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ARTICLE

Crowdsourcing as a Model for Problem Solving

An Introduction and Cases

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Abstract / Crowdsourcing is an online, distributed problem-solving and production model that has emerged in recent years. Notable examples of the model include Threadless, iStockphoto, InnoCentive, the Goldcorp Challenge, and user-generated advertising contests. This article provides an introduction to crowdsourcing, both its theoretical grounding and exemplar cases, taking care to distinguish crowdsourcing from open source production. This article also explores the possibilities for the model, its potential to exploit a crowd of innovators, and its potential for use beyond for-profit sectors. Finally, this article proposes an agenda for research into crowdsourcing.

Key Words / collective intelligence / crowdsourcing / distributed problem solving / Goldcorp Challenge / InnoCentive / open source / iStockphoto / Threadless / wisdom of crowds

> *There is an incredible story to be told about human ingenuity! The first step to its unfolding is to reject the binary notion of client/designer. The next step is to look to what is going on, right now. The old-fashioned notion of an individual with a dream of perfection is being replaced by distributed problem solving and team-based multi-disciplinary practice. The reality for advanced design today is dominated by three ideas: distributed, plural, collaborative. It is no longer about one designer, one client, one solution, one place. Problems are taken up everywhere, solutions are developed and tested and contributed to the global commons, and those ideas are tested against other solutions. The effect of this is to imagine a future for design that is both more modest and more ambitious. (Mau, 2004: 17)*

We can take Bruce Mau and the Institute Without Boundaries' claims a step further – from team-based and multi-disciplinary to fully, globally distributed – and come to terms with a creative industry that relies increasingly on crowdsourcing to find solutions to problems. Mau is correct in his estimation that problem solving is no longer the activity of the individual genius, but he is hesitant to imagine a problem-solving model that is so radically distributed beyond the boundaries of professionalism. The design team, as enlarged and diverse as it has become, is nothing like the crowd. Where design teams and other group collaborations rely on collections of experts, the wise crowd insists on

the presence of non-experts, on the presence of amateurs. Crowdsourcing, a distributed problem-solving model, is not, however, open-source practice. Problems solved and products designed by the crowd become the property of companies, who turn large profits off from this crowd labor. And the crowd knows this going in. And the Frankfurt boys roll in their graves.

This article is an introduction to crowdsourcing – what it is, how it works, and its potential. As an emerging, successful, alternative business model, I hope to turn the model toward non-profit applications for health and social and environmental justice. Toward this end, I argue that crowdsourcing is substantially different from open-source production – and superior in many ways. I also argue that crowdsourcing is a legitimate, complex problem-solving model, more than merely a new format for holding contests and awarding prizes. In critiquing the theories which seem to predict crowdsourcing, I hope to establish an agenda for research on crowdsourcing so that some day we will have developed a model that can have profound influence in the way we solve our world's most pressing social and environmental problems.

Crowdsourcing

Coined by Jeff Howe and Mark Robinson in the June 2006 issue of *Wired* magazine (Howe, 2006f), the term *crowdsourcing* describes 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. Howe offers the following definition:

> *Simply defined, 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 and the large network of potential laborers. (2006a: 5)*

Howe further clarifies that 'it's only crowdsourcing once a company takes that design, fabricates [it] in mass quantity and sell[s] it' (2006b: 1). In other words, a company posts a problem online, a vast number of individuals offer solutions to the problem, the winning ideas are awarded some form of a bounty, and the company mass produces the idea for its own gain. To understand the workings of crowdsourcing, it is best to examine some of the most successful and profitable cases in a variety of industries.

Threadless

Threadless.com is a web-based t-shirt company that crowdsources the design process for their shirts through an ongoing online competition. The company formed when Jake Nickell and Jacob DeHart met through an online design forum, both entered into a t-shirt design competition, and Nickell won. They formed skinnyCorp and its flagship property, Threadless, in late 2000 when Nickell was only 20 and DeHart only 19 years old (Nickell and DeHart, n.d.). Based in Chicago, skinnyCorp today is the umbrella company for OMG Clothing, Extra Tasty, Naked and Angry, Yay Hooray, and other message boards and businesses in the company's mission: 'skinnyCorp creates communities' (Our Ideas, n.d.; skinnyCorp, n.d.). None of skinnyCorp's other properties are as successful as Threadless,

however, and none more true to the crowdsourcing definition; as of June 2006, Threadless was 'selling 60,000 T-shirts a month, [had] a profit margin of 35 per cent and [was] on track to gross $18 million in 2006', all with 'fewer than 20 employees' (Howe, 2006e). With its profits, Threadless has also made large donations to organizations such as the Red Cross in response to Hurricane Katrina in 2005.

