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Crowdsourcing as a Policy Tool: Co-Production in the Digital Era

Title of the paper

Crowdsourcing – lessons from successful ICT communities and commercial initiatives

Author(s)

Magda Roszczynska-Kurasinska, Robert Zajonc Institute for Social Studies, University of Warsaw, Poland: m.roszczynska@uw.edu.pl

Agnieszka Rychwalska, Robert Zajonc Institute for Social Studies, University of Warsaw, Poland:a.rychwalska@uw.edu.pl

Marta Kacprzyk-Murawska, Robert Zajonc Institute for Social Studies, University of Warsaw, Poland: marta.kacprzyk@gmail.com

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Abstract

New ICT tools for e-participation promised to allow widespread access of citizens to the policy formulation process. However, the engagement of citizens is still very low. We present insights from two related areas that can help improve the process of e-participation. First, we draw from the theory and empirical findings on innovation adoption to show that e-participation should be treated as innovation. Second, we analyze a framework for classifying ICT collaboration models to show that the choice of who and how will participate is strongly related to the platform used for participation.

Keywords: e-participation, diffusion of innovation, crowdsourcing in policy cycle, collective agency

1. Introduction

The essence of democracy is giving citizens the power to govern themselves directly or through elected intermediaries. Active participation of the people and equal rights in decision making lay at the core of democratic systems. More pragmatically, the rationale is that citizens should be able to tell what is good for them and policies developed with their participation will better answer their needs and therefore be more readily accepted. The selection of citizens entitled to participation has been subject to many debates and has changed throughout history (e.g., women's suffrage, the Voting Rights Act of 1965). Representative democracy provides a balance between stability of rule and involvement of citizens. However, these days the emerging trend is to enable direct participation of as many citizens as possible in the process of policy making (Markoff, 2015; Komito, 2005), shifting the focus from representative to participatory democracy.

A common belief is that new Information and Communication Technology (ICT) tools for e-participation would enable inexpensive access to the policy making process of many groups of stakeholders. The improvement would not only be in the quantity of responses but also in their quality – e.g. some groups for whom active participation was so far too costly might be finally included, enabling true representation of the society. Another advantage is that in principle in active e-participation policy makers can not only learn about the needs of citizens from dry data but can also solicit information about their values and priorities (Voinov, & Bousquet, 2010). Moreover, using ICT for participation opens the space for more elaborate responses than simple "yes" or "no". Citizens can generate ideas, innovate, can become creative in the search for solutions to emerging problems. They can also express their opinions, state their perspectives and importantly, be exposed to the opinions of other stakeholders. A properly run, transparent ICT based participation process has also the

advantage of helping citizens build social capital and a collective awareness of how their community operates and what impact their own actions have on its functioning.

However, the rate of participation in ICT mediated policy crowd-sourcing did not live up to the expectations and is still far from ideal. Citizens quite often tend to be poor engagers. Introduction of a new technology alone is not enough to counteract lack of engagement as "(…) technology itself cannot empower the people or make the process more inclusive" (Liu, 2017, p. 44). Low rates of citizen e-participation are not only disheartening but they can also undermine the core idea of the direct participation process. This is because low participation can lead to a misrepresentation of the actual needs of the citizens if only certain stakeholders – e.g. big companies or NGOs – become intensively involved, using the participation process to broadcast their own interests and overshadow alternative, bottom-up ideas of ordinary citizens.

Understanding the reasons of low engagement is important (Roszczynska-Kurasinska et.al, in press) but even more important is to find ways of reaching out to a larger and more representative part of the affected populations. In what follows we present insights from two related areas that can help firmly ground in theory the attempts to improve the process and effects of direct participation. First, we draw from the theory and empirical findings on innovation adoption to show that e-participation attendance can be improved if we treat it as a social innovation that may spread through different segments of adopters. Second, we analyze a Benkler's framework for classifying ICT collaboration models to show that the choice of who and how will participate is strongly related to the platform used for participation which therefore should be carefully chosen depending on the task that the policy makers try to outsource. We conclude by pointing out some risks related to directly applying solutions from other areas of ICT based collaboration to the area of participatory policy making.

2. Diffusion of e-participation as a social innovation

ICT mediated participation in policy making – even though the idea is not anymore brand new to researchers – for ordinary citizens is still mostly a novelty. The problem of introducing novel products and services and ensuring their wide adoption is a staple in everyday functioning of organizations and businesses. Therefore, we propose to draw from the vast research on diffusion of innovation to understand how adoption of e-participation as a valuable democratic process can be improved.

