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Evaluation of a Pilot Game to Change Civil Servants' Willingness Towards Open Data Policy Making

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Abstract. The adoption of open data policy-making by governments is limited due to different types of constraints. Civil servants are reluctant to open their data to the public for many reasons. The lack of knowledge of benefits that can be produced by the release of data and the overestimation of risks and operational complexity seems to decrease their willingness to support the opening of data. The idea that a serious game intervention can change awareness of participants in different domains is already known. Yet, games are domain dependent and concepts differ per domain. A game has never been used for the emerging domain of open data in which civil servants are operating in a bureaucratic environment having a risk-averse culture and strict institutional rules. A role-playing game prototype was designed for civil servants to experience open data policy-making. This paper analyses its first results aiming at changes of perception for the participants of the game and aims to understand the changes in behavior of civil servants that played it. For some participants, the game influenced their attitude, whereas others were not influenced. Suggesting that different approaches might be necessary for changing the attitude of different groups.

Keywords: Open data · Open government · Game · Design · Quasi-experiment · Survey

1 Introduction

Games can be seen as simulated (safe) environments for human interaction on (multi-variable) complex (wicked) problems that demands creative (participative) solutions from multi-stakeholders [1, 2]. As defined by Duke and Geurts [1]: "game-design is a combination of a disciplined design approach with a mimicry of existing game formats and styles; it is an elusive but real 'art'" (p. 273). A game is also "a communication mode that is capable of linking tacit knowledge to formal knowledge by provoking action and stimulating experience (p. 313). Meijer, Reich [3] uses openness and purpose as concepts to define objectives for the use of games. Games can be used for training, research, policy and design.

It is already known that game interventions can change its participants awareness on different topics [4]. Games are highly context dependent and different context

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require games making use of different concepts. Still, it has never been tested with civil servants from governments that can provide governmental data to the public. These civil servants have particular characteristics to which a game intervention is complicated by the bureaucratic environment constrained by risk-averse cultures and norms and rules favoring not to open data [5]. This research focus at developing a game to change the willingness of local government's civil servants towards providing open data.

Governments are releasing more and more data in order to increase participation by the citizens, improve transparency, accountability and in order to deliver better policies [6]. Getting governments to release data implies in changing practices and routines. Many datasets remain closed [7] and civil servants resist to change and adopt open data as practice. Based on the literature [8], the main reasons found to explain the resistance for providing governmental data was listed in order to explore the triggers and incentives to overcome civil servants behavioral barriers for open data policy-making. Lack of knowledge of benefits and overestimation of risks by these professionals are defined as motives to decrease their open data policy-making adoption.

The goal of this paper is to present the evaluation results of the game. In an experimental set-up, a survey was applied before and after the game was played. The outcomes are compared in order to understand the game effects. The present paper aims at evaluating the pilot testing of this game.

2 Background

2.1 Open Government Data

Open Government Data (OGD) is the action by governments to get raw data to be available for manipulation by others [9]. Getting the public to access this data implies in open governmental data policies: "OGD can be used to help the public better understand what the government does and how well it performs, and to hold it accountable for wrongdoing or unachieved results" [10].

Described in Janssen, Charalabidis et. al. [8]: "Open data mends the traditional separation between public organizations and users. The opening of data leads to two important assumptions about government. First, it leads to an assumption of the readiness of public agencies for an opening process which considers influences, discourses and exchanges as constructive, and welcomes opposing views and inputs. Second, it leads to an assumption that government is to give up control, at least to some extent, demanding considerable transformations of the public sector" (p. 258). Achievable benefits for providing open data include reducing red tape burden and repeated demands by making data available, and benefits for society and government having more data used such as increasing economic activity, creating new products and services besides monitoring and control usages [8]. Still, there are barriers to get the data to be available and resistance to share data is common in the public sector.

The lack of knowledge of benefits that might be achieved by the opening of government data, such as increasing transparency and democratic accountability, is referred in the literature as a reason for low engagement in open data policies by civil

servants [8, 11, 12]. These professionals themselves might also not be aware of benefits with the optimization of administrative processes or the increase in data sustainability (reducing data loss) by the creation of trustable databases based on combining data (with potential external quality checks of data and validation). The possibility to merge, integrate and mesh public and private data can also generate access to external problem-solving capacity.

