

10EQS.com	GoFundMe.com	oDesk.com
99designs.com	GrabCAD.com	Quora.com
Airbnb.com	Indiegogo.com	Seedinvest.com
Autoharvest.com	Innocentve.com	Trada.com
Crowdcrafting.org	KickStarter.com	uTest.com
elance.com	Mturk.com	Wikipedia.com
Eureeka.com	NineSigma.com	Wizehive.com

Table 1: Public platforms evaluated

4. TAXONOMY OF CROWDSOURCING

A crowdsourcing paradigm that demonstrates important elements of crowdsourcing campaigns can be summarized as follows. A campaign *requestor* seeks to *motivate contributors* to provide resources to achieve a *requestor purpose* by working for duration on a *platform* using an implementation channel.

Several interacting parameters that shape proper campaign design are shown in a non-hierarchical configuration in Figure 1 Each successful campaign requires consideration of these parameters as described below.

4.1 Requestor

A crowdsourcing requestor is any individual or organization that proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task [9].

4.1.1 Requestor Type

The three distinguishing types that request crowdsourcing campaigns are: **Governments**, **Private Organizations** and **Individuals**. To motivate contributors to crowdsourcing campaigns requesters typically organize projects with clear milestones.

Government may seek the help of crowdsourced contributors for various purposes. For example, the Ihtimam brainstorming and feedback initiative for UAE in 2014 involves the public in prioritizing and evaluating government services. Another government crowd-sourcing exercise was the Strong Cities, Strong Communities (SC2) initiative in the United States, established to strengthen neighborhoods, towns, cities, and regions around the country by enhancing the capacity of local governments to develop and execute their economic vision and strategies. Government’s regulatory power gives it a motivational tool that is unavailable to other organizations and individuals.

Private organizations of both types, for profit or non-profit, are a major requestor for help who can utilize crowdsourcing for their scope of work. Both types of entities may ask for help to achieve altruistic goals, or while at the same time use crowdsourcing to generate revenues or cash.

Individual requestors may look less attractive to contributors, unless they are celebrities or offer a compelling reward.

4.1.2 Requestor Purpose

The requestors’ expectations of contributors vary from one platform to another and from one campaign to another. Listed below are common expectations from the survey sample.

4.1.2.1 Fund initiatives

Referred to as crowdfunding, requestors expect from contributors money to fund their projects and initiatives. Normally, requestors pitch their business idea to attract investors who receive in return equities, loans, perks or just a thank you card. Platforms dedicated to this purpose include Kickstarter and Indiegogo.

In a variation, another type of funding is called royalty financing, whereby profit is shared with contributors as under the affiliates business model. [11]

4.1.2.2 Share knowledge

Campaigns can request information from contributors. Requested knowledge can be in the form of answers to voting forms or surveys, or as detailed advice or ideas from professionals and specialists in a certain field. Innovation-based techniques such as brainstorming also address this purpose.

An interesting variation of this approach is “citizen science” whereby tasks are allocated to contributors to help answer a research question through collection or analysis of data. [12] [13]

Dedicated platforms such as NineSigma and Quora enable knowledge sharing and brainstorming for different types of projects, purposes and contributors.

4.1.2.3 Perform tasks

Contributors may share other things than knowledge with requestors, such as technical writing, art work, film-making etc. Tasks are not limited to business needs. A good example is the campaign initiated by 23AndMe to find better ways to treat IBD (Inflammatory Bowel Disease) through genetics where 23andme requested contributors from its pool of users to do tests and fill out surveys on its website (<https://23andme.com/ibd/>).

Examples of public platforms that enable contributors to perform tasks are eLance for different IT and editorial freelancers’ tasks and AMT (AmazonMechanicalTurk) which provides a collaborative environment for contributors by dividing the tasks into small units for each contributor. Sample business tasks in AMT are to enter detailed information for a postcard or extract information on thousands of contacts from newspapers into an Excel spreadsheet.