In his seminal work on diffusion of innovation, Rogers (2002) described it as a process in which a novel product or service, in our case ICT mediated participation, is communicated and spreads among the members of a community of potential adopters. Interestingly, different innovations diffuse with different speeds. Some ideas or novelties spread really fast, others require much more time to reach a substantial part of the community. Rogers identified two factors that influence the speed and rate of adoption: characteristics of the innovation itself and readiness of the adopters to pick up any innovation. What is crucial here is that adopters are not a homogeneous group and that their readiness to adopt is determined by a variety of psychological and socioeconomic factors. We propose to look at e-participation response rates as a consequence of both the features of the technological innovation at play as well as the natural segmentation of potential adopters of this novelty.

2.1. Innovations

Rogers specified five dimensions on which innovations differ and which influence their adoption rate: (1) relative advantage, (2) compatibility, (3) complexity, (4) triability, and (5) observability. First, the innovation needs to be perceived by members of the community as **advantageous** when compared to the solutions that it aims to supersede. Rogers clearly

underlines that it is not the objective advantage of the innovation that should be considered but its evaluation by the community in comparison to the solution currently in use.

In the case of e-participation we can distinguish two main groups of stakeholders: authorities and citizens. The benefits for each of the mentioned groups of stakeholders are clear. For policy makers it can be, for example, access to creative individuals at a low cost or increasing the legitimacy of the policy; for citizens it is, among others, the possibility of partaking in policy creation, expression of their own opinions and protection of their own interests. But are these benefits enough to entice them to adopt the innovation, especially when it is compared with the existing solution? In case of e-participation the existing solution, that is voting for representatives every few years, might still be far more compelling to the majority of citizens as it requires less time and is less intellectually and emotionally challenging. Therefore, a proper cost-benefit analysis should be performed before designing the e-participation process to ensure that the relative advantages of partaking are sufficiently visible to all stakeholders.

Second, the innovation needs to be perceived by members of the community as **compatible** with their values, needs or past experience. There are two points that follow from this. One is that the less often the citizens were asked to contribute to policy making in the past, the lower will be the adoption rate of e-participation solutions. In other words, the first participation process will be the most difficult to solicit and it has to be carefully planned. The psychology of social influence may be of help here. For example, policy makers could employ the foot-in-the-door technique, where in the solicitor entices another person to do something effortful by asking them for a little favor first (Freedman & Frazer, 1966). Therefore, the initial participation process should require little effort from the citizens but should give them positive feedback.

The other point to draw from the compatibility feature is that participation should be related to local specifics. Values prevalent in the community should be addressed, for example by stressing that direct participation in policy making fulfills the need for justice or equality. If other values are cherished locally, like power or hedonism, e-participation can be designed to address these values as well. Instead of advertising the e-participation initiative as enabling everyone to express their opinion, it should be promoted as a unique chance to influence the government (activates the value of power) or fun and advantage (activates the value of hedonism). Moreover, policy makers should be very careful in transplanting even successful solutions from another contexts – e.g. another country or region. In such a case analysis of value differences should be taken into account as values are one of the most important motivators for action (and therefore e-particpation) and they might differ substantially between communities.

Third, the adoption rate of innovation depends on its **complexity** - the degree to which it is assessed as difficult to understand and use. Using ICT for participation in policy making introduces two sources of complexity: the subject of the policy that is being formulated and the technology for participation. To present the problem in such a way as to make it clear for contributors with very varied background knowledge, policy makers can employ techniques from Human-Computer Interface (HCI) design or visualization. A common practice in HCI is to allow varied complexity of the interface that can be personalized by the users. For example, content on web pages is presented at a glance with links that the more interested visitors can follow. Similarly, when displaying information on the problem that policy makers try to solve by formulating a new policy, the main points should be presented as single sentences understandable to anyone with “Learn more” links underneath that would show more detailed description for advanced contributors. In there, there could be further links to data sources or results of preliminary analyses or forecasts that

the most savvy contributors could follow to gain in-depth knowledge of the problem. Visual and interactive content can further help reduce the complexity of the issue (Yi, Kang, & Stasko, 2007, Spence, 2001).

Similarly, the tasks and interfaces of the platform should be designed with very simple tasks visible first (e.g. voting, rating), with more complex forms of contribution accessible for the highly engaged. The barrier for entry should be minimal even for people not advanced in use of ICT, but ICT savvy users should be able to contribute more through commenting on others' work, writing their own suggestions, giving feedback to proposed solutions, etc.

Fourth, the success of adoption of innovation is also determined by its **trialability** – the degree to which an innovation may be tested. People often feel unsure about new solutions. They experience a mix of excitement and anxiety which might cancel each other out and lead them to reject the innovation. The possibility of trying the novelty out, without any negative consequences might ease the negative emotions evoked by being exposed to a new solution. Again, foot-in-the-door technique might be employed. If citizens are engaged first in simple activity, e.g., voting for or against policy or rating problems to be tackled for future policies and are given positive feedback for the sole act of contributing, then they might become more open to do something more risky next, e.g., expressing their opinions in written form and exposing themselves to potential criticism.

