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Helen Liu and Jodi Sandfort

Abstract

This paper investigates the use of open source, idea competition platforms to catalyze citizen participation. It specifically focuses on an initiative of Ashoka's Changemakers, an innovative international nonprofit to develop this capacity to leverage modest philanthropic resources and inspire citizens to offer ideas about solutions to public problems. Drawing upon theory from collective action, we empirically examined how project design affects contribution to forty-seven projects held from 2004 to 2011. The analysis reveals the number of contributions is higher when the projects are highly visible, when specific skills are required, and when outcome measures are specified in participants' proposals. This analysis gives support to existing theory about online engagement and considers implications for policy, practice and future research about use of and design of open source platforms in public affairs.

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Introduction

Many would agree that the biggest change in our lives since the late 1980s is the proliferation of information communication technology into many realms, both personal and professional. Advances in hardware and software are fundamentally altering our social, economic, and public lives. In recent years, an increasing trend is toward "cloud computing" in which web-based processing (resources, software, and information) is shared on demand over the Internet. What social scientists are just beginning to grapple with, however, is this trend's implications for how work is accomplished in organizations, communities, and society. In this study, we examine such an example of cloud computing developed by an international nonprofit organization, Ashoka. Their project, Changemakers, deploys an open-source platform to encourage social innovation and engage citizens in developing solutions to difficult public problems (Berger 2008).

Referred to in the popular literature as Ideagoras (Tapscott and Williams, 2006), Changemakers asks citizens to identify proven or innovative solutions to a significant public problem and contribute their ideas on their open-source platform. Project topics are diverse, including intimate violence, health care, emergency preparedness, and water quality. Others can add comments to enhance, critique, and offer suggestions and improvements to submissions, forming a type of online community. There is also a dimension of competition, as a panel of judges selects the best ideas for the particular problem. Most competitions also use citizen participation, or "crowdsourcing," to narrow contributions further or select final winners. A modest financial prize is offered to most winners but finalists also benefit from significant exposure of their idea within the Changemakers community.

Our empirical investigation of this platform is timely because its functionality is of increasing interest to government. During the last ten years, governments at all levels have begun to utilize Internet technologies to communicate with constituents in both one- and two-way information flows (Fountain 2001; Mayer-Schönberger and Lazer, 2007). The Obama administration has embraced the new tools of the information society in a way previously unseen through its Open Government Initiative (Bingham 2010; Lukensmeyer, et al. 2011). For example, the administration developed a Twitter presence to enable citizens to more easily monitor economic stimulus implementation, adopted more transparent use of social media in the State Department, and began to adopt technology platforms—similar to what's being used in the Ashoka Changemakers initiative—to solicit citizen ideas to solve management problems within federal agencies (see http://challenge.gov/). In late 2010, as part of the reauthorization of economic competitiveness legislation, Congress enabled the Administration to use idea competitions and prize money to address policy problems and citizen engagement

(Congress 2009-2010). While descriptive case studies exist (Kay 2011), there is little empirical evidence that can inform the design of such idea competition platforms. This study of Ashoka's Changemakers initiative begins to provide that evidence.

Since its inception, the Ashoka initiative attracted considerable attention in the nonprofit sector, including that of large, national foundations (Nee 2009). The platforms' ability to engage diverse participants in an online community, publicize innovative ideas, and reduce time conventionally spent by foundation staff reviewing proposals all held intuitive appeal; but, real questions remain about the usefulness of these platforms in the public arena. This paper examines one that is particularly relevant to public policy making: How can online idea competitions be structured to inspire participation and engagement? To bring empirical evidence into the discussion, we focus attention on the forty-seven projects held on Ashoka's open-source platform from 2004 to 2011. We use theories about online engagement and participation to assess important elements of design to better inform the development and deployment of such platforms by government agencies in the years ahead.

Research Context

The rise of information communication technologies offers the potential of alternative citizen engagement mechanisms, if they are designed and implemented effectively (Zukin, et al 2006). Unconstrained by time and place, the Internet facilitates inexpensive access, interactive communication, and participation, and existing research shows that web-based platforms can both positively (Rheingold 1993; Foot and Schneider 2006) and negatively (Kavanaugh 2002; Norris 2001) affect public engagement.