Anyone may join the Threadless community free with a valid email address, and membership in the community – in the crowd – grants access to vote on designs or to submit them. To submit a design, community members download either an Adobe Flash or Adobe Photoshop template, follow the guidelines for image quality and number of colors, and upload their design back to Threadless. From there, designs are scored on a zero-to-five scale, with an option to check an 'I'd buy it!' box, and a new design to be scored becomes available to the community. Designs remain available for voting for two weeks, and the highest scoring designs are selected by Threadless staff to be printed and made available for sale on the website. In a typical week there are at least three new shirts for sale and at least one reprinted shirt, reprinted by overwhelming demand from the community. For designer shirts, they are priced affordably, at around US$15, or US$10 during their frequent sales, all due to the low cost of designing them. Winning designers receive US$1,500 in cash and US$500 worth of Threadless t-shirts and gift certificates. However, US$2000 is a very low price for design services that yield such high profits. Threadless also boasts a street team (for promotional needs) and rewards its members with purchasing credits for referring sales by linking to the website or by submitting photos of themselves wearing Threadless shirts they own.

iStockphoto

iStockphoto.com is a web-based company that sells royalty-free stock photography, animations, and video clips. Calgary, Alberta-based iStockphoto was launched in February 2000, founded by Bruce Livingstone, who 'conceived the iStockphoto engine' (Introduction and Company Background, n.d.). To become a photographer for iStockphoto, one must fill out an online form, submit proof of identification, and submit three photographs for judging by the iStockphoto staff. If the photographs are technically sound, regardless of their content, applicants are typically admitted as photographers to the website. From that point, photographers may submit their photographs to the website to be stored in the databases under keywords. Clients seeking stock images – for use on websites, in brochures, in business presentations and so on – purchase credits (US $1 per credit) and start buying the stock images they want. Typical sizes and qualities of photographs can be purchased, royalty-free, from between one and five credits, with high resolution photographs, oversized images, and some longer video clips costing as many as 50 credits (Introduction to iStockphoto, n.d.).

Photographers receive 20 per cent of the purchase price any time one of their images is downloaded (Frequently Asked Questions, n.d.), and some photographers, who become more involved members of the online community and typically end up donating their talents for screening applicants and maintaining the database, can begin to earn exclusive contracts with iStockphoto and get 40 per cent of the price of their sold work (Mack, 2006: 17). As long as photographs are in focus, free of dust specks and so forth, they will be accepted to the database, meaning anyone able to operate a camera can

potentially earn money as a stock photographer. Like Threadless, iStockphoto's community is composed of both amateurs and working professionals in the field.

InnoCentive

Crowdsourcing is not limited to the creative and design industries. Corporate research and development (R&D) for scientific problems is taking place in a crowdsourced way at InnoCentive.com. Launched in 2001 with funding from pharmaceutical giant Eli Lilly (Howe, 2006f: 22), Andover, Massachusetts-based InnoCentive 'enables scientists to receive professional recognition and financial award for solving R&D challenges', while it simultaneously 'enables companies to tap into the talents of a global scientific community for innovative solutions to tough R&D problems' (About InnoCentive, n.d.: 2, 3). Seeker companies, which include 'Boeing, DuPont, and Proctor and Gamble' (Howe, 2006f: 22), post their most difficult R&D challenges to the InnoCentive solvers under the broad categories of Life Sciences and Chemistry and Applied Sciences. The crowd of solvers can then submit solutions through the web, which go under review by the seeker, which remains anonymous at least during the open phase. If a solution meets the technical requirements for the challenge, which about half of the time only requires written theoretical and methodological proposals (Lakhani et al., 2007: 5), the seeker company awards a cash prize that they determine up front. Awards range from US$10,000 to $100,000 per challenge (Howe, 2006f: 23), though a current challenge, open through November 2008, offers US$1 million to a solution actually put into practice that identifies a biomarker for measuring disease progression in ALS (Lou Gehrig's Disease).

Potential solvers need only to register for free at InnoCentive, supplying contact information and checking off categories for degrees earned, areas of research interest and so on, though each of these questions required for registration includes an 'other' option, meaning solvers need not be professional scientists or scholars. Submitting solutions is simple, also, requiring only the uploading of a word-processed solution written into a downloadable template in most cases. InnoCentive 'broadcasts scientific challenges to over 80,000 independent scientists from over 150 countries' (Lakhani et al., 2007: 5). Lakhani et al. offer further background information on InnoCentive (2007: 28).