Finally, **observability** of the results of innovation may influence decisions to participate. When citizens can see how their input translates into actual policy they become more inclined to participate. Transparency of the process is crucial (Liu, 2016). Citizens should be able to understand how their inputs will be incorporated into the policy. Observability means not only transparency of the process of contributing, but also direct and

immediate feedback on how the contributions combine to form the policy. Feedback is a very important factor in acquisition of new skills and habits (Schmit et al., 1989; Anderson, 1995) and therefore the possibility of observing the results of ones e-participation can help the innovation spread.

To sum up, "innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, observability, and less complexity will be adopted more rapidly than other innovations" (Rogers, 2002, p.990). However, diffusion of innovations is not only about the new product and its characteristics but also about the people who are potential adopters. It is important to notice that diffusion of innovation is a social process – by talking to each other adopters spread information about the innovation together with its evaluation. Social influence is therefore a very important factor determining the future success or failure of an innovation.

2.2. Adopters

People differ in their readiness to adopt novelties. Some cannot wait to try something new, others are rather reluctant about novelties and would prefer the world to stay as they know it. Based on the results of numerous case studies, five segments of the population of potential adopters have been identified: innovators, early adopters, early majority, late majority, laggards (Rogers, 2002; Nowak et al., 2013). Each segment has its own distinctive characteristics and its own timing of adoption – innovators are the first to try out the innovation while laggards are the last ones.

Innovators account for only 2,5% of the population but they exhibit the greatest potential of creativity. They are willing to engage their time, energy and money just to be part of an innovation. They are well-situated and are not afraid of risk taking. In an e-participation

processes they would be the first to respond to new initiative if it speaks to them. However, the problem is that they often lack wider perspective and might be unaware of the general population preferences. They could be prone to imposing their own point of view as the optimal one, which could be far from being representative for the whole population.

The second to adopt an innovation are the **early adopters**. They account for 13,5% of individuals. Their motivation is strongly driven by social prestige. Similarly to innovators they are wealthy, personally confident and well informed, which allows them to deal with uncertainty and complexity pretty well. They often are local leaders who serve other members of the community with information or advice about innovations. If convinced to e-participate they might propagate this activity widely as they are well connected and influential. Their role in speeding up the diffusion process has been confirmed in many studies (Farquahar et al., 1990; Puska et al., 1986). Viral marketing and social network research tested how and when initial seeding of ideas to identified early adopters results in widespread adoption (Centola, 2010, Iyengar, Van den Bulte, & Valente, 2010, Weng, Menczer, & Ahn, 2013).

If the innovation proves to be affordable, relatively easy and quick in use it has chances to be taken in by the **early majority** (Robinson, 2009). Early majority makes up 34% of potential adopters. They are pragmatists who are not afraid of progressive projects, but they are also more risk aversive than the earlier groups of adopters. Therefore, they will not engage in an activity that has high potential of failure. Unlike early adopters they do not like complexity. They will join an e-participation project if the task will be well defined and if they would be convinced that their contribution will lead to a successful policy formulation.

The two remaining groups of adopters are **late majority** (34% of individuals to adopt an innovation) and **laggards** (16% of adopters). Late majority is mostly driven by social norms and peer pressure. They are skeptical, cautious, risk aversive, and cost sensitive. In

other words, they would participate in policy crowd-sourcing if the majority around them is doing so and if the profits of participation are clearly relevant to them. However, the late majority is not only influenced by individuals who have already adopted the innovation but also by laggards who are reluctant to adopt any novelty. Laggards prefer to maintain the status quo as they see any new activity or product as very risky. If representatives of late majority are surrounded by other representatives of late majority and laggards, the chances for them to adopt an innovation are rather low. This is a probable scenario, as in general, people tend to associate with those who are similar to them (McPherson, Smith-Lovin, & Cook, 2001).

When planning a direct participation process (where the goal is to better serve the needs of citizens), it is crucial to attract representatives from all segments of adopters – those who are more progressive and risk taking but also those who are rather conservative and more risk aversive. Only with suitable incentives and communication adjusted to particular groups e-participation might attract a higher number of citizens and a true picture of the situation can be drawn. A high involvement of citizens is especially important at early stages of policy formulation cycle when the priorities are set, values are established and an agenda for future is created. When a large, representative group of citizens partakes in that process and comes to an agreement on those most important issues, the participation might be more selective at later stages of the policy cycle. However, if this initial large attendance in participation on future directions of policies fails, the solutions developed later might also fail to spread.