The interactive web is based upon an ideology and set of technical designs that support dialogue, information sharing, and participation in co-production of content about public issues. Public and nonprofit agencies are using interactive web platforms to facilitate sharing of material and participation in diverse ways: sharing videos about problems; enabling aggregation of decentralized reports of flu incidents or potholes; soliciting public feedback on organizational strategy (Bollier 2008; Schweik, et al. 2011; Scearce, et al 2010). Technically, much of this interactive web is supported by open-source programming, in which software engineers collaborate freely and share their intellectual property with others on the Internet. The early development of Linux in 1991 is an often-cited example of an open-source community at work (Tapscott and Williams; Bollier). Linus Torvalds developed Linux and made it accessible on the common Internet because he believed the Unix operating system was too expensive to ensure wide-spread adoption. In Linux, programmers freely read, downloaded, and modified code

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through its general public license under the stipulation that any changes to the programming code be made explicit for others. Ultimately, the open-source product became superior to the propriety product and for-profit firms began supporting its ongoing development and distribution (Bollier; Lerner and Tirole 2002). As a free operating system, Linux was so popular it is widely understood as one of the first threats to commercial operating systems, such as Microsoft Windows (Wallich 1999).

With this origin, open-source programming enabled a whole new era of innovation in the development of the World Wide Web. New platforms were developed to share more than computer code: documents, social networks, photographs, videos, etc. It also enabled "crowdsourcing," in which groups of people exert their preferences and determine the rating received by a book, restaurant, movie, music, or brand identity (Bollier). Beyond commercial applications, open-source programming and crowdsourcing are being applied in the nonprofit sector. Some nonprofit leaders, like the founder of Ashoka, Bill Drayton, believe solutions to complex social issues can be more easily addressed through applying these principals and technological tools intentionally (Brown 2008; Drayton 2006; Karoff and Maddox 2007).

However, most research about open-source platforms and crowdsourcing focuses on applications in software and scientific fields (Wallich; von Hippel and von Krogh 2003; von Hippel 2005; Tapscott and Williams; Lerner and Tirole). Yet, the ideology and tools of open source are increasingly shaping work in the public and nonprofit sectors (Schweik, et al.). In fact, the products or services produced through an open-source platform can reasonably be understood as public goods, as they are both non-excludable and non-rivalrous (Bessen 2001; Johnson 2001). Open source content can be freely accessed from the Internet (non-excludable), and this action does not prevent others from using it again (non-rivalrous). Participants voluntarily donate their private time and resources to create new products and share ideas that can potentially benefit the common good.

These conceptual reasons and the growing interest in open-source approaches to public problem solving inspired us to conduct this research. We selected Ashoka's Changemakers initiative for a few reasons. As a nonprofit widely recognized for innovation, Ashoka focused on applying the open source philosophy and tools to engage citizens in public problem solving and online community building. As such, it was a useful source of data for exploring how citizen engagement might best be structured in experiments undertaken by government. Additionally, time-series data about a number of idea competitions were accessible, allowing us to analyze variations in the structure of the projects and design of the platform in light of hypotheses developed in other studies of open source communities. Finally, Ashoka's platform was visible and being widely replicated by other institutions for philanthropic ends. In 2010, it was adopted by the

Minnesota-based St. Paul Foundation as an alternative to their conventional grant application and staff review. Corporate philanthropies, such as American Express and Pepsi, increasingly are using such platforms to direct their own grant-making.

Relevant Theoretical Concepts

Two streams of scholarly literature examine the relationship between the design of and participation in open-source platforms. Economists interested in the extrinsic motivation of long-term potential benefits draw upon concepts from relational contracting to emphasize trust, rule designs, and expectations (Lerner and Tirole; Lerner, et al. 2006). Alternatively, sociologists consider the structure of a group, including community size and density, to consider how existing relationships shape collective action (Gould 1993, 1995; Chwe 1999). In this paper, we apply both of these research streams to the Ashoka project to assess the relationship between the open community and overall online participation.

Strictly speaking, rational choice economic theory suggests that public participation in a collective problem solving platform is unlikely (Olson 1965); individuals will not participate in collective issues if there is a conflict between them and their own self-interests. Some scholars operating within this paradigm, however, focus on how relationships among individual actors resolve such conflicts (Ostrom 1990; Robertson and Tang 1995). They suggest that informal social mechanisms, such as rules and standards, may play important roles in creating incentives for actors to participate in collective action.