Other Cases of Crowdsourcing

Beyond the full-time crowdsourcing operations of Threadless, iStockphoto, and InnoCentive, other corporations operating on traditional global business models have experimented with crowdsourced work. Shoe company Converse welcomed homemade commercials from its customers at ConverseGallery.com, and 'user-generated [advertising] content is a favorite of companies like JetBlue, Sony, and Chrysler' hoping 'to reach young, tech-savvy consumers who will spread their marketing messages [virally] around the Web' (Bosman, 2006: 13–16). For the 2007 Super Bowl, potato chip giant Doritos launched 'Crash the Super Bowl', a user-generated advertising contest with the winning advertisement and some of the finalists airing in coveted, multi-million-dollar commercial spots during the game. Chevrolet experimented with crowdsourced advertising as well, introducing 'a website allowing visitors to take existing video clips and

music, insert their own words and create a customized 30-second commercial for the 2007 Chevy Tahoe' (Bosman, 2006: 3). The Chevy Tahoe crowdsourcing experiment is a clear example of what *Wired* editor Mark Robinson calls *crowdslapping*, when 'the crowd turns against the crowdsourcer' (Howe, 2006d: 2). In Chevy's case, the crowd resisted the call to develop clever Tahoe advertisements and instead assembled 30-second spots that 'skewer[ed] everything from SUVs to Bush's environmental policy to, natch, the American automotive industry' (Howe, 2006d: 2). Interestingly, Chevy did not take down the satirical ads, claiming 'it's part of playing in this space' (Bosman, 2006: 8).

Finally, Goldcorp, a Canadian gold mining company, developed the 'Goldcorp Challenge' in March 2000. 'Participants from around the world were encouraged to examine the geologic data [from Goldcorp's Red Lake Mine] and submit proposals identifying potential targets where the next 6 million ounces of gold will be found' on the Ontario, Canada, property (Goldcorp Challenge Winners!, 2001: 6). By offering more than US $500,000 in prize money to 25 top finalists who identified the most gold deposits, Goldcorp attracted 'more than 475,000 hits' to the Challenge's website and 'more than 1400 online prospectors from 51 countries registered as Challenge participants' (Goldcorp Challenge Winners!, 2001: 6). The numerous solutions from the crowd confirmed many of Goldcorp's suspected deposits and identified several new ones, 110 deposits in all. Goldcorp's subsequent 'Global Search Challenge', with US$2 million in cash and capital investments available for winning, launched in 2001.

What these several applications of crowdsourcing provide is a view into a problem-solving model that can be generalized, applied to a variety of industries to solve both mundane and highly complex tasks. Crowdsourcing is not merely a web 2.0 buzzword, but is instead a strategic model to attract an interested, motivated crowd of individuals capable of providing solutions superior in quality and quantity to those that even traditional forms of business can. The crowd solves the problems that stump corporate scientific researchers. The crowd outperforms in-house geophysicists at mining companies. The crowd designs a handful of original t-shirts every week which *always* sell out of stock. The crowd produces memorable commercials and fresh stock photography on a par with professional firms. And the crowd outperforms industry *faster* and *cheaper* than even the top minds in the fields. Such is a profound paradigm shift in our view of the professional, of the corporation, of the global commons, and of the value of intellectual labor in a transnational world (Appadurai, 1996).

Crowd Wisdom

But how can this be? How can so many dispersed individuals excel at singular, sometimes highly complex problems when traditional problem-solving teams cannot? James Surowiecki (2004), in his book *The Wisdom of Crowds*, examines several cases of crowd wisdom at work, where the very success of a solution is dependent on its emergence from a large body of solvers. Based on these empirical investigations – from estimating the weight of an ox, to the Columbia shuttle disaster, to gaming sports betting spreads – Surowiecki (2004: xiii) finds that 'under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them'. This 'wisdom of crowds' is derived not from averaging solutions, but from aggregating them:

> *After all, think about what happens if you ask a hundred people to run a 100-meter race, and then average their times. The average time will not be better than the time of the fastest runners. It will be worse. It will be a mediocre time. But ask a hundred people to answer a question or solve a problem, and the average answer will often be at least as good as the answer of the smartest member. With most things, the average is mediocrity. With decision making, it's often excellence. You could say it's as if we've been programmed to be collectively smart. (Surowiecki, 2004: 11)*

The web provides a perfect technology capable of aggregating millions of disparate, independent ideas in the way markets and intelligent voting systems do, without the dangers of 'too much communication' and compromise (Surowiecki, 2004: xix).

