219.
- Hargadon, Andrew B., and Robert I Sutton. "Building an Innovation Factory." *Harvard Business Review*, May/June 2000, pp. 157-167.

Kazman, Rick, and Hong-Mei Chen. "The Metropolis Model: A New Logic for Development of Crowdsourced Systems." *Communications of the ACM*, Vol. 52, No. 7, July 2009, pp. 76-84.

Vrande, Vareska van de, Jeroen P. J. de Jong, Wim Vanhaverbeke, and Maurice de Rochemont. "Open Innovation in SMEs: Trends, Motives, and Management Challenges." *Technovation*, Vol. 29, Nos. 6-7, June 2009, pp. 423-437

Carl Adams is Principal Lecturer in the School of Computing at the University of Portsmouth, UK. Dr. Adams had over a decade of professional experience in software development before entering academia. His research interests include information systems development (ISD) practice (particularly creativity/problem-solving activities, and outsourcing), current technologies (e/m-commerce) and their impact on people and organizations, and crowdsourcing. His PhD thesis (Southampton University) was about dealing with uncertainty within ISD. Dr. Adams can be reached at Carl.Adams@port.ac.uk.

Isabel Maria Pinto Ramos is an Assistant Professor in the Information Systems Department of Minho University, Portugal, and Chair of its Information Systems Master Programs. Dr. Ramos is also Associate Editor of the International Journal of Technology and Human Interaction, a member of the editorial board of Enterprise Information Systems, and Secretary of the Technical Committee 8 (Information Systems) of IFIP – International Federation for Information Systems, as well as its Portuguese representative.

Dr. Ramos coordinates a research group in knowledge management at the University of Minho and advises several PhD and master dissertations in the area. She is the principal researcher in several projects in partnership with Portuguese companies and governmental agencies. These projects focus organizational memory, distributed cognition supported by information systems, and open innovation. She is the author or coauthor of two books and numerous scientific and technical papers. She has a master's degree in informatics for management and a PhD in information technologies and systems, specializing in information systems engineering and management. Dr. Ramos can be reached at iramos@dsi.uminho.pt.