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► **To cite this version:**

Gustaf Juell-Skielse, Anders Hjalmarsson, Paul Johannesson, Daniel Rudmark. Is the Public Motivated to Engage in Open Data Innovation?. 13th International Conference on Electronic Government (EGOV), Sep 2014, Dublin, Ireland. pp.277-288, 10.1007/978-3-662-44426-9_23 . hal-01401751

HAL Id: hal-01401751

<https://inria.hal.science/hal-01401751v1>

Submitted on 23 Nov 2016

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Is the Public Motivated to Engage in Open Data Innovation?

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Abstract

Governments aim to increase democracy by engaging the public in using open data to develop mobile apps and citizen services. They make information available (open data) and organize innovation contests to stimulate innovation with the goal to make new services available for the public to use. But will the public take on the challenge to both develop and provide services to each other? In this paper we use a case study from public transportation to investigate the motivation for individuals and teams to participate in innovation contests. The results show that the motivation for participating is primarily related to fun and enjoyment. We argue that in order to better meet the goals of open data innovation, governments need to follow through the full service innovation cycle and also care for making citizen coproduction in the execution and monitoring phases fun and enjoyable. Currently there is little chance for participants to make profit on a competitive market so governments need to provide other mechanisms to ensure service provisioning. For future research it is suggested to investigate how the later stages of open data innovation can be supported in order to meet the overall goals of open data innovation.

Keywords. Open data, citizen coproduction, innovation contest, motivation, e-service, mobile application.

1 Introduction

In their quest to strengthen democracy and to promote economic growth, governments strive to become more open, and since the 1980's the number of countries with freedom of information laws have increased more than fivefold [1]. Openness and transparency are viewed as fundamental to democratic participation as well as trust in government and prevention of corruption [2, 3].

In order to improve openness and transparency, governments are stimulating the provisioning and use of open data. For example, the European Commission has issued a directive on the re-use of public sector information [4]. In addition to strengthening democracy, open data is believed to be an untapped well of future prosperity [5]. Public administrations in Europe control large volumes of information collected by numerous public authorities and services. The outcome of the proper manipulation and management of this information is expected to enhance the EU economy with at least €40 billion each year [5].

But turning government information into value is not done overnight. First, data need to be made available and in formats easy to manipulate [37], and therefore public authorities are beginning to publish data¹ in open formats in conjunction with application protocol interfaces to support its manipulation by services. Second, services, such as mobile apps, that transform open data into value [6] need to be designed, executed and monitored according to the service lifecycle [7].

However, so far the competitive market has largely failed to generate revenues for the developers [8]. It is estimated that less than 0.01 % of all developers can expect a return on their investments by 2018, even for mobile services related to games and entertainment. Users have high expectations for what should be paid for, and today mobile services are rather used by companies to build brand recognition and product awareness than for making profit.

An alternative to the competitive market model is the collaborative production model where the public is engaged in service innovation [9, 10]. But while professionals in a competitive market are driven by financial incentives, the motivation for individuals to engage in collaborative production is most probably different. For example, earlier studies on software developers engaged in open source projects reveal that fun and enjoyment, alongside with user need and intellectual motivation, are the top drivers [11, 12].

To accelerate the development of new service ideas and prototypes, innovation contests, such as idea competitions and digital innovation contests, have become popular instruments [13, 14]. However, only a few of the service prototypes developed at innovation contests become viable digital services [15].

Although much has been written about citizen co-production in traditional areas such as neighborhood watches [16, 17], little is known about the motivation for citizens to engage in collaborative service development in a globally connected world [7]. Despite this lack of knowledge, governments are now embracing e-government

¹ See for example www.datacatalogues.org for publicly available data sources.

visions on the assumption that the public will engage in such endeavors, see for example “A vision for public services” [18].