So far the participation processes seem to attract rather less than a "crowd" (Liu, 2017; Prieto-Martín, de Marcos and Martínez, 2011). The opinions and ideas presented in the participation process might be objectively interesting but it is important to remember that they are standpoints of just a handful of citizens – probably innovators and early majority (that is, only 16% of the population) – the ones that are wealthy, ready to take risk and who know how

to deal with uncertainty. Therefore, the readiness of society to accept the solutions derived from such processes might be, surprisingly, much lower than expected by authorities employing a tool for wide participation. Late majority or laggards (50% of the population) might have different opinions but as they are reluctant to adopt the novelty of e-participation, their views remain unseen at the stage of participation process. The crucial point here is that their late position in the adoption chain is correlated with their views – they are the conservative segment, cautious to changes and not as well-situated as the earlier groups. Therefore, their absence in participation may directly translate into non acceptance of the solutions that are derived from such a process. This lack of acceptance from late majority and laggards might hinder any trials of implementing the solution, which will only frustrate those who sacrificed their time and effort by joining the process. In a longer perspective this might have catastrophic consequences for engagement – as those who decided to risk and participate might withdraw from it in future due to the negative experiences.

So far the early adopters are the most studied segment of the system of adopters as they are helpful in boosting the diffusion of innovation. However, as early as in 1970, Uhl, Andrus and Poulsen have indicated that even though understanding the behavior of innovators and early adopters is of great importance, understanding laggards should not be neglected because they can have a great influence in pushing or stopping the spread of a novelty throughout the late majority segment and perhaps even non-adopters. How can we reach out to laggards in the participation process then?

Laggards are known to be traditionalists (Rogers, 2002). Therefore the promotion of participation should include messages directed at their values alongside with those targeted at early adopters. For laggards, instead of propagating the participation process as innovative, advanced and new, more traditional values should be used to describe the initiative. For

example, while early adopters will likely react to new, eco-friendly solutions for a city, the laggards will more probably be attracted by keywords such as: “proven to work” or “traditional”. Designing varied communication about ICT based participation in such a way as to tailor it for all segments of adopters may substantially increase the attendance of all groups. Then, the policy makers gain a more true representation of the needs and priorities of citizens affected by the formulated policies.

3. Task driven design of e-participation

The number of possible ways in which people can contribute or simply express themselves to others using ICT have been consistently growing since the introduction of the notion of Web 2.0 – that is, web content that is based on user generated inputs. In scientific literature these have been called a variety of names, depending on the researcher’s background and the topic of study: social computing (Nov, Naaman, & Ye, 2009), content production (Forte et al., 2012), collaborative consumption (Hamari, Sjöklint, & Ukkonen, 2016), etc. In practical and mostly commercial applications we have crowd-sourcing, crowd labor, tournaments, and others. For the area of policy making, we chose to use the term of e-participation as the most general term to describe any way in which citizens can be involved in governance processes through the various uses of ICT. In most e-participation cases, it employs models of collaboration that were already practiced in other areas. It is then worth to distinguish what are the characteristics of each and in what way and when can it be used in policy making.

There are a number of dimensions on which ICT based user contribution models can be differentiated. In the area of policy making, crowd-sourcing models (which are considered here to include all ICT based participation) differ with respect to costs involved, anonymity of participants and scale of crowd, among others (Prpic, Taeihagh & Melton, 2014a, 2014b).

This classification is based mostly on a posteriori formal characteristics of existing platforms of collaboration and yielded only 3 distinct categories (tournaments – where a prize is given for the best solution to a set problem, crowd labor – where a well defined issue is cut into micro tasks that individuals chose to fulfill and open collaboration – which covers any other form of contributions, from wikis to twitter). However, if e-participation is to be carefully planned to increase its chances of engaging a sufficient and representative number of citizens, the choice of which model to use has to depend on a priori defined characteristics of the task at hand. These might depend on, for example, the stage in the policy cycle (Howlett, Ramesh, & Perl, 1995, Prpic et al, 2014b) but also on the area covered and the problem complexity.

Benkler (2016) has proposed a framework for classifying ICT based collaboration models (which he calls "peer production and open innovation" strategies) in which he concentrates on how the task (or goal) specifics determine the best strategy for ICT mediated collaboration. While this framework is not exhaustive and its main aim was defining strategies for commercial endeavors (i.e. for firms striving to remain innovative in the rapidly changing market), it is a valuable source that draws attention to how the project's features translate into possible collaboration models.

Benkler framed the space of possible collaboration strategies into three dimensions: project space, resource space and capital requirements. The **project space** dimension defines a continuum from well defined problems to uncertainty as to what should be done given the available opportunities and capabilities. The position on this dimension is proportional to the certainty with which any firm – or any project, any group of people – have when answering the question: what shall we do? At the origin of this dimension are projects with well-defined opportunities and predictable solutions while at the end – those were the possible pathways to pursue are diverse and uncertain. For example, a task to develop the architectural design for

an exhibition center in the middle of a town would be considered a well-defined project requiring a well-understood solution. Soliciting ideas from citizens on how to arrange a center square in a town would be a poorly defined project with the solution to a large degree uncertain.