On the other hand, Janssen, Charalabidis et. al. [8] also describe a set of constraints to open data policy making to happen and these can be overestimated by civil servants. Resistances can come from issues such as task complexity, when most workers lack the ability to deal with data. The common duplication of data and its availability in various forms makes it difficult to search and browse. There are also legal barriers related to open data. Privacy enhancement mechanisms can play a role in letting civil servants know better the risks and access tools on how to reduce them [13]. Finally, institutional barriers such as the stablished culture that emphasizes barriers and neglects opportunities or the unclear trade-off between public values (transparency vs. Privacy values) are explosive difficulties on the regular risk-averse environment of the public sector (lack of entrepreneurship).

Hardy and Maurushat [14] describes that: "fears of what might be exposed by releasing government information, with public servants reluctant to put decision-making processes down on paper for fear of these being released into the public domain (…) a generational preference amongst public service management for maintaining secrecy of information, whereas younger generations expect that data should be made freely available" (p. 35). Remarkably, while many of the perceptions described may vary from one government to another based on their context, a common group of benefits and barriers to open data policy-making can be defined for game design purposes.

A model was built to explore the variables that could influence civil servants behaviour towards open data [15]. Behavioral Intention (willingness to provide open data) was the main dependent variable defined which was to be influenced by other variables such as Performance Expectancy (benefits of open data) or Effort Expectancy (task complexities and risks). Hence, civil servants tend to decrease their adoption if not ad dressing the benefits that can be achieved providing open government data and overestimating the difficulties to put it into practice. The game intends to change their perception and increase the possibilities of getting government data to be accessible to the public by getting them to experience open data policy-making.

2.2 Game Description

A game was developed based on the list of expected unknown benefits and overestimated barriers to provide open government data [16, 17]. It simulates a public office where civil servants interact to deliver services to citizens. Different operations are performed producing datasets that needs to be managed. Data management options results in obstacles and performance boosters, mimicking the change in benefits and risks of data options in the office.

Different guidelines were referenced for the development of the game [2, 18–26]. First, a group of target behaviors were defined in order to decide the type of game to use. Then, a library of different entertainment game designs was built for the game design options that could work for the defined goal. A mobile digital game with time-management elements was selected. Three different prototypes were built before achieving the actual pilot tested prototype [16].

While developing the digital prototype, testing human behaviour assumptions before designing the digital game was suggested by specialists. Hence, the Role Playing version of the mobile digital project was designed [27, 28]. An specific data labelling activity was added and a new group of datasets with descriptions [29]. The pre-test conducted with PhD researchers (TUDelft) resulted in improving suggestions.

The game was designed to observe civil servants behavioural change when dealing with data management in a simulated office. It creates an environment for experiencing and learning the possibilities of opening data in different situations.

The game is played by four players that needs to role-play different positions in the office. The **Citizen** is the player that starts the processes by demanding services from the office. To do that he demands the **Civil Servant** (through a pre-set of cards with specific activities organized in routines that needs to be fulfilled). The Civil Servant walks across the office to distribute resources and deliver services to the Citizen. She is helped by a **Colleague** that has machines (dices) that produces certain codes for the demands to be delivered. A **Boss** stays in the middle of the office, monitoring the work and authorizing specific types of service deliveries.

Both Civil Servant and Colleague represents the operational workers in public service that needs to implement decisions in order to deliver services. In real life, they follow routines defined in law and the decisions made by the boss. In the game it is assumed that the law sets the task list which is to be executed by citizens demands. Supposedly the Boss has already defined the goal to deliver as many services as possible (maximizing recognition points).

Each round is set by a time-limit (5 min) that was designed to put some pressure on the players. After each round, the Game Master (**Facilitator** – an extra role played outside the "magic circle" [30]) announces the scores and prepares the upcoming week.

Each delivered service generates a dataset that has a sensibility. In between rounds, the players discuss the sensibility of these datasets and suggests how to label them (opened, shared or closed).

The Boss is the one to register a final position for labelling each dataset. Depending the labelling options, new resources or demands are added to the upcoming week. Certain combination of numbers on the machines generates Privacy or Security Crisis. Hence, the players also feel the risk of having data crisis to disturb their work.