Applying the relational perspective to open source, online communities, Lerner and Tirole suggest that signaling incentives motivate contributors to participate. They identity three primary conditions for designing and operating a successful open source community: (1) a relevant audience, (2) skill specification, and (3) performance measurement. In their study of software development communities (Lerner and Tirole; Lerner, et al.), they argue that the transparent feature of an open-source community allows participants to send signals to potential employees and employers. For instance, the audience of an open-source project can see whether the component written by an individual programmer actually worked, whether the project was difficult, or if the code can be useful for other programming tasks (Lerner, et al.). In a non-open-source environment, such information about programmers' skills and performance is not visible. In this new context, individual programmers are more responsible for their work. There is a long-term incentive to maintain a trustworthy relationship online, which overcomes the short-term costs of participation. In order to generate this condition, however, the online environment must be transparent. Participants develop reputations by demonstrating their abilities within the community, and

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transparency makes participants' reputations visible to relevant audiences (Moon and Sproull 2000).

An alternative perspective about the characteristics needed to inspire online participation is offered by sociologists. Gould proposes actors would be willing to contribute online if they are sure that their contributions will not be wasted. Drawing upon simulation data, he argues the structure of social interaction within an online community sends out a signal to future participants about the meaningfulness of their actions. Actors will only participate if they see that the group is sufficiently large and they believe it will be successful implementing an idea (Fernandez and McAdam 1988; Gould). Initial participants play critical roles in driving the success of the community because their input and contribution create incentives for others to participate (von Hippel). Thus rather than needing to overcome self-interest, Gould's theory draws attention to the numbers and quality of online contributors as important signals to inspire future participation.

Drawing on either of these two perspectives raises questions about how the open design of Ashoka's platform might influence participation. The rational choice perspective helps us understand why participants of Ashoka are willing to spend time and resources to put together a proposal for public view. Participants might contribute their ideas because they are seeking potential funding and employment opportunities with non-governmental organizations or public sector agencies working on a specific problem. Ashoka provide a platform to showcase their abilities. In Lerner and Tirole's framework, knowing the platform is highly visible to donors or other agencies would inspire participants to put together a proposal for public viewing and demonstrate their specific knowledge or skill. The short-term costs of time and resources to create a proposal are justified by the long-term gain in potential funding (not necessarily the prize) and future employment if the platform is designed properly.

At the same time, a social perspective provides an alternative explanation on how the open design of Ashoka might influence the number of contributions: perhaps not all participants are calculative actors who weighed their pros and cons before submitting their proposals. Gould's (1993) theory suggests that by providing an open and interactive platform for participants to learn how others are also doing great work or creating knowledge a social need is satisfied. When participants learned that their contributions can be beneficial to the community because others are also participating, they are more likely to contribute their knowledge. For instance, Li (2011) finds in his survey that college students are more willing to contribute information to an online discussion forum when they find helpful and constructive information contributed by the others participants. In other words, the openness of Ashoka's platform allows participants to receive information about the outcomes of the other members' contributions to the community, and such information affects the level of individual contribution.

In this paper, we apply these two theoretical frameworks to generate our hypotheses for examining the Ashoka Changemakers platform. Based on the self-interest theory, a platform will attract contributions when it can provide enough financial prizes to cover participants' costs of time and resources in developing proposals. This suggests:

H1.1: The higher the prize amount of a project, the greater the contribution.

Furthermore, the concepts of self-interest and extrinsic motivation provided by the potential of longer-term benefit draw our attention to the importance of transparency within the community because participants might gain future employment opportunities from the potential donors or grant makers in the audience. This suggests:

H1.2: The greater the visibility of a project to the relevant audience, the greater the contribution.

Because open-source platforms create a mechanism for actors to interact and exchange information, the information revealed on them may also play a key role in influencing participation and overall online community development. The Lerner and Tirole project found that open source projects revealing employee talents and describing performance offered more to encourage participation and overcome short-term costs. Applying their ideas to this study suggests:

H1.3: The more specific the skill requirement of a project, the greater the contribution.
H1.4: The better demonstration of the impact and effectiveness of participants' performance, the greater the contribution.

These first four hypotheses emerge from economic studies concerned with overcoming self-interest in online communities.

An alternative theoretical explanation of participation in online communities comes from examining the underlying structure of the community. While it might be logical to conclude that there is a linear relationship between membership and participation, Gould argues the relationship is more complex. Smaller communities actually provide more chances for participation. There also may be a threshold value where the participation decreases as the number of members increases (Gould; Chwe). This suggests:

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H2: The relationship between density and participation is an nonlinear one—i.e., the density and the number of contributions increase until a threshold is met and will decrease after the threshold.