The question of interest in this paper is the motivation for the public to engage in innovation on open data. So far there is little scholarly work on why and how the public participate in collaborative production of digital services. We use a case study from public transportation to investigate the motivation for individuals and teams to participate in innovation contests. The result of the study is an increased understanding of the motivational factors triggering individuals to participate in collaborative production of digital public services. It also enhances the understanding on the requirements for how governments should organize the later stages of the service development cycle when relying on the public for its production.

The paper is organized in seven sections. Section two contains an extended background discussing key concepts followed by a case description in the third section. In section four we describe the method and in section five the results are presented. Section six contains a discussion of the results and in section seven we conclude the paper and suggest areas for future research.

2 Innovation and Coproduction using Open Data

Innovation has been described as a linear process of sequential events from research and idea generation to commercialization [19]. The linear process model has been challenged due to a lack of feedback loops [20]. The chain-linked innovation process model, presented by Kline [21], is a simultaneous model including elements such as research, invention, innovation, and production. Rothwell [22] argues that innovation also involves interaction both internally and with external parties such as customers and suppliers. This model has been furthered into open innovation [23], where organizations innovate with partners to share risks and rewards.

According to Linders [7], innovation of digital services can be described as a loop model including three phases: design, execution and monitoring. It is a simpler model than ITIL (Information Technology Infrastructure Library²), which has become the de facto standard for describing the digital service lifecycle [24]. ITIL is a linear model that consists of five sequential steps including strategy, design, transition, operation and continual improvement. The European Commission uses Linders’ loop model in its vision for public services [18].

2.1 Coproduction of Digital Services

Through the emergence of the Internet and ubiquitous communications, coproduction may find new forms and increase dramatically [7]. Osimo et al. [9] call the coproduction of digital public services between citizens and public and private organizations *collaborative e-government* and defines it as “any public service that is electronically provided by government, citizens, NGOs, private companies and individual civil

² ITIL is a registered trademark of the United Kingdom's Cabinet Office.

servants, in collaboration or not with government institutions, based on government or citizens-generated data” [9, p.14].

While studying third-party development, Linders [7] focuses on the relationship between citizens and governments in the coproduction of public services. He identifies three different types of coproduction: Citizen sourcing, Government as a platform and Do it yourself government. Citizen sourcing is where citizens produce for governments, government as a platform where governments produce for citizens, and do it yourself government where citizens produce for citizens. Linders [7] then classifies citizen co-production according to the three phases of the service innovation process, see Figure 1. However, he does not take into account other actors involved in coproduction, such as private companies and NGOs.

	Citizen sourcing (C2G)	Government as a platform (G2C)	Do it yourself government (C2C)
Design	Citizen consultation (e.g. eParticipation)	Informing and nudging (government using behaviour economics to design services that encourage the socially optimal option, e.g. through data mining)	Self-organisation (e.g. community portal)
Execution	Crowd-sourcing and co-delivery (trying to find a solution to a problem through the knowledge of the public or personalisation of services)	Ecosystem embedding (government agents becoming part of the community for example through openly sharing government knowledge, infrastructure and assets, e.g. government open sourcing)	Self-service (government expecting citizens to provide a public service themselves, whereby government may provide the facilitating framework, e.g. car-pooling is the 2 nd largest commuter transportation system in the US)
Monitoring	Citizen reporting (e.g. FixMyStreet)	Open book government (proactive information dissemination, empowering citizens to hold their government to account, e.g. data.gov)	Self-monitoring (online citizen testimonials)

Fig. 1. Classification of citizen co-production. Based on [7, p. 449].

2.2 Understanding Third Party Developer Motivation

As third-party developers typically aren't paid up-front for their work [25] but instead pursue development in return for e.g. future potential income [26] or intrinsic rewards [27], it is important to understand the different motivations for this type of development [28].

Previous research has observed that such motivations can be surprisingly heterogeneous. As the importance of third-party software has skyrocketed in the last years, more entrepreneurially oriented developers are hoping to ship “blockbuster applications” [29]: by drawing on first-mover advantages (such as exploiting new technical affordances provided by device manufacturers and/or unoccupied niches in the service ecosystem) [29, 30], signaling partnership with market-leading firms [26] or

accessing otherwise unattainable downstream capabilities through minor investments (e.g. by publishing applications in application marketplaces) [26, 29, 31] small and independent developers may reap substantial monetary rewards for their development work.