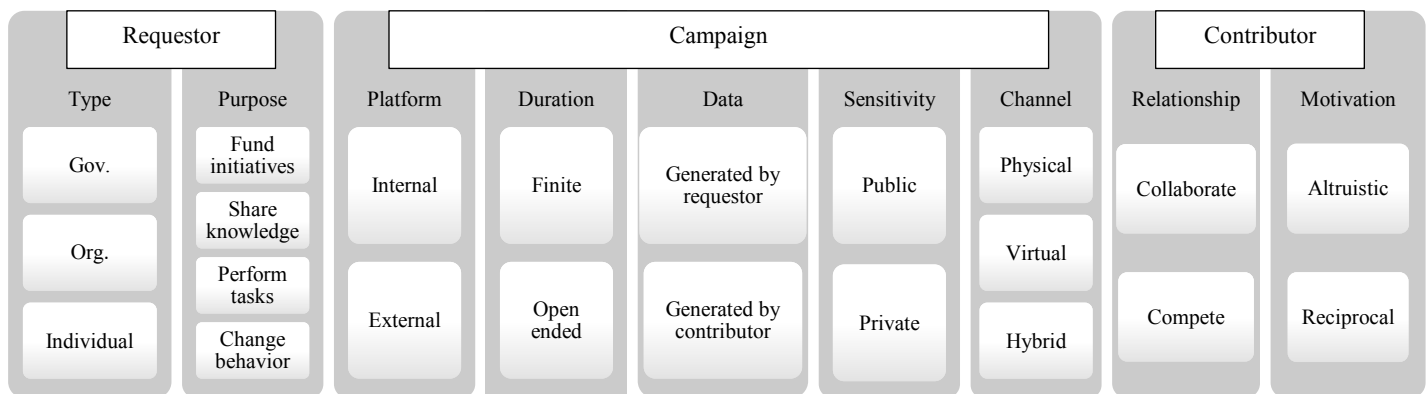


Figure 1: Proposed taxonomy of crowdsourcing campaigns

4.1.2.4 Change behavior

Campaigns may also seek to change long-term contributor behavior. A successful campaign of this type normally starts with a respected leader delivering a speech, asking for action. The purpose is to change or reinforce contributor opinions, generally to support a political or social cause. President Obama's campaign had this purpose and won two U.S. presidential elections [15]. It is also the purpose of internet activists who seek net neutrality [16]. Other campaigns in this category include water efficiency campaigns to reduce water consumption and environmental campaigns that encourage planting trees. In this case the contributor contributes only time and attention, though such campaigns may also be integrated with other purposes such as funding.

4.2 Contributor

Contributors are the agents who fulfill the requestor's campaign purpose. Two contributor parameters are important, their relationship to each other and their motivation.

4.2.1 Contributor Relationships

Contributors are either *competing* with each other, typically in a zero-sum game (one's gain is the other's loss), or *collaborating* with each other where pieces provided by each one could be combined then added in a single deliverable to their mutual benefit.

Contributors may compete to win the campaign (e.g. 99designs where best design normally gets the reward), or collaborate as part of the campaign. (e.g. uTest.com where each contributor finding bugs in the software is rewarded). The organizer then selects one or more to do the job, or asks that be done collaboratively.

The collaborative approach exemplified by Wikipedia.org offers great potential to increase creativity and innovation. Collaboration platforms in the campaigns we analyzed attracted more contributors than competitive campaigns. Almost 70% of the studied sample operated using the collaborative model.

Note that the "bandwagon" effect is demonstrated in collaborative campaigns. This effect is a psychological phenomenon whereby people do something primarily because other people are doing it, regardless of their own *a priori* beliefs. [14]

4.2.2 Contributor Motivation

Crowdsourcing activities are either reciprocal, with mutual benefit for requestors and contributors, or altruistic on the part of at least one party. Contributor motivations can be further segmented into *Ethics*, *Recognition*, *Reward* and *Investment*. Figure 2 displays what current main platforms offers to the crowd as a motivation.



Figure 2 Types of contributor motivation

The motivation could be ethical, providing the satisfaction of contributing to a worthy cause. This can work well for requestor purposes involving religious or humanitarian goals. A second form of motivation is private or public recognition of the value of the contribution. The contributor might receive a certificate of appreciation or simply be ranked higher on the platform to be distinguished from his or her peers. Approximately 22% of the campaigns we analyzed fit in this category. They did not directly reward volunteers but were successful due to their impact on people's beliefs.

In most cases in this study contributors received a reward, such as a cash prize or free product or service, or possible investment returns through crowdfunding campaigns. The type of motivation heavily depends on the nature of the requestor and its purpose, and the type of contribution. For example a contributor may volunteer few minutes of his time to brainstorm ideas without paying attention to the return, but may hesitate to contribute five hours of time without tangible return.

These motivations involve various degrees of risk of return. A successful campaign uses the correct class or classes of contributor motivation.

4.3 Campaign

The campaign itself has different parameters that are related to its structure.