Surowiecki is not the first to ponder crowd wisdom. Pierre Lévy decreed it as the condition of now:

> *It has become impossible to restrict knowledge and its movement to castes of specialists . . . Our living knowledge, skills, and abilities are in the process of being recognized as the primary source of all other wealth. What then will our new communication tools be used for? The most socially useful goal will no doubt be to supply ourselves with the instruments for sharing our mental abilities in the construction of collective intellect of imagination. (Lévy, 1997 [1995]: 9)*

Lévy, however, is perhaps too utopian in his vision of a society thriving on collective intelligence. In these knowledge communities, as he calls them, Lévy (1997 [1995]) hopes for democracy, ethics, art, spirituality. He makes no mention of hipster t-shirts. But, as Jenkins (2006: 27) makes clear, 'the emergent knowledge culture will never fully escape the influence of commodity culture, any more than commodity culture can totally function outside the constraints of the nation-state'. The compromise: 'collective intelligence will gradually alter the ways commodity culture operates' (Jenkins, 2006: 27). Thus, there may be an immense amount of good that can come from the existing for-profit crowdsourcing applications in that we may be able to harness the intelligence-aggregating engine of the crowdsourcing model to blend commodity culture with social justice goals.

Harvesting Distributed Intellect

> *Cyberspace designates the universe of digital networks as a world of interaction and adventure, the site of global conflicts, a new economic and cultural frontier. There currently exists in the world a wide array of literary, musical, artistic, even political cultures, all claiming the title of 'cyberculture'. But cyberspace refers less to the new media of information transmission than to original modes of creation and navigation within knowledge, and the social relations they bring about . . . It is designed to interconnect and provide an interface for the various methods of creation, recording, communication, and simulation. (Lévy, 1997 [1995]: 118–19)*

Lévy (1997 [1995]) is equally optimistic about the capability of crowds networked through web technologies, an optimism that has been seconded (Terranova, 2004). He called this capacity *collective intelligence*, a 'form of universally distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effective mobilization of skills' (Lévy, 1997 [1995]: 13). Since 'no one knows everything, everyone knows something, [and] all knowledge resides in humanity', digitization and communication technologies must become central in this coordination of far-flung genius (Lévy, 1997 [1995]: 13–14, Ch. 3). Successes in distributed intelligence – or intelligence amplification (Bush, 1945; Smith, 1994), or crowd wisdom, or innovation communities (von Hippel, 1988, 2005), or

whatever the nomenclature – existed prior to the arrival of the web, as Surowiecki (2004) notes throughout his book. Yet, if diversity of opinion, independence, decentralization and aggregation of the crowd are necessary conditions for crowd wisdom – as opposed to crowd stupidity and irrational mobs – (Surowiecki, 2004), how can we *not* ground crowd production in the web?

The web is the necessary technology that can realize the four-pronged specifications of crowd wisdom and flex a mass of users into productive laborers. First and most simply, the web provides the means for individuals around the globe to commune in a single environment; the web is 'not simply a specific medium but a kind of active implementation of a design technique able to deal with the openness of systems' (Terranova, 2004: 3). Given that users spread throughout a geographical terrain, among a variety of cultural backgrounds, the web can facilitate the exchange of diverse opinions, independent of each other, in a decentralized way. The web – along with various lines of code designed to collect and assess solutions specific to different crowdsourcing applications – is the aggregator of this open system, this diversity of thought. What is more, the immense nature of the web, the grand network of networks (Terranova, 2004), and its ability to facilitate idea exchange both in real time and asynchronously makes possible the aggregating of disparate flows of ideas in one stream.

Second, though, the web is a technology that enables a certain kind of thinking, stimulates a certain kind of innovation. We must remember the *intertwining* of technology and its human users, that we must be careful of becoming too technologically determinist in our understanding of how the two distantly *affect* each other (Williams, 1992 [1972]: 3–25). The hypertextual nature of the web mimics the very way we think as humans (Bush, 1945), so it should come as no surprise that humans should see themselves *in* the medium as actors, creators, innovators, as implicated in the information flow rather than witnesses to it. As active users of media who seek gratifications through our interactions with media technologies and their contents,[1] the highly interactive nature of media in the postmodern era can even be seen as an erotic mode (Ott, 2004). Thus, the web's interactive identity, its welcoming of user-generated content and play, makes crowdsourcing applications into pleasuredomes, crowd labor into digital (fore)play, the crowd into brand communities (Muniz and O'Guinn, 2001) engaged in e-rotic, simultaneous consumption and self-expression in a commodity culture. Thus, the web is not merely 'the means through which a flexible, collective network intelligence has come into being' (Terranova, 2004: 74–75), but it also *beckons* users to cobble together ideas within its architectures.