However, a large portion of third-party developer work is also undertaken without expected monetary compensation [27]. In third-party application development previous research have observed that e.g. learning a new technical platform [30, 31], improving existing services [32], the freedom of undertaking autonomous work [29, 30, 31] as well as the sheer enjoyment of programming [33, 27] as salient motivators for developers to freely engage in development of publically available services.

This wide array of motivation has implications for organizations governing open development efforts. E.g. Boudreau and Lakhani [28] argue that to attract actors with commercial interests, innovation is favored by market-like structures, where as more intrinsically motivated actors is best governed through communities. In sum, when organizations wants to tap into outside development capabilities, they need to 1) recognize the rich spectrum of motivations and 2) work to support these motives (whether it is financial turnover or catering for the disbursement of more “invisible wages” related to application development). One such way of tapping into these capabilities is to arrange digital innovations contests.

2.3 Digital Innovation Contests

Innovation literally means something new and original that breaks into a market or society. As such innovation is a process that always involves competition in some form. Over the years, a number of different types of contests have been discussed in order to control and organize innovation: idea competition [35], community based innovation [13, 36], online innovation contests [13], and digital innovation contests [14].

Piller and Walcher [35] state that the value with an idea competition is that the contest provides a mechanism by which users can transfer innovative ideas to firms and other organizations. Consequently, a core challenge of organizing an idea competition is to motivate users to provide innovative ideas, which the initiator of the contest then can transform to new services and products [35]. The concept of innovation contests is extended in Bullinger and Moeslein [13] when presenting the concept of online innovation contests, who distinguish ten key design elements when setting up idea competitions.

Füller et al [36] provide, through the concept of community based innovation, support for how to identify, access and interact with lead users in online communities in order to stimulate valuable input at different stages during the innovation process [36].

These concepts for controlling innovation does not take into account the possibilities that open data brings to an innovation process. “Open data is data that can be freely used, reused and redistributed by anyone – subject only, at most, to the requirement to attribute and share alike” [37]. This as they merely focus on idea generation for which open resources as data is not needed. Consequently, Bullinger and

Moeslein [13] do not discuss the provision of open data as a design element when organizing innovation contests for that purpose.

Building on that lack of support, the concept of *digital innovation contest* was introduced in 2012. Digital innovation contest is defined as “an event in which third-party developers compete to design and implement the most firm and satisfying service prototype, for a specific purpose, based on open data” [14, p.2]. Events of this kind are based on the nature of an idea competition, however, they also stimulate and encourage third-party involvement in the making of the actual end result; not merely using end users to provide ideas and other input at different stages of the innovation process [35, 36]. Consequently, while idea generation is an important activity in a digital innovation contest, software design, implementation and testing as well as service operation and monitoring are also crucial activities that have to be performed [14].

3 Case Description

The case selected was the innovation contest Travelhack 2013 organized by SL, the public transportation organization of Stockholm, Samtrafik, a service provider owned by transportation organizations in Sweden, and the research institute Viktoria Swedish ICT. The main objective for organizing the contest was to provide a platform for the best developers in Sweden to design and develop novel digital service prototypes that support travellers using public transportation, and by this increase the attractiveness of public transportation. The reasons for selecting the case was that the goals of the innovation contest resemble the overall goals of open government data, and that the organizers provided a catalogue of open traffic data³ as well as promoted use of open data from other areas, for the participants to develop on⁴. The contest was held in the winter and spring of 2013 and spanned three months, divided into three phases: idea, preparation and final. Proposals on ideas were divided into three categories:

- Digital services that make public transportation trips more fun
- Digital services that make public transportation more efficient
- Digital services that make public transportation more accessible to everyone, especially passengers with cognitive disabilities.