The game is played in 5 rounds. It starts with a tutorial round for each player to learn the basic operations of their roles. Players get to switch roles every week, so they can experience different positions in each round.

3 Research Approach: Evaluation of the Game

The game was played using a quasi-experimental setting [31] to test the causal mechanisms for civil servants engagement in open data policies [32, 33]. It was aimed at comparing similar situations before and after the game as well as to understand how different variables affect outcomes for specific reasons [4, 31, 33]. The set-up aimed at providing these conditions to explore the outcomes of the gaming exercise.

The research is being developed based in Brazil which is a 200 million people Federal democracy in South America. Divided in 26 regions that contains 5,570 municipalities, it has the 6th largest area in the world. After a decade of national efforts to support open government policies, the country is ranked 8th in the Open Government Index[1]. Though differences remain between regions and local governments capacities for open data practice. Brazil is also a very unequal country. As the targeted research group is the Brazilian Local Public Service, the game was adjusted and translated to Portuguese.

3.1 The Survey

In order to assess civil servants perceptions, a survey was designed to be applied before and after the game was played. Different sets of questions were formulated in order to address the variables of influence and test their strength. A 7 points Likert scale was used varying from 1 (Strongly Disagree) to 7 (Strongly Agree). Debriefing sessions were conducted after each game play sessions in order to assess qualitative feedback from the participants. The present paper focus on the initial quantitative analysis of outcomes. A more complex data exploration and the discussions for the qualitative feedbacks are to be summarized in other papers.

Out of the 84 questions of the survey, 60 were repeated measures (30 before and 30 after the game was played) and 24 related to moderation variables – such as age, gender, previous experiences with open data and public service for a partial reference on the survey instrument. Three questions specifically addressed whether the civil servants were aware of their actual data provision situation in office, if they were willing to provide in the future and if they predicted if they would need to provide. These three approaches intended to stress different perception of their actual and future engagement in open data policy-making.

The survey was applied before the game briefing avoiding to bias the respondents with concepts to be shared in the game explanation. The repeated measurement questions were applied immediately after the game session ended, before the debriefing session (Table 1).

[1] https://index.okfn.org/ accessed on March 22nd 2019.

Table 1. Survey questions

Question code (Before/After)	Questions
BI_11 BI_12	I already provide open public sector data in my work
BI_12 BI_22	I intend to provide open public sector data in the future
BI_13 BI_23	I predict that I will provide open public sector data in the future

The debriefing sessions focused on acquiring feedback on the game experience. Participants were invited to share comments and suggestions to improve the game.

3.2 Sample Description

The pilot testing happened in the city of Sao Paulo/Brazil. An invitation was sent by email and WhatsApp for all more than 100 civil servants from the Municipal Innovation and Technology Secretariat (SMIT)[2] and 011Lab[3] team organized the playtest groups. The sessions were developed in the public facility MobiLab, a co-working/incubator maintained by the municipality for start-ups that want to develop solutions for the city's transportation issues.

The 32 enrolled participants were majorly young with almost 40% under 25 years old and another 40% under 35 years old (80% of the total). About 53% were male, almost an equal gender distribution in the sample. In terms of work experience, the group was low experienced with more than 80% declaring less than 5 years' experience in public sector. Most of them (44%) declared to have the role of advisory as their main job and most of them had a permanent job relation to the municipality.

The group presented itself as an experienced sample with more than 80% declaring to have already heard of open data before playing the game and the same amount declared to have already studied the issue (even if just a little). About 47% declared to really already have used open data before (about 90% accused some kind of use).

The group showed some risk-taking attitude. Most of them declared themselves not to feel uncomfortable with sharing personal data in the internet (more than 70%, although they declared being aware of privacy concerns). The group was split between those who would "go against the law for reaching an important goal" but most of them (44%) would never do it. Most of them declared professional stability not to be a goal for their professional career and most of them declared to be excited with the unexpected (87%).

3.3 Methods for Data Analysis

The surveys were applied to the 32 subjects, before and after the playtest sessions. The aim of the experiment was to evaluate whether the game resulted in a change of

[2] The researchers thanks the Municipality of Sao Paulo and the SMIT team for their support.