Why Crowdsourcing Is Not Open Source

Open source is most commonly applied to software development, as some of the clearest examples of the model exist in that context, but it can be seen as an overall philosophy for product development in general. To paraphrase the definition for *open source* production from the Open Source Initiative's official website, it involves allowing access to the essential elements of a product (such as source code for software) to anyone for the purpose of collaborative improvement to the existing product, with the continued transparency and free distribution of the product through the various stages of open development (Parens, n.d.). In essence, all the nuts and bolts of a finished product are made

available to everyone so that people may contribute their improved versions of the product back to the commons. The driving philosophy is that transparency and access in the design stage and the ability to develop a product outside of the punishing constraints of traditional intellectual property law will produce a product that is increasingly better, developed collectively and democratically. Also part of the philosophy: open source production is a *hacker ethic* manifest (Levy, 1984; Himanen, 2001). In the hacker ethic, information strives to be free and hackers toil passionately to learn about it, manipulate it, and keep it free (Himanen, 2001; Raymond, 2003). The open character of these kinds of projects is key for collaboration and bringing new creative input into the design process. In this open source philosophy, the world is full of talent, two heads are better than one, and a million heads can move mountains.

Products like the Mozilla Firefox web browser and the Linux operating system are successful examples of the open source model, but open source, while appropriate for software development, may not be particularly suited for other applications. The most compelling reasoning behind this doubt of the open source model lies in the concept of self-interest and in material demands of production. Many of the people tinkering with the source code for Linux, for example, are hobbyists who would be doing this kind of tinkering anyway. The payment for their service in producing a better version of Linux is perhaps some recognition among other hobbyists, but, more importantly, the pursuit of the problem and the satisfaction in finding a better solution to the problem is payment enough (Ghosh, 1998; Hars and Ou, 2002; Hertel et al., 2003; Bonaccorsi and Rossi, 2004; Lakhani and Wolf, 2005). There is an intrinsic, feel-good reward in solving the puzzle (Ghosh, 1998; Raymond, 2003), and perhaps some social capital among fellow hobbyists if one succeeds. Thousands of minds working on a problem and none of them compensated in cash.

Not all problems are as well suited for the open source model as software development. In simple economics, software can be produced with basically no overhead costs. The Linux or Mozilla programs exist virtually, in ones and zeroes, occupy no shelf space in a brick-and-mortar storefront, use no raw materials, emit no waste products, and the distribution is free – as easy as a download from a website. Not all products are composed of digital code; the overwhelming number of designed products in our built world are made from actual materials, require machines to produce, have real-world costs associated with distribution, and so on. What happens when the product that needs to be improved – or invented in the first place – actually has these kinds of material production costs? Will the hobbyist's interest in the problem, and his or her subsequent donation of free labor, account for the costs of producing the improved end product? A company investing in the capital to produce such a product would need to ensure at least enough sales to cover the investment. Thus, if the product will eventually be sold for a profit, would a human, with a natural degree of self-interest, reasonably want to donate his or her talent and energy to the project without a cut of the profits? These questions cast some doubt on the open source model as a supreme model for product development. Crowdsourcing, however, overcomes these limitations in the open source model by providing a clear format for compensating contributors, a hybrid model that blends the transparent and democratizing elements of open source into a feasible model for doing profitable business, all facilitated through the web.

Further, winning crowdsourced solutions, because they are owned in the end by the company posting the call for solutions to its problem, have a monetary value relative to the potential to maximize profits from the solution. Because the ideas of the crowd can yield profits, those ideas can be relied upon to offset the costs of material production. In other words, Threadless must eventually silk screen the crowd's ideas onto t-shirts, must incur the expenses of shipping the shirts, maintaining the website, renting the warehouse space, buying the clothing and ink. Since the work of t-shirt production costs Threadless money, it reasonably must own the ideas it acquires from the crowd to guarantee no other clothing company can make the exact same shirts, lest the t-shirt design lose its exclusive aura, its endowment as a commodity, its fetish appeal. For material objects to have cultural importance as commodities in capitalist societies, the idea driving the object must be novel, rare, coveted. Open source production works precisely against this notion by liberating code, making it available to everyone. At the same time, though, open source production yields products superior to those of closed development (see any comparison of Linux to the bug-riddled landscape of Microsoft). This philosophy of liberation, while noble, is naïve. Material goods do not make themselves, are not free from cost and risk. A society that values the quality and innovation of open source production, but is locked into a capitalist system of ownership, capital, and overhead, can have their cake and eat it too with crowdsourcing.