A jury then evaluated the ideas based on four criteria: innovativeness, potential to make impact, technical feasibility, and usefulness. Out of a total of 58 proposals, 25 teams were invited to the final and 21 participated. The purpose of the final - which was organized as a 24-hour hackathon - was to have contestants finalize the prototypes, select winners, and promote the result to invited venture capital providers. During the final, the organizers and data providers supported the teams on-site together with business coaches to finalize their pitches to the expert jury.

³ Trafiklab.se

⁴ For example: Spotify, Oxify, Skype, Bing Maps, Windows 8, Windows Phone och Rebtel

The organizers had no intention to acquire any of the participant's services after the contest, and instead venture capital providers were invited to the final. However, no teams have so far managed to attract funding from the invited venture capitalists, however through other means of finance the development, one year after the contest, is ongoing in at least six of the teams.

4 Research Method

In this study the aim is to investigate the motivation for the public to engage in open data innovation. We selected a case study of public organizations arranging an innovation contest based on open data made available through an open data catalogue. The case corresponds well with the overall goals that governments have with open data, namely to 1) make government data available in open formats for services and mobile apps and 2) stimulate the development of services and mobile apps to create public value. Hence we argue that the case is representative for service innovation on open government data, and the results and conclusions may be applicable to similar cases.

To collect data we developed a survey based on the motivation model developed by Bodreau and Lakhani [28]. We used a seven step Likert scale to measure the levels of motivation. A seven step Likert scale was chosen in favor of a five step Likert scale in order to receive better discrimination of the responses [38]

The survey was directed to the participants of Travelhack 2013. We received 39 responses from a total of 76 participants giving a response rate of a little more than 50 %, which is considered as satisfactory. To complement the survey, interviews with 20 of the 21 teams were conducted including questions about their intention to finalize their service and make it available to the public. The survey was conducted in conjunction with the final, and the team interviews were carried out during a period of 2-4 months after the final using telephone interviews and a prepared interview guide. These interviews were carried out with the team leaders who then represented the whole team.

5 Results

In total, 76 individuals organized in 21 teams participated in the final of Travelhack 2013. The final resulted in 21 service prototypes of which four were awarded prizes in different prize categories

5.1 Who Participated in the Contest?

The majority of participants, almost three fifths, were citizens with an interest in and ability to develop digital services. Two thirds of the citizens viewed themselves as being hackers while the remaining third of the citizens consisted of students, researchers, community teams and friends. Community teams are characterized by a shared interest in development. Almost a fifth of the participants were project teams

representing companies and one fourth were start-up companies with the aim to generate business from the service. Start-ups represent a category of participants in between citizens and established companies. Start-ups are characterized by a shared intent among the team members to make business from the developed service and that the business is in its early stages of trading. The organizers of the contest had consciously aimed toward engaging participants from these categories in order to stimulate broad participants from different groups interested in building new services based on open data.

5.2 Motivation for Participating in the Contest

The motivation for individuals to participate in the innovation contest were primarily intrinsic where the top three triggers were fun and enjoyment, intellectual challenge and status and reputation, see Table 2. User need, an extrinsic type of motivation, scores fairly high while other extrinsic triggers related to money, reciprocity as well as signaling and career concerns score the lowest.

Motivation	Avg.	Dev.	Type
Fun and Enjoyment	6,8	0,6	Intrinsic
Intellectual Challenge	6,3	1,2	Intrinsic
Status and Reputation	6,0	1,4	Intrinsic
User Need	5,8	1,6	Extrinsic
Professional and Personal Identity	5,5	1,8	Intrinsic
Autonomy	5,3	1,8	Intrinsic
Learning and Skills Development	4,9	2,0	Extrinsic
Money	4,9	1,8	Extrinsic
Reciprocity	4,7	1,9	Both
Signaling and Career Concerns	4,3	2,2	Extrinsic

Table 1. Summary of results from the survey of motivational factors. Listed in order of popularity. Levels are measured in a Likert scale, where 7 is the highest score and 1 is the lowest.

