
Proposed solutions to citizen engagement in virtual environments of social participation: a systematic review

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Abstract: This paper aimed to understand how the engagement of citizens in virtual environments of social participation is studied in the literature. By virtual environment of social participation I understand: an Internet platform where themes for direct or indirect dialogue between civil society and the various spheres of government are made available through the digital participation of the citizen. A systematic review identified 96 papers, which were then analysed. Proposals to engage citizens in virtual environments of social participation use one of the following approaches: gamification, games, social networks, collaborative contribution or specific and personalised information. This study is important for researchers wanting to be current with the scientific state of the art. This review will also assist the scientific community working with citizen engagement in virtual environments of social participation to build a common understanding of the challenges that must be faced, and to identify areas where research is lacking.

Keywords: systematic review; e-participation; engagement.

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1 Introduction

The evolution of the Internet has allowed the creation of a virtual public sphere (De Oliveira and Rodegheri, 2014), which acts as a channel for building and improving the debate that already occurs in society, in person. This virtual public sphere allows the citizen more effective social control over its rulers (Luño, 2004).

The experiences, initiatives and political practices related to democracy and supported in the technologies of communication and information compose what we call digital democracy (Gomes, 2005). The concept of digital democracy begins in the mid-1990s, with the emergence of the Internet and the creation of spaces for virtual debate, such as forums, blogs and other forms of democratic expression (Vedel, 2006). However, digital democracy goes beyond the availability of information online, it is about getting the ordinary citizen to participate in discussions and interactions with political powers, giving voice to the citizen (Coleman, 2007).

Thus, the great exposure of the citizen to the Internet opens the possibility for applications that can be used by civil organisations in order to promote more spaces of participation and strengthen the democratic process, bringing the civil sphere and decision politics closer together (Rossetto et al., 2015), allowing these actors to communicate, exchange information, consult and debate, directly, quickly and without bureaucratic obstacles (Maia, 2001).

However, the mobilisation of the citizen is still a challenge and the methodologies and technologies for popular participation appear in the Major Challenges of Research in Information Systems in Brazil (2016–2026) (Araujo et al., 2017). Thus, this systematic review aims to identify the solutions that are adopted in the literature for citizen engagement in virtual environments of social participation.

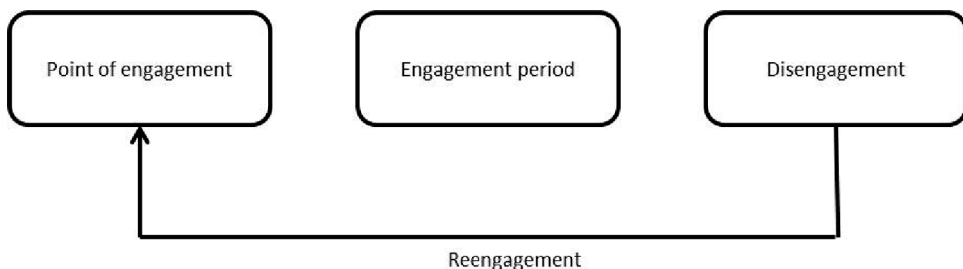
The rest of this paper is organised as follows. In Section 2, I show the concept of engagement and the problem of low engagement in different virtual environments of social participation that justifies the importance of this study. Section 3 explains how this systematic review was conducted. Section 4 presents an analysis of what was found in the literature. Section 5 concludes the paper and outlines future work.

2 Engagement

In attempting to understand user engagement in their experiences with technology, O'Brien and Toms (2008) conducted interviews in which they found that some interviewees were motivated by social reasons, while others sought to meet a specific goal (e.g., to buy a product) or simply open up to have an engaging experience.

O'Brien and Toms (2008) observed that user engagement with technology occurs in stages, as shown in Figure 1. When the user has their interest aroused and uses the technology, the user will be in the stage of engagement that O'Brien and Toms (2008) call the 'point of engagement'. The point of engagement is when the engagement process begins.

Figure 1 Stages of engagement proposed by O'Brien and Toms (2008)



Thus, the point of engagement occurs when something arouses the user's interest, be it the aesthetic or informational composition of the system interface with users. These elements captured the attention and interest of the user and boosted him or her to engagement.

After the point of engagement, the user moves on to a stage in which he or she will be involved with the activity, the engagement period. This stage is marked by the attention the user can give the task, in the novelty of the experience, in their level of interest and in their perceptions of challenge, feedback and user control inherent in the interaction. What will maintain user engagement may vary. For example, someone participating in a Webcast may remain interested in the ability with which the message is being transmitted. A player can stay engaged because he or she plays and keeps seeing newness in the game. Thus engagement continues as long as the interest of the person is maintained.