The more uncertain the project space is, the more important it is to explore the space of possibilities, to experiment and to entice contributors with diverse knowledge. In contrast, in well-understood spaces focus should be on optimization, efficiency and exploitation of existing knowledge rather than innovation. This clearly shows that to design effective participation in uncertain project space, a large number of citizens, differing in values, motivations and background would be needed. Coming back to the example with town square – it would be important to reach contributors with different aesthetical preferences and different ways of living to properly gauge what types of buildings or arrangements would best fit citizen needs. If we relate this to the innovation diffusion theory, we might come to the conclusion that for this type of task a varied informational campaign targeting different segments of adopters would be needed together with a careful design of the platform that would allow for different levels of involvement and would be apt for different levels of ICT literacy. In contrast, the task to develop a design for an exhibition center would still fare well if a smaller group of citizens become involved, possibly motivated by monetary rewards.

The **resource dimension** describes the human resources needed to fulfill the tasks and goals. The position on this dimension can be related to the easiness with which the project can answer the questions: who knows what? At the origin are tasks that require well-defined and routine skills, knowledge and insights. At the other end of the continuum are projects that are knowledge intensive and demand diverse, often tacit and hard to standardize skills.

A project to minimize transfer times of passengers of public transportation in a city would require participation of citizens with varied skills that are difficult to pinpoint. Possibly, an algorithm could be developed to optimize the whole public transportation network, but equally useful might be an app that would help the passengers plan their journey. A solution might be optimizing the comfort of passengers, another one might concentrate on limiting air pollution of the transportation vehicles. Such a task then would require a varied human resources force, both in terms of knowledge as well as values and motivations and will be highly uncertain as to what skills would finally prove to be the best fit for the task. On the other hand, the process of voting on proposed solutions in that case or the process of measuring air pollution using smartphone apps in various points of the transportation network would both be considered tasks requiring predictable and routine skills. The first then, would need to recruit through proper specification of the platform those users that would be innovators, that would not be afraid to experiment but that would also need to possess highly specialized skills. However, the number of participants need not be huge. On the other hand, the projects requiring routine skills would need a large number of possibly unskilled users – to ensure wide coverage it should include at least the late majority if not laggards. Therefore the platforms for them should be designed to maximize easiness of use and the fun factor but to minimize the effort required to participate.

Finally, the **capital requirements dimension** – one specifically well-fitted to commercial organizations – determines what material capital is necessary for effective delivery of a product or service. At the origin are those projects that require high amounts of concentrated capital, while at the end are those where the capital investment need is either low or can be distributed among contributors. Projects at the origin of this dimension motivate contributors through monetary incentives, while those at the end often exercise other incentives, e.g. reputation, self-improvement, social power, and others. Interestingly, this

dimension might translate into the degree of freedom that is given to contributors. With high, concentrated capital operation of a project is centralized, focuses on appropriation of the gains and usually has well-defined, hierarchical governance structure. When the capital invested is low or distributed, the contributors are given freedom to operate, the project's governance structure is complex and the gains of the project usually constitute a commons. Therefore, we can treat the "capital" here as both material investments as well as decision power – which can be either high and concentrated (origin of the dimension) or diffuse (end).

Soliciting architectural projects for the town hall building would probably require certain capital to at least reimburse the winning designer. Moreover, in the final decision on which project to chose, the policy makers – for example, town administration representatives – might reserve the right to shift the balance, even if public vote is used as advisory tool. This could ensure justified spending of the capital as well as ensure feasibility of implementation of the project. In contrast, rewarding contributors with positive feedback or small gifts (a pen, etc.) for evaluating the usability and clarity of newly implemented rules for waste segregation would involve much less capital and the final assessment would be fully dependent on aggregating individual contributions. In the first project a rather limited number of contributors would need to be encouraged to participate, while in the other one – the numbers would need to be substantial, requiring a more accessible platform for participation, with simple choices and simple feedback on the results of the evaluation.

The framework described above neatly captures some of the most common collaboration models in ICT mediated production. Crowd-sourcing, of which the simplest case Benkler identifies as crowd labour (e.g. Amazon Mechanical Turk) can be found at low uncertainty of project space, well-defined skills and dispersed and rather low capital investments (i.e. contributors invest their time and hardware use, the company invests in

many small reimbursements). Online labor markets – such as Upwork (a network of freelancer experts that can be hired for specific tasks) or TaskRabbit (a marketplace of freelancers) – are shifted towards the middle on both capital required (they are paid more than non-trained employees in crowd labor and invest more expertise themselves) and on the resource dimension as their tasks are usually more knowledge intensive. However, the projects tasks are well-defined, similarly to crowd labor.