4.3.1 Platform

A successful crowdsourcing campaign requires a platform for outreach to the public and to take care of all logistics. The platform's detailed architecture will vary depending on the requestor purpose. It must be coordinated by a dedicated team. This team can be either *internal* or *external*. An internal team could be a department within the organization. Individual requestors could rely completely on social network pages to invite volunteers, update them on the work and share results. However, the most effective way is to use an external collaboration platform that has access to contributors, and focused on the specific requestor purpose. Managers of such platforms may have policies that restrict the campaigns that may be accepted. Platforms that deal with reciprocal motivations such as equities often have more legal constraints. The typical objective for crowdsourcing in a generic platform rather than a private site is to bring in more contributors. However, it's easier to start with friends and family than to attract strangers, unless the requestor or its purpose is very attractive to the public. Social networks can play an important role in engaging contributors regardless of the type of platform.

4.3.2 Duration

The campaign may be regarded as a formal or informal *contract* between the three parties: Requestor, Platform and Contributor(s). In most cases the duration is finite – i.e., not open-ended – unless the requestor finds a motivation that keeps contributors active.

Most of the work is done by contributors. It is therefore important to clarify the expected duration of time and efforts needed before the campaign starts to avoid any misunderstanding.

4.3.3 Data Source

The path of data transition streams differs in campaigns and can be classified into two main types where the critical data are *generated by requestor* and given to contributors to do the work

or *generated by contributors* and collected by requestors for further studies and analysis. In many cases, both parties generate data, however, there is in each campaign a critical data that is generated by one of them.

4.3.4 Data Sensitivity

Internet-based crowdsourcing is a global initiative by default unless restricted by the requestor. Restrictions on data accessibility from contributors and even the public may be imposed for reasons related to data sensitivity that include the need to protect confidential data; the desire to obtain contributions only from contributors with the requisite skill or training; or from legal restrictions such as those placed on fundraising by government. As most of crowdsourcing campaigns are limited to the English language, there is room to expand linguistic reach by facilitating participation by non-English speakers, providing instant translations or defining tasks that are relatively independent of language proficiency.

A common classification of contributor eligibility is whether a campaign is *public* (where most campaigns fit) or *private* (such as Siemens Scalable Software Platforms for C# Applications Campaign listed in NineSigma.com). Variations of the public/private distinction may be made with respect to distribution of results rather than contributor input. A public campaign may share final deliverables openly while in a private campaign the requestor will keep all information for internal usage, even when contributions are openly solicited.

4.3.5 Implementation Channel

All campaigns analyzed are promoted through the Internet. They differ, however, in where the work is being implemented. Depending on the campaign purpose, requestors' expectations and the convenience of the contributors, one of the following implementation channels of crowdsourcing is typically used:

- **Virtual channel** which is purely using the Internet do all the work from the beginning to the end.
- **Physical channel** in which work is performed off-line, such as brainstorming sessions in meeting rooms and contributor focus groups. The internet may be used for logistics but is not sufficient to achieve the campaign purpose.
- **Hybrid channel** which uses virtual and physical channels together to complete the work. An example is mapping and GPS applications that request people to send real-time updates while driving their cars. A person in this example needs to drive a car and use his smart phone to complete the work.

5. APPLYING THIS TAXONOMY TO EVALUATED CAMPAIGNS

The parameters discussed above are applicable to all of the campaigns in this study. For example, the Blindspot Initiative [17] for exhibiting and sharing the work and research of a range of

designers, each redefining the blurry landscape of their disciplines was initiated by an organization (startup) looking for individuals to collaboratively fund its initiative. The campaign used kickstarter.com as a platform and in 33 days collected \$11,000. The data of the campaign were completely generated by requestors and the campaign was classified as public since all generated information was shared. The contributors used virtual channels only to participate in the campaign. They were motivated by different types of reciprocal motivations based on the amount they contributed.

Another example is GE's Industrial Solutions Challenge: Ergonomic Switch Design campaign [18]. The campaign was initiated by an organization (large size) looking for individuals to compete under a "best will win" approach. The campaign purpose was to share knowledge and brainstorm on a specific problem. It used ninesigma.com as a platform and after two months it closed participation. The data generated for the campaign was coming from contributors. It was private since organizers shared no outcomes except the winners. The motivation used by organizers to encourage participation was cash prizes.