In this analysis, we test these two different theories of online behavior in the Ashoka Changemaker community. Lerner and Tirole's theory emphasizes the long-term gain for a participant of an open community whereas Gould's theory emphasizes the current community structure. To conduct our analysis, we generated and use a relational data set from the Ashoka Changemakers project.

Data & Analytical Methods

To examine the five hypotheses mentioned, our empirical strategy consists of analyzing observational data of contributions on the Changemakers website. We created a longitudinal data set tracking participation in 47 unique projects over a six-year period, from 2004 to early 2011 (Ashoka 2011). Like other research in this area (e.g. Lerner, et al.), we analyzed contributors of the competitions on the Changemakers website through a t-test and moving average analysis of the panel data to test our five hypotheses.

The panel data set begins at the initiation of the Ashoka open community in November 2004 and extends through February 2011. Ashoka's Changemakers regularly announces idea competitions; while most competitions held during the 2004-2011 lasted for three months, there was also some variation (between one month and five months). Individuals affiliated with an organization walk through a structured format to submit their ideas, and all entries are transparent to the public. The platform also facilitates contributors' and other participants' posting of comments related to any submission. After the submission deadline, a panel of citizen or expert judges and Ashoka staff select ten finalists. With a public announcement about these finalists, members of the online community are invited to vote and select the idea competition winner. For each competition, Ashoka identifies a financial sponsor who provides a modest financial prize for the best idea;[1] during the study period, these included Robert Wood Johnson Foundation, National Geographic Society, and corporations such as Coca-Cola, Nike, and Staples. In two instances, in addition to the financial prize, the winner also received significant grants (of over a million dollars) from the project sponsors.

From 2004 to 2011, nearly 8,400 unique users from approximately 150 countries participated by either formally contributing an idea or commenting upon ideas submitted by others. During our study period, there were over 10,502

[1]During the study period, the size of this prize was $5,000 per winner (exceptions were projects #38 ($400), #1 and #32 ($1000), #31 ($1500) ; #47 (10,000),#21, #26, # 34, ($25,000) ; #45 ($50,000) #23, #27, #30 #43 (no monetary price)).

contributions and over 25,578 discussions in 47 projects supported by the platform. This activity created an online community, reflected through ongoing interactions and participation in subsequent projects.

We extracted key information about each competition, the idea contributors, and any subsequent participation (Ku 2009), including the name of the project idea, the affiliated organization, country, number of discussions about a particular contribution, and date of submission. Table 1 summarizes the projects and highlights their considerable variation in size and other characteristics. The competition categories include humanitarian, civil society, environment, housing, health, youth, technology, and social entrepreneurship. Each attracted varying numbers of contributions: the average number of entries per project was 223.45, ranging from 10 to 605 over the study period.

Table 1: Project Characteristics

#	Topic	Month	Year	Mission Category	# of Entries	# of Discussions	Prize $
1	How to Build a Citizen Base that Supports an Organization	Nov-Feb	2005	Capacity	105	n.a.	$1,000
2	How to End Human Trafficking	Mar-Mar	2005	Humanitarian	69	n.a.	$5,000
3	How to Build a More Ethical Society	Jun-Jun	2005	Civil Society	79	n.a.	$5,000
4	How to Create Market-based Strategies that Benefit Low Income Communities	Aug-Aug	2005	Housing	128	n.a.	$5,000
5	Meeting Disaster: How to Prepare	Oct-Oct	2005	Humanitarian	22	n.a.	$5,000
6	How to Improve Health for All	Mar-May	2006	Health	139	492	$5,000
7	How to Provide Affordable Housing	Jun-Sept	2006	Housing	86	272	$5,000
8	How to Entrepreneur Peace	Oct-Jan	2007	Civil Society	158	226	$5,000
9	That Was Easy	Nov-Feb	2007	Social Entrepreneurship	55	448	$5,000
10	No Private Matter! Ending Abuse in Intimate & Family Relations	Jan-May	2007	Humanitarian	31	176	$5,000
11	Ending Corruption: Honesty Instituted	Feb-Jun	2007	Civil Society	79	278	$5,000