The Crowd's Human Costs

No system is perfect. Crowdsourcing, though it may blend the best aspects of open source philosophy and the benefits of global business (including its outsourcing component), it might negatively affect a labor pool: the crowd. To see it one way, the intellectual labor the crowd performs is worth a lot more than winning solutions are paid. Threadless designers win far less than professional clothing designers would earn if design work were outsourced to them. iStockphoto members earn a tiny amount for their photography, where professional stock photographers could expect hundreds or thousands of times more for the same work. InnoCentive solvers win very large awards, but the bounties pale in comparison to what the equivalent of that intellectual labor would cost seeker companies in in-house R&D. The young filmmakers whose Doritos commercials aired during the Super Bowl certainly were not paid the same as the major advertising agencies who produced all the other spots for other products during the game. Proportionately, the amount of money paid to the crowd for high quality labor relative to the amount that labor is worth in the market resembles a slave economy. Similar to the ways commercial video game developers use 'modders' to develop new games, crowdsourcing companies hope to use the crowd for their own profits. Postigo argues that 'this process manages to harness a skilled labour force for little or no initial cost and represents an emerging form of labour exploitation on the Internet' (2003: 597).

As Postigo (2003) argues that 'unwaged work on the Internet is an attempt to transcend alienation' because laborers take 'ownership of the productive process, even when this process is not physical', I contend that crowdsourcing, where the crowd is not only part of the productive process but also produces tangible goods, is even more transcendent. Though crowdsourcing companies – say, Threadless – stand to make enormous profits off the backs of the crowd, the crowd gets to slip the very products they design

on their own backs, sporting their ideas-on-cloth as fashion statement, as stylistic resistance to the homogeneity of mainstream fashion design and culture in general (Hebdige, 1979; Muggleton, 2000). Crowdsourcing can be quite empowering indeed, a hopeful reunion of worker and product in a post-industrial economy of increasing alienation of labor.

In other ways, though, crowdsourcing necessarily involves casualties, as any shift in production will. For instance, iStockphoto has crippled long-time stock photographers, whose prices – hundreds or thousands of dollars for image rights – were necessary to cover the cost of their equipment, travel, and film processing. As photographer Russell Kord laments on the crowdsourcing blog, 'digital cameras have taken away any skill necessary to expose a decent image, composition is a matter of opinion, and distribution [e.g. through iStockphoto] is now cheap and easy' (Howe, 2006c, Comments section: 43). Because of this willingness for amateur photographers to 'dump' their work on iStockphoto for next to nothing, professional stock photographers are becoming obsolete. The tragic tale in this loss of jobs is the last tail of an increasing obsolescence of the industrial economy as a whole, and the diffusion of technology (like the digital camera), spread of expert knowledge (via the web), and our discovery of value in amateurs can be seen as refreshing and liberating in its own way. On the micro-level, crowdsourcing is ruining careers. On the macro-level, though, crowdsourcing is reconnecting workers with their work and taming the giants of big business by reviving the importance of the consumer in the design process.

The Crowd's Human Possibilities

To see it the other way, being part of the crowd is far from exploitation. Instead, it is an *opportunity* for the crowd, the Protestant self-help ethic rearing its head in a bootstrap, capitalist, global economy. Crowdsourcing offers individuals in the crowd a chance at entrepreneurship, or at the very least an outlet for creative energy. Lakhani et al. (2007) have identified the desire to acquire new skills and the desire to learn as motivators for solvers at InnoCentive, and the passion for problem solving and exploration in open source production has been noted in several articles (see, for example, Levy, 1984; Ghosh, 1998; Raymond, 2003). As some of the narratives from individuals in the crowd indicate (Mack, 2006; Brabham, 2007a; Livingstone, 2007a, 2007b), part of this motive to learn new skills in crowdsourcing is to be able to incorporate that experience in the seeking of better employment or in the goal of establishing oneself in freelance work as an entrepreneur. I posit, though, that this motivator is perhaps more prominent in crowdsourcing cases than in open source production, simply because bounties in crowdsourcing applications already indicate for the crowd a recognition that such work is worthy of compensation. Coupled with an individualistic, libertarian mentality that seems pervasive on the web, the entrepreneurial prospects of crowdsourcing experience presumably become evident for many individuals in the crowd.