Figure 3 illustrates how the indices of the new taxonomy can be correlated to provide interesting insights into crowdsourcing. We looked at the correlation of campaign motivation to contributors' relationship. The bubble size represents the number of total contributors in the campaign. All large campaigns ranging from 4,000 to 12,000 contributors are within the collaborating side of the figure, while campaigns that use a competition methodology have fewer than 600 contributors. The investment type of motivation attracts fewer contributors even within the collaboration category and is mainly used in funding initiatives.

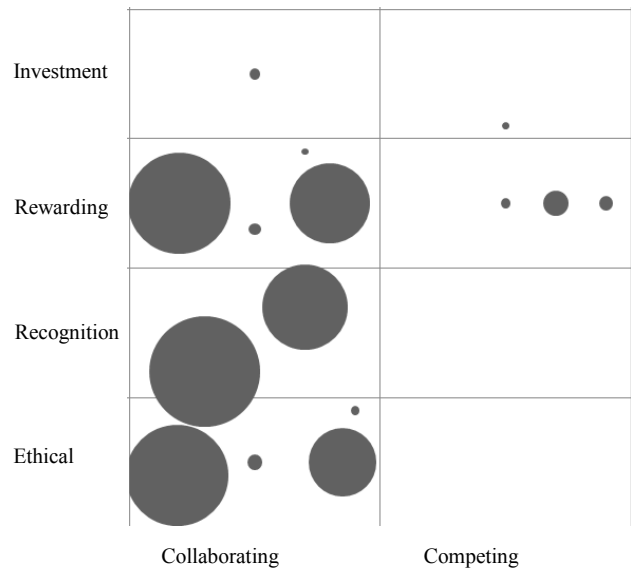


Figure 3: Correlation of motivation and relationship

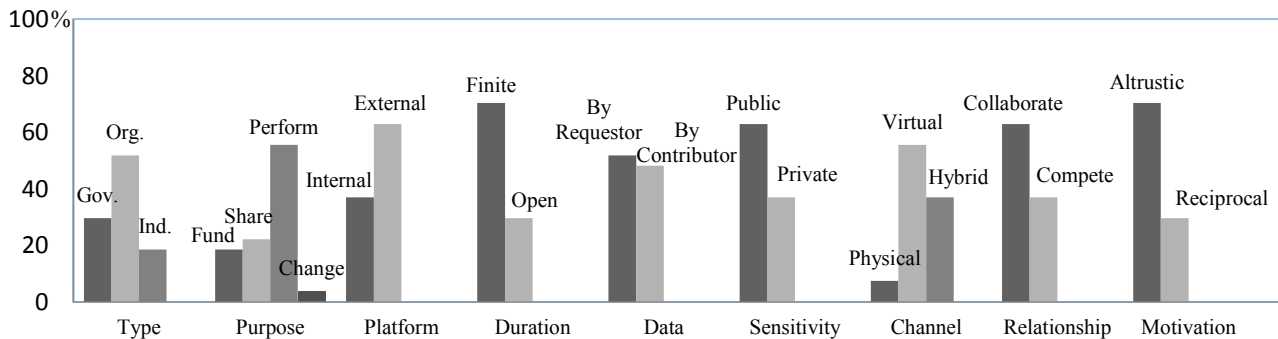


Figure 4 Distribution of selected parameters for gathered data

Figure 4 shows the distribution of campaigns in the study along each axis of the new taxonomy.

After analyzing the data for correlations between contributor motivation and requestor purpose we found:

- 70.4% of our sample data depend on reciprocal motivators while 29.6% depend on altruistic motivators.
- 88% of reciprocal campaigns are fixed durations while 12% are open. Altruistic campaigns are 40% fixed durations and 60% are open ended durations.
- 76% of reciprocal motivators are given to “perform tasks” purposes while 12% to “share knowledge” and 12% to “fund initiatives”.
- Altruistic motivators are used only within collaborative relationships between contributors.
- Altruistic motivators are used in campaigns that are meant for public data distribution and will not withhold progress and findings from the public when the campaign is completed.
- 40% of the sample’s altruistic motivators are to “share knowledge”, 30% to “fund initiatives, 20% to “perform tasks” and 10% to “change behavior”.

7. CONCLUSION AND FUTURE WORK

This paper develops a comprehensive taxonomy of crowdsourcing campaigns and applies the taxonomy to 41 recent campaigns. In general, the mode of the campaigns is that they are public, of fixed duration, and, interestingly, predominantly altruistic from the standpoint of motivation. It is also clear, however, that crowdsourcing campaigns vary a great deal along each axis. The reasons for this variation, and correlation of these features with each other beyond that demonstrated in Figure 3 should prove a fruitful area for future research.

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