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12	Disruptive Innovations in Health and Health Care: Solutions People Want	May-Aug	2007	Health	303	699	$5,000
13	Why Games Matter: A Prescription for Improving Health and Health Care	Jul-Nov	2007	Technology/ Health	73	245	$5,000
14	Sport for a Better World	Sept-Mar	2008	Sport/Youth	379	1818	$5,000
15	Young Men at Risk: Transforming the Power of a Generation	Nov-Mar	2008	Youth	357	1104	$5,000
16	Tapping Local Innovation: Unclogging the Water and Sanitation Crisis	Jan-May	2008	Environment	263	736	$5,000 with 1 million grant
17	The Geotourism Challenge: Celebrating Places Changing Lives	Jan-Jun	2008	Environment	319	1723	$5,000 with three-year $25 million grant
18	Ending Global Slavery: Everyday Heroes Leading the Way	Apr-Aug	2008	Humanitarian	236	1147	$5,000
19	Banking on Social Change—Seeking Financial Solutions for All	Jul-Dec	2008	Social Entrepreneurship	280	521	$5,000
20	Staples Youth Social Entrepreneur Competition	Aug-Nov	2008	Social Entrepreneurship	514	665	$5,000
21	The Power of Us: Re-Imagine Media	Dec-Feb	2009	Technology	323	464	$25,000
22	Gamechangers: Change the game for women in sport	Nov Feb	2009	Sport/Youth	391	2555	$5,000
23	Globetrotting for Good:THE CONDÉ NAST TRAVELER CHALLENGE	Apr May	2009	Civil Society	56	365	$0
24	Designing for Better Health	Jan Apr	2009	Health	280	685	$5,000
25	Cultivating Innovation: Solutions for rural communities	Feb May	2009	Economic/Development	421	729	$5,000
26	Art in Public: expressing youth voices in Pittsburgh	Apr June	2009	Civil Society	50	211	$25,000
27	Connecting to the World: THE CONDÉ NAST TRAVELER CHALLENGE	Jun Aug	2009	Civil Society	27	13	$0

28	Champions of Quality Education in Africa	Mar Jun	2009	Education	412	800	$5,000
29	Geotourism Challenge 2009:Power of place - sustaining the future of destinations	Feb May	2009	Environment	605	1961	$5,000
30	Green World Heritage: THE CONDÉ NAST TRAVELER CHALLENGE	Aug Sep	2009	Environment	10	3	$0
31	GMO Risk or Rescue? Helping Consumers Decide	Jul Oct	2009	Economic/ Development	37	113	$1,500
32	The Atlanta Falcons Youth Fitness Contest	Sep Nov	2009	Health	48	54	$1,000
33	Rethinking Mental Health: Improving Community Wellbeing	Jul Oct	2009	Health	338	251	$5,000
34	We Media PitchIt! Challenge: How Can We Use Media To Inspire A	Nov Jan	2010	Technology	240	900	$25,000
35	Improved Nutrition: Solutions Through Innovation	Sep Dec	2010	Health	243	343	$5,000
36	Violence Envers Les Femmes Un Problème De Tous (Preventing violence against women)	Jan Mar	2010	Humanitarian	155	361	$5,000
37	Healthy Mothers, Strong World: The Next Generation Of Ideas For Maternal Health	Dec Mar	2010	Health	207	540	$0
38	Women | Tools | Technology: Building Opportunities & Economic Power	Jan Apr	2010	Economic/ Development	267	386	$400
39	Revelation To Action: Your Place. Your Idea. Your Change.	Feb Apr	2010	Civil Society	357	424	$5,000
40	Leveraging Business For Social Change: Building The Field Of Social Business	Mar Aug	2010	Social Entrepreneurship	445	600	$5,000
41	Changing Lives Through Football	Mar Jun	2010	Sport/ Youth	292	373	$30,000

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42	Strong Communities: Engaging Citizens, Strengthening Place, Inspiring Change	Jun Aug	2010	Civil Society	259	201	$5,000
43	The G-20 SME Finance Challenge	May Aug	2010	Economic/ Development	341	549	$0
44	Patients | Choices | Empowerment	Jul Sep	2010	Health	275	629	$10,000
45	Property Rights: Identity, Dignity & Opportunity For A	Aug Nov	2010	Economic/ Development	211	524	$50,000
46	Geotourism Challenge 2010: Places On The Edge - Saving Coastal And Freshwater Destinations	Sep Dec	2010	Environment	249	447	$5,000
47	Sustainable Urban Housing: Collaborating For Livable And Inclusive Cities	Nov Feb	2011	Environment/ Housing	288	547	$10,000
	Total				10502	25578	$323,900
	Average				223.45	609	$7,198
	Min.				10	3	$0
	Max.				605	2555	$50,000

To conduct our analysis, we created a time-series data set based on the information extracted from the Ashoka archive. In our study, participants can—and do—contribute to multiple projects and we tracked unique actors. The data also includes submission date, which enables us to create the time-series data. For the 47 projects, we tracked participants' contributions throughout the six year period.[2]

We first use a t-test to discover if the differences in project contributions over time are related to different prize amounts, visibility levels, and content categories. In our analysis, we examine *project participation* as our outcome variable, indicating individuals who engage (through contributing an idea or making comments) in one or more Changemakers projects during the time period from November 2004 through January 2009.