Tournaments (Kaggle, Innocentive, etc.) are high on the resource space dimension as they leave open the skills space – the contributors themselves define how to reach the set goal, which often requires diverse skills and is highly knowledge intensive. However, the project space is clearly defined and the effort required is mostly in optimization of solutions to a defined problem. The required capital investment is usually high and concentrated and the motivations to contribute are mostly related to the monetary reward.

The collaboration models just described, even though they differed on the capital requirement and resource space dimensions, were placed at the lower end of the project space. What is interesting in Benkler's framework is that it pinpoints the difference between those models and the rest of the "open collaboration". The distinction lies in the project space dimension. A huge mass of collaboration platforms – which Benkler coined "peer production" projects – operate in poorly defined and uncertain contexts, where the problem itself and the tasks needed to be fulfilled are yet to be clearly established. It should come as no surprise then that a review of cases of crowd-sourcing policies has found that only select few were carried out using crowd labor or tournaments (Prpic et al, 2014b). The vast majority employed "open collaboration" which is more comparable to "peer production" than any other model in Benkler's framework.

This could be a consequence of the fact that similarly as in other areas of ICT based collaboration, many tasks and projects on which policy makers solicit direct participation of citizens are not well-defined. Moreover, they have poorly established context (i.e. criteria for success) and require substantial amount of exploration of varied ideas, directions but also of the values and priorities of contributors. It is worth taking a closer look at this part of the project space and analyze what are the specifics of the platforms used for this kind of collaboration, what makes them suited for the projects they operate on and what contributors they draw in.

4. Peer production

Peer production systems are those were a large number of contributors coordinate to deliver a product, most often in the area of knowledge production (other artifacts are possible, but not so common – e.g. hacker spaces production). Peer production relies on the diversity of contributors, their varied skills and knowledge to both explore the possibilities and to pursue many solutions concurrently to pick out the most optimal one (i.e. the project space is uncertain and the skills required are not well standardized). A prime example of such systems are Wikipedia and Open Source projects (e.g. Apache Group, Pearl or Mozilla).

One of the most important assets of peer production is that contributors are given freedom to operate (mostly because the capital investment is diffuse and so is ownership of the ideas). This, together with the non-defined problem space entices contributors with varied, non-monetary motivations. Some of these are internal – i.e. self development, fun, but some are clearly social. For example, in open source projects reputation is one of the primary drivers. Motivations are strongly dependent on the value systems that contributors have – some will be driven by the self-transcendent values like welfare of the world (e.g. creating an

encyclopedia that anyone can use), freedom (to develop and improve code) or caring for the welfare of close others (forming a strong community).

To make many diverse motivations work, the platforms need to operate for a prolonged time (e.g. reputation needs to be gathered) and have to have certain design choices implemented. These include, for example, differentiated user roles (e.g. vandal fighters, moderators, arbiters), allowing feedback on user activity (e.g. user profile pages, counters of activity – lines of code or edits, awards – automatic for reaching milestones in activity, or given by other users, etc.) or providing a space to socialize apart from the tasks performed (a forum, chat or comments on user profiles).

The uncertainty of the project space is reflected in the organization of work in peer production projects. They are characterized (Benkler, 2002) by a) modularity of tasks (they can be divided into many separate modules); b) varied granularity of modules (differing in the amount of effort, required; with many tasks demanding very little effort); and c) quality control and module integration that is performed in a cheap, centralized way or in an iterative process that is also peer produced.

These characteristics are crucial because they ensure that a representative, large, varied (in skills and motivations) group can contribute by self-selecting the tasks to fulfill. Less "advanced" users (moderately engaged or motivated, acknowledging their own lack of time or necessary skills, that are normally careful in adoption of new ideas – late majority or laggards) can still have a say in the outcomes of the production process without the need to devote too much time or effort. At the same time more motivated or experienced users (not afraid to experiment or to devote time and effort to a novelty – early adopters for example) have room to enact their creativity and motivation and may take lead in establishing both the functionalities of particular solutions as well as general values and goals of the communities.

In effect, users with different values and from different segments of adoption will still be able to contribute, even if just a little. Even a tiny contribution builds a sense of being a part of the community and through the psychological mechanisms of self-perception (Bem, 1972) enhances the chances of further participation.

This variety of tasks not only creates a place for everyone but through engaging varied contributors, may increase the quality of solutions. In Wikipedia community, for example, contention of ideas and material submitted by others is a very important motivator of contribution (Jemielniak, 2014). Moreover, articles that are authored by cognitively diverse contributors with varied background and sometimes even conflicting views are of higher quality thanks to the "creative abrasion" they generate (Arazy, Nov, Patterson, & Yeo, 2011).