[3] https://011lab.prefeitura.sp.gov.br/.

perception of the participants intentions. Hence, first, matched pair comparisons were conducted on the response of each participants before and after the game. Histograms were then crafted and analysed with paired sample t-tests for the repeated measures [34].

The intended statistical significance could not be reached by the sample. Still findings from the pilot testing were explored to improve the survey and the game. Mainly, the three Behavioral Intention questions were considered as the focus subject to which a deeper analysis needed to be conducted to explore the eventual effects of the game on its changes. Specifically, the analysis of these variables histograms showed a movement on the distributions for the before and after situation that could already inspire reflections for the game and survey improvement.

4 Findings

4.1 Analysis of the Behavioral Intention Change

A first operation of crafting histograms was conducted in order to analyse each of the three Behavioral Intention questions. It was possible to observe a change in their distribution and discuss whether the effects of the game in the sample were to be considered for the next steps of the research.

Already Providing Open Public Sector Data
The first question was related to individuals already providing public sector data in their work - Fig. 1. A clear movement happened in their perception after playing the game. More subjects were aware that they already work with public sector data and that by doing so they do provide it to the public.

It is interesting to observe that the increase of awareness that the civil servants already provide data can be an important game outcome. By being more aware, it is also possible to foster its practice in an active way, knowing better the risks and consequences. Even with a declared experienced (with open data) group, the effect appeared. It is expected that in less open data experienced groups the effects can be even greater.

Intention to Provide Public Sector Data in the Future
As shown in Fig. 2, after playing the game, more individuals were willing to provide more data (only one of them reduced its intention intensity, maybe an effect of awareness to be discussed).

One possible explanation for the resulting effect being weak may be the profile from the sample. As the Secretariat is responsible for fostering data policies in the municipality and most of the participants declared to already know about open data, the base measurement before the game was at a very high register. With other more diverse groups, with less open data knowledge or declared experience, the effects can be greater.

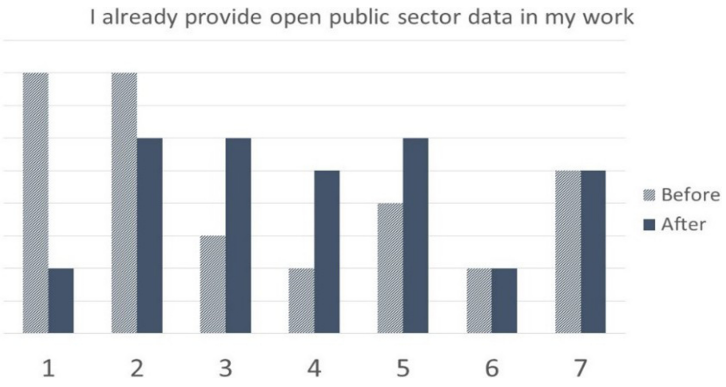

Fig. 1. BI_11 BI_21 (Likert Scale)

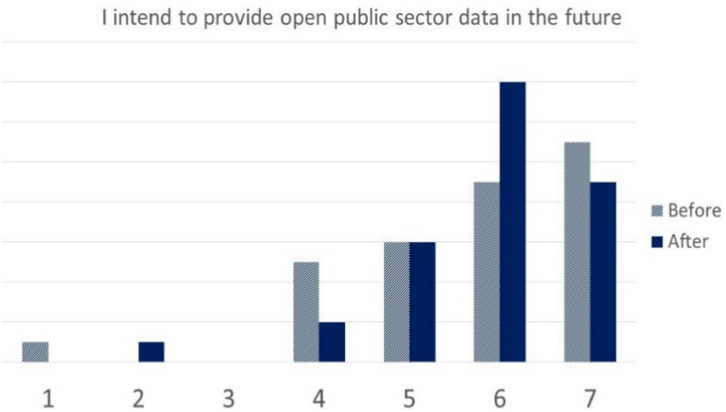

Fig. 2. BI_12 BI_22 (Likert Scale)

Prediction of Open Public Sector Data in the Future
Surprisingly, when predicting if they will provide public sector data - Fig. 3, more individuals were already very optimistic on the issue, making it difficult for the experience to improve their perception. Anyway, a small positive change is noticed towards a greater prediction of open data provision.

4.2 Matched Pair Analyses

The second method used to explore the produced change in Behavioral Intention was to analyse the differences for defined moderators: gender, age and public service previous experience [15].