Most of the motivational factors are self explanatory but professional and personal identity, reciprocity as well as signaling and career concerns might need some further explanation. Professional and personal identity refers to the intrinsic motivation of strengthening the view of the participant as a competent developer (“I *am* an iPhone developer”). Reciprocity denotes the sense of developing services for free but expect counter-services such as organizer recognition in return, and signaling and career concerns refers to participants’ motivations to develop showcases for future employers or customers.

5.3 Following up on Development Status

Four months after the final one third of the teams were still active developing their service, see Table 1. However, 83 % of the teams planned to develop their prototype

into a working service. Out of these, 83 %, 60 % of the teams intended to finalize the service on their own while 40 % planned to do it in collaboration with others, either through direct collaboration or by selling the rights of the service to a third party.

Development status and plans	Percentage
Active development	33%
Plan to finalize the service	83%
- the team on its own	60%
- in collaboration with others	40%

Table 2. Development status and future plans for the teams participating in the final of Travelhack 13.

6 Discussion

Given the results of this investigation, the main motivation for individuals to participate in development of public services is similar to the motivation for developers to participate in open source communities: fun and enjoyment alongside with intellectual challenge and status. Despite a significant number of participating teams from companies and start-ups, money scored low as motivational factor. One potential explanation for this can be that the teams were aware of the low chances of making profit on a market for public services. Although more than 80 % of the teams planned to finalize their service, only one third had actually 2-4 months after the contest continued the development. It is also possible that the organizers' decision not to acquire any of the services after the contest, and a lack of interest from venture capitalists, discouraged the teams continue developing. One exception is the winner of the innovation contest, *Resledaren*, who after the contest in a consortium consisting of the team in collaboration with the organizers won an application for innovation funding to push on the development of the service in to a market ready service. This visualizes a gap that must be bridged for teams in order to externally fund and continue the development. It also visualizes that additional competences (provided by the organizers) have to be engaged by a team in order to bridge the gap. In this case the organizers' experiences in writing proposals for funding were used to identify the available funding opportunity and create a bid that won the external funding.

Travelhack 13 is a good example of an innovation contest for open government data. The organizers have spent much effort in creating an attractive event and informing about it. However, the event only supported the first parts of the design phase of the service development life cycle. There was no support for the subsequent phases of finalizing the design, execution and monitoring from neither the organizers nor the venture capitalists. We argue that for collaborative production of public services to occur and for the public to engage in this production, public organizations need to establish mechanisms to support all phases of the service development life cycle. So far there are minimal chances for developers to make profit on open data services and mobile applications.

If governments are to engage the public in collaborative production, the motivation for individuals and different types of groups needs to be better understood and managed. In her seminal work on collective action, Elinor Ostrom [17] points to a number of factors affecting how groups of individuals are prepared to manage a common good. E.g. clear rules and structures are required for how governments hand over responsibility to the public. Following the same strands of argument, we claim governments need to establish policies and mechanisms for the latter phases of the service development lifecycle. Arranging innovation contests is a good way of generating ideas and prototypes but it is not enough to tap the potential well of fortune that open data represents.

Innovation contests focus on developers. But maybe the successful collaborative production of public services needs to involve other actors and competences as well, actors that do not have the competence to develop services but to provide the services for the benefit of other citizens. Maybe there is a need to identify actors that have other motives than developers to engage in the execution and monitoring phases of the service development life cycle.

7 Conclusions and future research

The question at the center of this paper is the motivation for the public to engage in innovation on open data to strengthen democracy and enhance economy. We conclude that participants in innovation contests for open data primarily are motivated by fun and enjoyment and other intrinsic factors prior to the contest. Money and signaling and career concerns score low in our investigation as initial factors motivating the public to engage in open data contests. We also conclude that innovation contests like Travelhack 13 do not take into account the entire service lifecycle leaving participants on their own finalizing their digital services and finding ways to provide them to the public. Therefore, for future research we propose to increase the understanding of collaborative production of digital services and design and evaluate new mechanisms for supporting the later phases of digital service execution and monitoring.

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