Structuring the work in such a way that there is place both for highly and poorly engaged participants may also translate into creating the core / periphery group division so common in ICT mediated self-governing communities (Wikipedia, Open Source Software projects). Not only the activity levels of these groups in the projects are different but also the type of the tasks they undertake (Crowston et al., 2006). The periphery are mostly contributing content, usually limited in scope (single ideas, etc.), while the core are contributing content in many areas but also taking supportive roles, maintaining and moderating the work of the community. Both groups are crucial to the success of a project. The proportion of the size of these groups has been found to be less than 20% for the core and around 80% for periphery (Crowston et al., 2006). Strikingly, this Pareto proportion has also been found in e-participation (Liu, 2016) and can be related to the division between adopter groups where innovators together with early adopters constitute around 16% percent of the population.

Drawing from the design principles and the observable characteristics of peer production systems may prove valuable for designing ICT based participation processes. What distinguishes those projects from other ICT based collaborations is that the communities that form around them build up sometimes immense amounts of social capital, they create a distinct community identity (e.g. Wikipedians, Mozillians, Redditors, etc.), they evolve a self-governance structure and exhibit collective agency (Rychwalska & Roszczynska-Kurasinska, in press). Clearly, those are the features that an ideal, democratic and participatory community should possess. Therefore we pose that whenever possible peer production type communities should be encouraged in participatory policy making, for example, by providing a stable socializing and communication platforms (e.g. fora, wikis) through out many policy projects. Participation with the same people in a few projects creates social bonds that are one of the main drivers of engagement in online communities (Yuqing Ren, Kraut, & Kiesler, 2007). On the other hand, participation in many projects creates identity based engagement, the other crucial component of online community loyalty (Festinger, Back, & Schachter, 1950). The platforms should be designed to allow varied levels of contribution (e.g. on a single project, or in a simple task but also giving space for more elaborate contributions to highly engaged citizens). Such ICT based support for social capital build up could foster better and more direct engagement of a representative group of citizens.

To sum up, from Benkler's framework we can draw insights for better defining the possible forms of crowd-sourcing – or more generally, e-participation – in the process of policy making. It is clear that the policy making process involves a variety of tasks, and some of them can be clearly positioned on both the resource dimension and project dimension. For example, the policy cycle describes tasks that are increasingly more specific as the formulation of the policy proceeds – from establishing the agenda, through problem definition and implementation up to evaluation. Involving citizens at the early stages would require

platforms that enable exploration, diverse inputs and varied motivations (e.g. wikis, discussion fora, possibly maintained by policy makers throughout many participation projects). Engagement at the later stages requires optimization and exploitation of specific skills and knowledge and models such as labor market or tournaments will be more appropriate.

For these different tasks, participation numbers and the groups encouraged to participate would also differ, which should be reflected in the design of the platforms to either enable wide participation of not so ICT savvy users or to enable advanced users to act on their innovative potential.

It is worth noting, however, that all policy making e-participation necessarily lies on the middle of the capital required dimension. Both the material costs and decision power will be more concentrated in the hands of the policy makers as compared to the citizens. Yet, this specifics is clearly related to the democratic process and provided that the representatives are chosen preserving the core values of democratic elections, this should not diminish the innovation potential, the freedom to explore and varied motivations of participants.

5. Risks

Examples from commercial and open ICT mediated collaboration systems are a valuable source to draw good practices from. However, some ideas should be treated with caution when applying them to the case of policy making, some others should be outright avoided. We have distinguished four major risks that should be considered when implementing e-participation process.

The first risk is related to the concept of "open call". Open call is prevalent in ICT based collaboration as it welcomes anybody who wants to contribute. The rationale behind the

open call is that a creative, excellent idea might come from anyone so all should be encouraged and none should be restricted from participating. However, this popular solution may not always be good for e-participation in policy making. Often, a closed call only to those who potentially will be affected by the intervention is a better choice – a method often used in participatory budgets. For example, if in a participation process on traffic organization in Warsaw, no one is restricted from participation, the dwellers from inner city might not be satisfied if surrounding cities shift the voting on solutions. Similarly, they might be reluctant to accept the choices of a panel of experts based in the UK that could win a tournament call and design the traffic in the inner city. An externally imposed or simply influenced decision, even if grounded in elaborate analysis of the needs of the community and opportunities present, will never be as well accepted and adopted as a decision made by internal deliberation, especially when citizens are not consulted whether they want outside contributions.

It might be a good, enriching experience for citizens to be able to make decisions by their own means and to the end of their own possibilities as a community – even if those abilities are limited and could result in suboptimal choices. In the long run interaction in e-participation might built a sense of belonging to the community, might increase social capital or even enable collective agency, which can help the community make better decisions in the future. Generally, reaching out in an open search for solutions to local challenges can be very helpful, but we claim that it should be a community decision to do so.