We include *prize* using a dummy variable (high/low) assessed by the total prize amount that will be awarded to the winner of the competition projects. A

[2]One flaw in our data extraction comes from the inability to document all of the activity each participant had in the community. As independent researchers, we can only depended on publicly available data on Changemakers' websites. If the information has not been published, or removed, we will not be able to report it. Thus, our data might conservatively estimate activity within the community.

project has a "high prize" when the price award is greater than $5,000. A project has a "low prize" when the price award is equal or less than $5,000.

We measure *visibility* using a dummy variable (high/low) assessed by the relative frequency of comments received. Any participant can make comments on submitted projects, and larger numbers of comments provides a legitimate proxy for how many times a project is viewed and discussed. A project has a "high visibility" when the number of its comments is higher than the median number of comments for all competitions.

To examine project content we constructed two dummy variables—indicators to show whether the project had a *skill requirement* or *specified outcomes*. To construct the specific skill requirement variable, we assess "competition framework" and "competition guidelines" reports of each project, coding when looking for keys words—such as "talent," "skill," and "ability"—to see if those projects require specific skills. Two independent coders performed this task. For example, Project #13, "Why Games Matter: A Prescription for Improving Health and Health Care," requires participants to have game developing and programming abilities. Project #19, "Banking on Social Change," requires specific skills in financial services.

Another dimension of project content was whether or not outcomes were requested in the idea competition. Our indicator, specified outcomes, is categorical measures reflecting: none [0], effectiveness indicator [1], specific impact measurement [2].[3] For example, our coder assigned a "2" for the Games and Health competition (Project #13) because contributors needed to list specific impact measurement (e.g. "Provide one sentence describing your impact/intended impact"). In this way, contributors must demonstrate the existing or potential impact of their innovations, helping the audience assess project potential. However, some projects did not require impact criteria. For instance, Project # 9 on Entrepreneurism required contributors to describe effectiveness without specifying any measurement criteria (our coders assigned "1"). Contributors to Project # 1 on Citizen Engagement were not asked to describe any assessment or impact measurement (our coders assigned "0").

To investigate hypotheses # 2, we examine the pattern of the contributions throughout the competition time period for each project. We measure project *density* by dividing accumulative daily contributions to a specific project by the total contributions of that project. We then plotted the distribution of contributions over one project period and added a moving average trendline to demonstrate the distribution of daily contributions. We also calculated the daily project density and

[3] This dimension of project content did not occur randomly. In March 2006, Ashoka's Changemakers began to alter its project design, by encouraging project contributors to articulate desired outcomes indicators; even more encouragement in this regard was initiated in July 2007.In this analysis, we examine the degree to which this design change influenced overall participation.

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plotted accumulative project density distribution over one project period. We added a moving average trendline to demonstrate the project density distribution and examine whether the relationship between the density and participation is a nonlinear one.

Results

To understand the pattern of contributions to Ashoka's Changemakers open-source platform, we hypothesize that higher participation in a collective action is associated with project design (Lerner and Tirole) and structure (Gould). Table 1 lists all the projects from the establishment of the Changemakers open-source model from November 2004 until January 2011. One can see the size varies across different projects even in the same mission category. For example, in the humanitarian category, the "Meeting Disaster: How to Prepare" project has 22 contributions in one month,[4] the "No Private Matter! Ending Abuse in Intimate & Family Relations" project has 31 contributions in five months, and the "Ending Global Slavery: Everyday Heroes Leading the Way" project has 236 contributions in five months. Furthermore, the minimum contribution of a project is 10 for the project titled, "Green World Heritage," whereas the maximum of a project is 605 for the project titled, "Geotourism Challenge 2009." Interestingly, both of those projects are under the Environmental category. We will apply Lerner and Tirole's as well as Gould's theories to further explain the variation across different projects and to understand the pattern of contributions to Ashoka's Changemakers open-source platform.