In this perspective, the maintenance period of engagement is marked by the attention and interest of the users being kept in the interaction. This is achieved by presenting new feedback, information, and resources in the interface. Respondents by O'Brien and Toms (2008) were also more likely to remain engaged when they realised they were in charge of interaction and properly challenged.

After the loss of interest, the user will move to the stage of disengagement, which is when the user decides to stop the activity in which he or she was engaged. When it comes to online activities, disengagement can also occur because the user decides to leave the activity for another time, either because the user can not keep his or her attention in that activity because he or she is interrupted by another person, or because of other causes such as fatigue in the eyes, need to eat/drink or go to the bathroom (O'Brien and Toms, 2008). In addition to these factors, the disengagement of the user can also be due to technical issues, such as a program that crashed, difficulty to move to the next phase of a game or even lack of novelty in that activity.

It is observed, then, that disengagement can happen by internal and external factors. Respondents by O'Brien and Toms (2008) reported making a conscious decision to discontinue their activity because they lost interest or felt pressures associated with others' opinions, time or other tasks. External problems, however, consist of distractions and interruptions, lack of novelty in the application, and usability problems with technology, which also caused participants to disengage.

After disengagement, the user may come to reengage at another time, but, not necessarily this will occur. It is known that returning to a site or app in the future is a result of past positive experiences with that site or app. In the survey conducted by O'Brien and Toms (2008) interviewees pointed out that the motivations for reengagement were about having fun, being rewarded with convenience and incentives, and learning or discovering something new.

2.1 Engagement in virtual environments of social participation

O'Brien and Toms (2008) seek to clarify user engagement in their experiences with technology. However, they do not present a proposal to increase user engagement. It is still necessary to understand how to increase user engagement, especially of VESP user. For this, I have done a systematic review that I will present in Section 3.

In this work I consider that engagement is an action, or set of actions, that the user practices in the virtual environment of social participation (VESP) that occur in a greater or lesser degree, eventually exerting influence on other users, and with some frequency over a period of time.

I should stress that technology alone will not cause the citizen to engage, since those who do not feel inclined to act politically simply do not do it independent of any technology (White, 1997; Maia, 2008). Van Deth and Elff (2004) argue that without a minimum of curiosity about politics, the citizen will not even be aware of the opportunities to defend their welfare and contribute to collective decisions. However, once participating in online discussion forums, citizens exhibit a sensitive increase in knowledge about the topics covered and even a possible increase in interest in demonstrated political engagement. However, the indices of engagement indicated in the surveys indicate a greater stimulus among those who already practiced these activities.

Rennó (2003) states that not only the personal motivations affect individual decisions about involvement with civil society entities, as presupposed by the theory of social capital. Tarrow (1994) argues that it is also necessary to create structures of political opportunity that can encourage people to participate in collective action. Tarrow's (1994) understanding is that, with the reduction of participation costs, social mobilisation takes place. On the other hand, participation in collective action decreases when participation costs increase.

However, contrary to the notion that the Internet could lead to greater public participation by offering a virtual community for expression, communication, and active interaction, most users do not participate much, as data show.

De Sousa and Gouveia (2012) used a Web application that seeks to bring together key stakeholders in an election, voters and candidates, into a central, regulated, and neutral website, promoting collaboration and multidirectional communication between them. Their purpose is to enable the voter not only to be an information consumer, but also to be able to intervene and produce information. In their work, this interaction and collaboration are possible through questions, answers, suggestions, comments, votes and debates. They also present the results of a case study on the Portuguese parliamentary elections of 2011. Google Analytics statistics show that during the two weeks, 21,486 unique users visited the app (for a total of 44,777 page views). However, only 1.3% of visitors are logged in to participate, not just view the content.

In April 2017 I received data from the Brazilian federal government regarding Dialoga Brasil (<http://dialoga.gov.br/>), which is the platform of the federal government to allow citizen participation. In April 2017 there were 25,331 registered users. By April 2017 Dialoga Brasil had received 276,149 votes, 3536 participations in hangouts and 18,347 proposals. They clarified that the hangouts were events with users of Dialoga Brasil and ministers of state of the topics treated in the website. According to the Brazilian Institute of Geography and Statistics, the Brazilian population in April 2017 already exceeded 207 million people. This shows that the percentage of the population participating in this platform is very small. Such low engagement is not desirable if it is understood that citizen participation in decision-making processes contributes to a more democratic society.

3 Systematic review process

The systematic review was chosen to ensure that all the papers available in the main databases were read in a given time interval. According to Magdaleno et al. (2012), the main reason for performing a systematic review is to improve the quality of the material covered in the subject of interest, as compared with what is obtained by a less formal review. This study was conducted in three main phases: planning, execution and reporting.