The second risk is related to the notion “wisdom of the crowd”. It is one of the most called upon statements to justify involving large numbers of people in the process of decision making. In short, this name describes the fact that in most cases the average of estimates of a large number of people will be better than any single estimate. The caveat is that,

mathematically, for this statement to be true the errors of single estimates must not be correlated. Only then the errors cancel out when computing centrality measures (mean, median) and a good aggregate estimate can be found. Moreover, the quality of the aggregate estimate depends on the variation of the single estimates – the more diverse they are, the better the general assessment. This is what solutions such as crowd-sourcing or tournaments depend on. But are those two conditions always met?

The answer might not be so optimistic. There are social processes (especially, in ICT based communication) that can dramatically alter the wisdom of the crowd phenomenon. These are the so called echo chambers and filter bubbles. The first phenomenon describes a situation when an individual bases his or her opinion (consciously – seeking advice, or unconsciously – by being exposed to it) on the opinions of their social contacts – in the process known in social sciences as social influence. While normally this process enables the individual to draw from the experience of others, in the context of ICT it might turn into a trap. Opinions in ICT social communication are often simply repeated and shared without verification. That means that the opinion of a handful of individuals might perpetuate through the crowd creating the impression of wide number of individuals having the same opinion. In such situation the opinion of many is no better than the opinion of a single individual as the errors of opinions are highly correlated.

The second process – filter bubbles – is a direct consequence of the prevalent social media technology. Service providers are trying to keep the users engaged on their platforms and to that end they try to "personalize" the content served. In simple words, users are served content that is similar to what they have already chosen to see or read previously or to what they explicitly "liked". The assumptions here are that seeing similar content will make the experience more pleasant (it does!) and worth repeating (spending more time on the

platform). This seemingly harmless tool may result in a serious bias of opinions – people are exposed to content that is predominantly similar to their own views and they may grow in conviction that their point of view is the dominant one. They have no chance to see or adopt diversity. In effect, their opinions are strengthened, get polarized (i.e. get more extreme) and what is worse – they are increasingly unaware of what "the other" side thinks, what are their arguments, their rationale and even – how many of them are there.

These both phenomena are something that policy makers should be especially aware of because they might influence the participation process in undesired directions. When errors of opinions are potentially highly correlated and participants are polarized with very little diversity and unaware of the others – wisdom of the crowd does not exist.

The third risk, probably the least discussed in the literature on policy making, is connected to monetary rewards that are used to encourage participation. As mentioned before, in the ideal situation, policy making is supported by participation of an engaged self-aware community through platforms that use varied incentives, like social norms, reputation, etc. Yet, even for those communities in some cases there may be ICT solutions used that do not build up social capital. This is for example the case when there is need to find optimized solutions to well-defined problems or where a large amount of only simple inputs are needed (for example, gathering data on parking space usage, etc.). In this cases, monetary rewards might be used as an incentive for a tournament or crowd labor mechanism, respectively. Yet, they should be used with caution.

External incentives may replace any preexisting or possible internal motivations, for example those based on moral commitment and engagement or social norms. Moreover, once such internalized incentives are replaced, they are difficult to reinstate. Consider the example of a nursery that introduced late pick-up fines on the parents (Gneezy and Rustichini, 2000).

The internal motivation to take care of ones child was monetized – it was commodified and changed into external incentives. Simply, there was a cost associated with being a "bad parent". The nursery expected parents to improve their behavior with the penalty in place, but the effect was opposite – pick up times got even worse. The parents replaced any moral guilt they might have felt with cost-gain analysis. Therefore, the nursery withdrew the fines expecting to revert the behavior of late pickers. Yet, this did not happen. The external motivation (saving money) was already in place of any internal ones and the fact that nothing was charged only made it a more lucrative deal. This example clearly shows that the incentive scheme for any action that requires effort has to be well thought out so as not to undermine the social capital already present.

The last issue we mention here is the issue of intellectual property, which while minor might still affect some participation design. In commercial crowd-sourcing – crowd labor and tournaments mostly – the ownership of artifacts produced is transferred to the institution that opens the call. Moreover, in some tournaments or crowd sourcing without monetary prizes, all solutions submitted, including the ones not implemented by the organization, become its property. This strategy might be used by policy makers to ensure protection against possible claims especially when physical artifacts are produced. Yet, in many cases common ownership – especially of more intangible ideas – can be a great driver of social capital. It also may encourage others to join at the later state of the policy cycle. For some citizens it will be hard to join e-participation at the early stage when nothing yet is done, but they might be drawn to join a community that has already established potential, as proved by the intellectual artifacts it owns.

6. Conclusions

E-participation is a great tool which, if used properly, might change the way communities operate, and the way citizens think about their surroundings and their role in it. We argue that replacing the word "e-participation" with "crowd-sourcing" loses some very important idea standing behind the process – inclusion of citizens in policy making cycle, which may result in emergence of social capital and even collective agency in the long run. Nonetheless, the examples of ICT collaboration models employed in commercial and open space should be studied to increase our understanding of the sociological, psychological and economical processes leading people to engage.

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