In general, it came evident that 56% of the participants changed their perspective of being aware of already providing data by playing the game (44% changing positively,

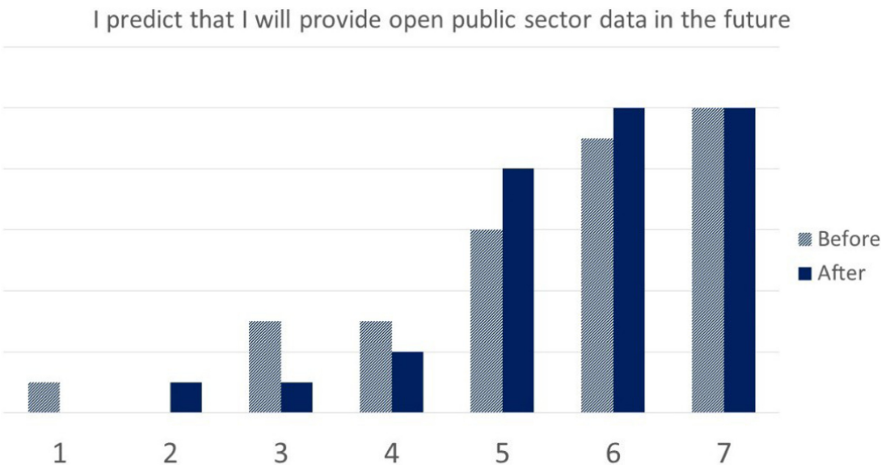

Fig. 3. BI_13 BI_23 (Likert Scale)

declaring to be more aware that they already provide). Gender was not a strong issue for change but the negative change was more impactful in men (9% against 6% for women). Both, absolute, negative and positive were greater on the less experienced civil servants (0 to 5 years in public sector) that lead us to the hypothesis that the less the participant experience, the greater is the potential impact of the game in changing their perception.

Changes promoted by the game in the intention to use open data were equal for positive and negative variations and there has been almost no evidence of gender differences. Younger civil servants also tended to have greater a positive variation (16% compared to 9%) while older participants had a greater negative change (13% compared to 9%). Age analysis shows that younger individuals and less experienced had more positive impact while the older were more negatively impacted.

Half of the participants inflicted in a score change related to their prediction of using open data in the future. The majority (31%) was in a positive direction. In between these positive change, more women changed (22% to men's 9%). Once more, the less experienced civil servants were, the more impacted in both, negative and positive effects. Older civil servants had more positive change whereas in between the younger, the effects were balanced.

4.3 Resulting Propositions from Data Analysis

As a result of the first data analysis from the collected data it is possible to explore some new propositions for further research with the improved versions of the survey and the game. These propositions can help to better define the focus of the research and how to use the designed game in order to explore the resulting knowledge.

1. The game shall fit better for civil servants with limited experience that might lead to higher attitude changes

2. Unexperienced civil servants tend to be more positively impacted by the game whereas it tends to have a negative impact in more experienced civil servants
3. The game has an important role in getting civil servants to be aware that they already provide data
4. Younger participants tend to be positively affected by the game while older participants tend to be negatively impacted
5. Gender doesn't seems to make a difference for the game.

5 Conclusions

The game was successfully played and surveys completed by the 8 groups of civil servants. The most common reaction when debriefing was for the game to last longer as it stopped when they usually managed to learn properly how to operate the resources (round 5).

From the data analysis, the most interesting outcome was to confirm the effect that the game increases awareness, even in a bureaucratic environment such as the public service. The awareness increase higher than the willingness change might have been caused by the sample bias of civil servants with previous experience with open data. As the group had prevailing high scores for the before the game Behavioral Intention questions, little room was left for improvement.

It will be important to test the game with more experienced civil servants. The bias from the group with a prevailing maximum of 5 years' experience seemed to show greater impact on people less influenced by stronger governmental routines.

For next rounds, it is already clear the need to include more direct questions related to the effects of the game. The post gameplay survey needs to assess more clearly if people felt effects of the game and if they declare to feel a different perception than they had before playing.

The game is still to show impacts for Behavioral Intention on broader and more diverse public. The outcomes of the exercise will improve the game and survey for the upcoming sessions.

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