3.1 Planning phase

During the planning phase, I identified the review objectives, specified the research question, and developed the review protocol, that specifies the inclusion and exclusion criteria and document the search strategy. At the end of this phase, the protocol must be validated before being applied, in order to establish the feasibility of the plan.

3.1.1 Objective and research question

This study aims to identify the approaches that have already been described in the literature in the attempt to engage the individual, as well as the successes and failures described in the results of the published papers. As few authors attempt to engage in virtual environments of social participation, my search has been extended to works that seek to engage users in the use of ICTs in general. By virtual environment of social participation I understand: an Internet platform where themes for direct or indirect dialogue between civil society and the various spheres of government are made available through the digital participation of the citizen.

What is sought is to answer the following questions:

Q1. What are the proposed solutions to engage the citizen in virtual participation environments?

Q2. What are the successes and failures presented in the proposed solutions?

3.1.2 Search string

The papers were accessed via the web through the following pre-established search expression. I used the PICO process, a technique used in evidence based practice to frame and answer a question. PICO means Population, Intervention, Comparison and Outcome. Intervention is the techniques used in the engagement or motivation of the citizen. The population is papers published in conferences and journals reporting the use of these techniques in the engagement of the individual. From the identification of these techniques I intend to carry out a more detailed analysis of the approaches seeking to understand how to engage citizens in virtual environments of social participation.

The string I used was: (model OR method OR technique) AND (engage citizen OR citizen engagement OR user engagement OR citizen motivation OR user motivation) AND (online system OR eParticipation).

3.2 Execution phase

Two-hundred and four papers were returned in the IEEE Xplore database and 247 in Scopus after the execution of the search expression. Abstracts of all these publications have been read. I selected those papers that mentioned in their abstract some form of user engagement using information and communication technologies. Thirty-eight IEEE Xplore publications were selected for analysis and 58 from the Scopus database. All selected publications have been completely read.

3.3 Reporting phase

Lastly, in the report phase, I documented the results from the previous phases.

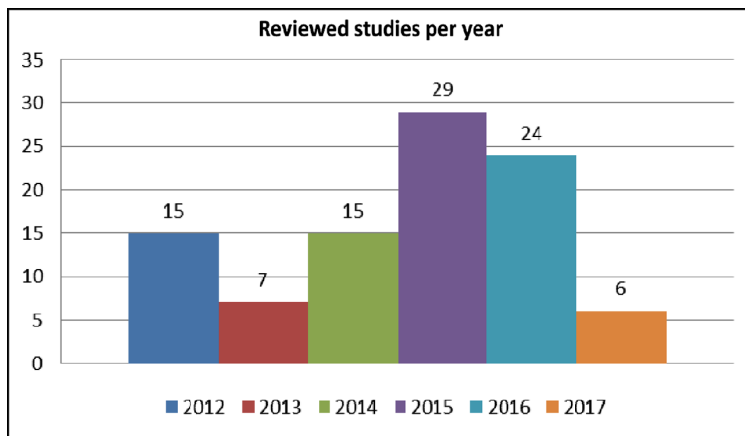
I present in Table 1 the number of papers returned by the search protocol used in this systematic review and the number of papers selected in each database.

Table 1 Number of papers per database

	<i>IEEE</i>	<i>Scopus</i>
Returned	204	247
Selected	38	58

The distribution of the studies according to publishing year is shown in Figure 2. As it can be seen from the chart, there are few studies available from 2012 to 2014. The number of engagement studies increased significantly from 2015 to 2016. Since this systematic review was conducted in May 2017, few studies are shown on the chart this year.

Figure 2 Number of papers per year of publication (see online version for colours)



4 Findings

I noted that the success of virtual environments of social participation depends not only on technological but also social aspects (Sanchez-Nielsen and Lee, 2013). With regard to

technological aspects, the functionality of these environments is positively associated with citizens' use of these environments (Zheng, 2017), as well as environmental design (Alharbi et al., 2016). The aesthetic perception of the online environment also has an influence on citizen engagement, as stated by Riaz and Mushtaq (2016). It is also important for the citizen to have confidence in the online environment (Alomari, 2014; Sanchez-Nielsen and Lee, 2013), perceive its usefulness (Nemeslaki et al., 2016) and ease of use (Nemeslaki et al., 2016) so that the individual can use it.