Lerner and Tirole believe that making connections with others who are in the field creates incentive for actors to contribute to the commons because it produces a long-term effect—reputation. They state that long-term incentives are stronger when the project design meets the following three conditions: (1) visibility of the relevant audience, (2) clear information on talents, and (3) impact measurement. Table 2 shows the distribution of average contributions to Changemakers projects by prize, visibility, skill requirement, and outcome specification. The first column shows that the average number of contributions to projects with high prize amount is similar to the average contribution of projects with low prize amount and the difference is not statistically significant. The second column shows that the average number of contributions to high visibility projects is more than two times the average contribution of projects with low visibility (statistically significant). In the third column, results show that the average contribution to projects requiring a specific skill is about 2.5 times higher than the average contribution of projects without such requirements (again, statistically

[4]Four projects in the early stage only lasted about one month.

significant). Finally, the average contribution to projects requiring participants specify impact indicators is nearly three times larger than the average project contribution which only required indicators of effectiveness (again, statistically significant). The average contribution including impact indicators is nearly four times larger than the average contribution to projects not requiring any outcome specification. Thus, participation in Ashoka's online idea competitions is correlated with project visibility and design. If a project presents a higher visibility, requires a unique skill, or specifies outcomes, it creates more participation. Following the logic of the Lerner and Tirole work, there are more incentives to contribute ideas because participation serves as a signal to others in the community.

Table 2: Distribution of Average Contributions to Changemakers' Projects by Prize, Visibility, Skill Requirement, and Specified Outcomes

Prize			Network Visibility			Skill Requirement			Outcome Specification		
	Mean	N		Mean	N		Mean	N		Mean	N
High	251.000	10	High	362.667	15	High	322.435	23	Impact Indicator	296.067	30
Low	216.000	37	Low	158.188	32	Low	128.583	24	Effectiveness	101.417	12
									None	80.6	5
t test	0.507			0.000			0.000			0.020	

This relationship between project visibility and content is also influenced by time. A multivariate analysis can help to clarify the cause of participation increases over time, but it is not an appropriate analysis method in our study given our small sample size (N=47). When we assessed differences between older (the first ten) and newer (the most current eleven projects), we found that the average contribution to the newer projects (252.852; N=27) is larger than the average contribution to the older projects (183.750; N=20) ($p<0.109$). In part, this reflects the overall learning among Ashoka's open source designers. As noted above, over time, they asked sponsors to craft projects more clearly specifying outcomes. It also likely reflects the establishment of Ashoka's reputation in sponsoring successful, engaging online idea competitions focused on significant issues.

To understand how the community structure influences participation, we also tested our second hypothesis about how participation in online communities changes according to the structure of the group. For each individual project, we examine the pattern of participation throughout the competition time period. Overall we find a consistent pattern for the majority of those projects: participation starts off low in the first month, reaches a peak around the third month, and then gradually decreases until the project deadline. An illustrative example is Project #18, focused on an end to global slavery, held from April to July 2008. Nearly 44%

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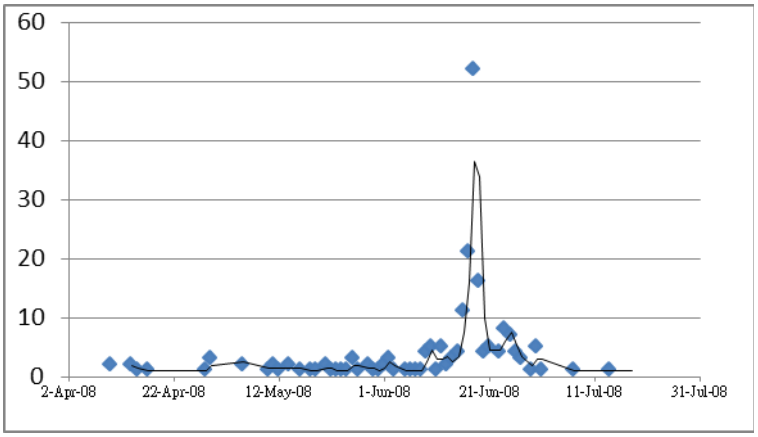
of the contributions occurred within a four day period during the middle of the project period (June 16 to June 19, 2008). Figure 1 illustrates the distribution of contributions over time, with the moving average trendline in Figure 1 reflecting an inverse-V shape. (Figure 1B also plots the distribution of project accumulative density over one project period). In this project and others, actors contribute when they find enough people who have contributed, but will stop if they feel that their contribution will become marginal. This finding is similar to Gould's proposition. Actors are willing to participate when they feel that their contribution might be useful to the community, regardless of whether or not they will win the prize. However, when the number of contributions reaches a certain point, participation rate increases slow, potential contributors might perceive their ideas as less unique when there are more ideas already submitted or feel there is less likelihood of winning the financial prize after a certain number of contributions.