Much in the way American entrepreneurial spirit is fueled by poster-child success stories of working-class heroes who 'made it big' in business by blazing their own paths, superstars of crowdsourcing are emerging and inspiring others in the crowd to continue working. The several designer interviews available on the Threadless website speak to this desire to 'make it' on one's own, some solvers at InnoCentive have experienced career

success because of their work, and some iStockphoto photographers are becoming professional amateurs, so to speak. For example, Lise Gagné's 'over 390,000 downloaded sales of her stock photographs in just 3 years' through iStockphoto has allowed her and her partner to 'have a comfortable lifestyle' and to soon afford the expensive adoption of a child from China (Mack, 2006: 2, 17, 24). Now an exclusive photographer to iStockphoto and a volunteer screener of new applicants to the community, Gagné receives higher commissions from her photography sales and does stock photography full-time. And, she adds, 'Lately, I hear from a growing number of people who are doing this full-time' (Mack, 2006: 17). Howe (in press) argues that in a culture where liberal higher education is developing diverse creative skills in young generations – skills which are suddenly not put to use when students spill into the entry level positions of a post-industrial, cubicle-filled information economy – it stands to reason that crowdsourcing would provide such an outlet for this pent-up talent, would inspire an entrepreneurial mentality in the crowd.

Still, though, a libertarian self-perception in the crowd has its dangers. Cyber-libertarianism, as Winner (1997: 16) writes, entails an 'emphasis upon radical individualism, enthusiasm for free market economy, disdain for the role of government, and enthusiasm for the power of business firms'. Perhaps the crowd 'revel[s] in [the] prospects for ecstatic self-fulfillment in cyberspace and emphasize[s] the need for individuals to disburden themselves of encumbrances that might hinder the pursuit of rational self-interest' (Winner, 1997: 15). The success narratives of the very select few winners among the crowd, and the prominence of those narratives on the websites of the companies themselves and in chatter about crowdsourcing in the blogosphere, indicate the crowd, true to the rhetoric that has existed online since its birth, embraces this cyberlibertarianism (for an example of these narratives, see Brabham, 2007a). Yet, radical positions within cyberlibertarian rhetoric '[fail] to sense the role played by corporate capitalism in its creation and continuous survival of society' (Kelemen and Smith, 2001: 383), so it seems reasonable to assume that the crowd may not recognize its own dependence on and existence within corporate capitalism as it strives to rise above crowdsourcing in pursuit of entrepreneurship. Appropriately, then, the biggest successes within crowdsourcing are not the individuals in the crowd who were able to set themselves apart from the masses and make it on their own as professional versions of their former crowdsourcing selves. The biggest successes are the inventive young minds (e.g. Nickell and DeHart at Threadless and Livingstone at iStockphoto) and large corporations (e.g. Eli Lilly at InnoCentive) who conceived the crowdsourcing applications in the first place. They reap the biggest rewards. So much for rugged, defiant individualism!

Faces Not in the Crowd

The democratizing, empowering promise of the mere presence of new media technology is far overstated, as Winner (2003 [1986]) reminds us. Many people are still without access to the web, and of those connected, many still do not have high-speed connections enabling them to participate like broadband owners can (Fox, 2005). Further, simply connecting the disconnected does not guarantee they will want to participate in the play of the web (Winner, 2003 [1986]). This means we cannot be assured a diversity of opinion in the crowd. A theory of wise crowds *needs* this diversity of opinion to succeed, but

what does this diversity of opinion entail? Brabham (2007b) argues that diversity of opinion must be broken down into smaller pieces, into diversity of identity, diversity of skills, and diversity of political investment.

> *According to many scholars who study identity, diversity – in terms of gender, sexuality, race, nationality, economic class, (dis)ability, religion, etc. – is important because each person's unique identity shapes their worldview. Thus, we can assume that differing worldviews might produce differing solutions to a problem, some of which might be superior solutions because the ideas might consider the unique needs of diverse constituencies. (Brabham, 2007b: 3)*

We must be careful, too, in assuming that ideas emerging from the crowd in crowdsourcing applications represent an ascendance of the superior idea through democratic process. Many studies on the digital divide indicate the typical web user is likely to be white, middle- or upper-class, English speaking, higher educated, and with high-speed connections. Moreover, the most productive individuals in the crowd are likely to be young in age, certainly under 30 and probably under 25 year of age (Lenhart et al., 2004; Lenhart and Madden, 2005), as this age group is most active in the so-called web 2.0 environment of massive content creation, such as through blogging (Madden, 2005; Rainie, 2005; Madden and Fox, 2006). With such a lack of diversity of opinion in the crowd, particularly a lack of diverse identity, crowdsourcing applications are possibly doomed to fail, based on wise crowd theory. More important for critical theorists, however, is that the crowdsourcing applications that do succeed through the might of a homogenous crowd are reproducing the aesthetic and values of white, straight, middle-class men.