Figure 1A: Distribution of Daily Contributions to Changemakers' Project # 18 by date.



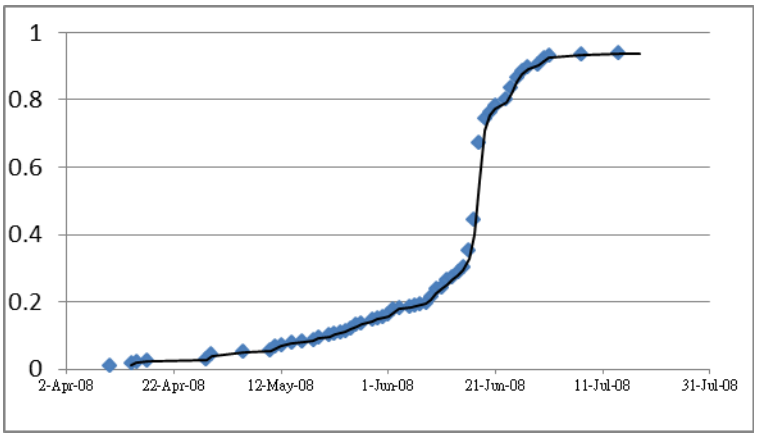


Figure 1B: Distribution of Daily Accumulative Density of Project # 18 by date.

In summary, in the 47 projects from 2004 to 2011, we find the average number of contributions is higher when: (1) the project attracts a higher visibility, (2) the project is designed to require specific skills from participants, and (3) the project requires outcome measurement from participants' proposals. Prize amounts which seem important do not show significance in our study of the Changemakers case. We verify the theory of Lerner and Tirole that people will contribute online when this participation enables them to show their unique knowledge and attract others to their ideas. We also find that the average number of contributions correlates with project density in an inverse V-shape, verify Gould's theory that actors join collective action when they believe their contribution is meaningful and do not join when they believe their contribution could be marginal. While there are some limitations in our data and methods, these results can still inform the development of open source platforms that engage citizens in public problem solving.

Conclusions Relevant to Open Source Platform Design to Engage Citizens

The Obama Administration's Open Government Initiative establishes a priority on using community information technologies to make the work of government more transparent and participative. They are now making more government documents publicly available, allowing citizens to track federal grants, and soliciting public comments before signing legislation (Bingham). As of January 2011, the Challenge.gov website managed by the U.S. General Services Administration hosted more than 55 idea competitions sponsored by federal agencies with prize awards ranging from $200 to $15 million (Kay). The America COMPETES Reauthorization Act of 2010 gives broad parameters to federal agencies interested in using idea competitions to solve policy problems and engage citizens. These facts suggest that relying upon open-source platforms to solicit public ideas about solutions may be a feature of a new practice of public administration. These new platforms and competition projects must be designed with care so their structure aligns with and reinforces policy intent.

Our analysis of the Ashoka platform deployed to encourage citizen participation in solving public problems is useful to public officials. This experience suggests there is appeal in using open-source platforms to generate attention and solicit ideas from an online community about how to address broad topical challenges. However, the structure of each individual project is related to the overall participation generated. If marketing can increase visibility, participation is likely to increase. Furthermore, clearly specifying the skills needed to implement the idea and specific outcomes also is related to participation levels. Vague project guidelines create less incentive for actors to submit their proposals because those projects do not differentiate participants' capabilities. In the spirit of

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many open-source designs, interaction among participants should be transparent to the community. For instance, participants' submission history in the Ashoka project is easily accessed by other participants.

This notion of sharing ideas, providing modest financial rewards, and depending upon the opinions of crowds to direct resources is increasing in frequency, supported by the interactive web. Like Ashoka, InnoCentive, a private company, focuses on linking businesses seeking solutions with individuals and smaller businesses who may have solutions; their challenges include the search for a biodegradable synthetic polymer and light protective interactive films. As mentioned earlier, corporations and foundations, such as PepsiCo, American Express, and community foundations are also beginning to harness the power of crowds to inform charitable giving. While some academic colleagues decry the increased marketization of philanthropy (Nickels and Eikenberry, 2009), the advent of the interactive web provides a new opportunity. Attending to purposive design, informed by theory and empirical evidence like that offered here, could help create open source platforms that leverage citizen engagement to influence how both private philanthropy and public funding is directed.

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