In this hegemonic environment, then, does resistance get squashed? Alternative ideas, which may or may not come from the minds of ethnically diverse members of the crowd, are likely in this system to sink to the bottom as tried-and-true, familiar forms of the dominant culture rise to the top. A problem-solving model such as crowdsourcing, which values the quality of a solution over an individual's identity or pedigree, may seem democratic and liberating, true to a hacker ethic (Levy, 1984). But, if solutions are measured against the yardstick of the company sponsoring the crowdsourcing application, or measured against the opinions of the homogenous crowd, alternatives to the presiding discourse will probably always lose out. Thus, familiar hegemonic mechanisms lie beneath the veneer of the 'democratic' crowdsourcing free-for-all, brass-knuckling dissent and difference away from positions of power in the system. Can we truly democratize innovation in crowdsourcing (von Hippel, 2005)?

An Agenda for Crowdsourcing Research

There is much for the cultural critic and the communication scholar to investigate in this new phenomenon of crowdsourcing. It is easy for critics to bemoan the oppressive exploitation of labor taking place in the crowdsourcing process, but narratives from superstars in the crowd indicate more agency than Marxist critiques would allow. Research is needed to understand how members of the crowd feel about their role as a laborer for companies, examinations not only of the success stories, but qualitative interviews with members of the crowd who have not 'made it' yet as crowdsourcers. Investigating how crowds resist attempts by companies at manipulation and servitude, especially through

crowdslapping, might shed light on the human experience of being part of the crowd. At the same time, a constant eye on who is missing from the crowd must remain. Barriers to access in participation in crowdsourcing applications not only include access to computers, access to the web and access to high-speed connections. New barriers to participation in crowdsourcing include access to problem-specific skills and technologies. For instance, one cannot submit a design idea to Threadless without the graphics and editing software necessary to upload to the company's template, and a digital camera – and knowledge of its use – is required of iStockphoto photographers. This begs the question, can and should crowdsourcing ventures be governed, regulated (Rossiter, 2006)?

Tracking which crowdsourcing ventures fail and which ones succeed should also be part of an agenda of crowdsourcing research. What advertising and public relations techniques, for instance, are employed by companies looking to attract a robust and eager crowd? Beyond that, we must strive to understand what truly motivates crowd participation. Open source motivators are helpful but are not precisely translatable to crowdsourcing cases. More research in the vein of Lakhani et al. (2007) is needed.

As more businesses test the waters by crowdsourcing aspects of their production, ethical and legal analysis will be needed. Hopefully, too, standards of best practice will emerge *from the crowd* to inform companies eager to try their hand at crowdsourcing. Ultimately, though, I am hopeful for a refining of crowdsourcing as a generalizable, effective model for problem solving. For better or for worse, lessons from the for-profit world have informed other industry sectors: leadership and accounting strategies in non-profit organizations, fundraising in colleges and universities, and more. I am eager to see us learn from the successes and mistakes of crowdsourcing so that we can apply the best principles to the non-profit world and in the fight for social and environmental justice. Where altruism may be lacking or where material products are needed by these causes, crowdsourcing may provide a productive alternative. Environmental sustainability, architecture and urban planning, emergency logistics planning, public art projects, and even intelligence industries may benefit from the application of crowdsourcing in the problem-solving process.

Conclusions

In this article I have provided an introduction to crowdsourcing through definitions established by its pioneers and illustrated through a collection of case examples. Crowdsourcing can be explained through a theory of crowd wisdom, an exercise of collective intelligence, but we should remain critical of the model for what it might do to people and how it may reinstitute long-standing mechanisms of oppression through new discourses. Crowdsourcing is not just another buzzword, not another meme. It is not just a repackaging of open source philosophy for capitalist ends either. It is a model capable of aggregating talent, leveraging ingenuity while reducing the costs and time formerly needed to solve problems. Finally, crowdsourcing is enabled only through the technology of the web, which is a creative mode of user interactivity, not merely a medium between messages and people. Because of this, it is now the challenge of communication studies, science and technology studies, and other scholars to take up this new, hearty agenda for research.

I hope we can agree with Mau that it is time 'to imagine a future for design that is both more modest and more ambitious . . . More ambitious in that we take our place in society, willing to implicate ourselves in the consequences of our imagination' (2004: 17–18). Crowdsourcing may very well be the means to harness the productive potential of such imagination as we implicate ourselves in the process.

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Note

1 See Severin and Tankard (2001) and Lakhani and Wolf (2005) for but a small recent sampling of the long line of uses and gratifications research since Katz, Blumler and Gurevitch (1973).

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