With regard to social aspects, Anttirioko (2003) suggests that citizen participation, in experiments or practices of digital democracy, must truly influence the issues dealt with. It is therefore necessary that the information made available is relevant and that citizens feel that they are influencing issues relevant to society, not just minor issues. Thus, for citizens to participate in relevant issues, they should also have access to this information. According to Peristeras (2009), there is an extreme imbalance of information between citizens and the various spheres of government. A United Nations study (UN, 2003) showed that the top 20 countries in e-government allowed citizens to engage in irrelevant and useless issues, and that these countries were only one-third the potential of what they could offer. In the work of Mahrer and Krimmer (2005), high-ranking politicians in the Austrian government were interviewed, and most of them argued that the average citizen is not interested in politics and is not qualified to influence government decisions that, according to these politicians become more complex each year. Mahrer and Krimmer (2005) concluded that the fear of change seems to be the major motivator for politicians to interfere in the evolution of digital democracy. For Gramsci (Santos, 2005) the system prevents major changes and concessions are gradually made as citizens increase their degree of engagement. This leads to a lack of public confidence in the government. According to Komito (2005), this trust can be recovered through the interaction of the citizen with the government.

4.1 Q1. *What are the proposed solutions to citizen engagement in virtual environments of social participation?*

The proposed solutions can be divided into the different types presented in Table 2 that shows the number of selected articles distributed by solution proposals. Of the 96 articles selected, seven were literature reviews, 76 included empirical work and 20 were theoretical.

Table 2 Number of papers by type of proposal

<i>Type of proposal</i>	<i>Number of papers</i>
Social networks	23
Gamification	19
Collaborative contribution	14
Games and game design	11
Specific and personalised information	4
Others	5

4.2 *Q2. What are the successes and failures presented in the proposed solutions?*

4.2.1 *Gamification*

It is noticed that many of the articles in the literature try to engage the individual through extrinsic motivation. Extrinsic motivation refers to behaviours that we develop to obtain results that go beyond the activity itself. This is the case of those works based on gamification. In works that use gamification, authors try to get the individual to engage in some task in return for some benefit outside the activity (e.g., a score in a leadership frame). However, the results presented by Tomaselli et al. (2015) should be taken into account. They argue that most of the recent studies on competition in games are almost entirely carried out in the USA and in Asian countries such as South Korea where there is a strong competition culture. This is very different from the Brazilian context, which explains why the competition was not so important in the result of the research they conducted with Brazilian players.

The main problem of extrinsic motivation systems is that they tend to fail when the user's interest is exhausted. Therefore, these works that use extrinsic motivation are able to maintain the individual's interest only in the short term, as well as the results of Thiel (2016) and Thiel and Fröhlich (2017). However, the motivation ends when the benefit is withdrawn, as observed in the results of Massung (2013) and Packham and Suleman (2015), among others. It should also be considered that intrinsic motivation is reduced when performance is explicitly linked to financial rewards (Deci, 1971). Therefore, the extrinsic motivation is insufficient when it is intended the long-term engagement of the citizen.

4.2.2 *Games and game design*

Games and game design use intrinsic motivation in activities that individuals find interesting, challenging, and enjoyable. Authors who focus on intrinsic motivation tend to be more successful in the long term. This happens because the motivation to engage in the activity is in the individual, not depending on some external incentive that could be withdrawn. Thus, there is a possibility of keeping the behaviour changed because the system has already changed the user's perception (Lee and Doh, 2012).

However, cultivating intrinsic motivation is a complex process, which needs to be based on a theory of motivation, such as Deci and Ryan's (1985) theory of self-determination (SDT). The SDT is used by several authors such as Hassan (2017), Xiong et al. (2014), Zhang et al. (2012), Lamprinou and Paraskeva (2015), Cupid and Ophoff (2014), among others. SDT presents the satisfaction of your basic internal needs so that people can evolve in their environment. The three basic needs are:

- the effectiveness of my actions in my current environment
- the internal need to be responsible for their own significant choices
- social involvement and relationship with others.

Generally, these needs are met through feedback to the individual so that they are aware of the outcome of their participation, and through the possibility of interaction with other users, as done by Lamprinou and Paraskeva (2015).

The results of Gutierrez (2012) also showed that feedback proved to be a plausible way to improve participation in certain periods of time. In their literature review, Cupid and Ophoff (2014) found that continuity of future participation has been related to feedback provided to participants' contributions and motivation is driven by the desire for recognition and status (Halavais, 2009). Recognition is an important motivator for individuals (Lampel and Bhalla, 2007). Other motivators include community visibility of contributions and recognition of the quality and quantity of individual contributions (Preece and Shneiderman, 2009). The importance of feedback can be perceived by the large number of authors who use it, such as Lee and Doh (2012), Reeves (2012), Snijders (2015), Herbert (2014), among others.

4.2.3 Networks and collaborative contribution

Engagement through social interactions with other users is also used by authors such as Buchem (2015). It is also important to highlight that in their study, Wei et al. (2015) observed that what motivates users to make voluntary contributions in online communities, such as Wikipedia, is the user's relative reputation, which is, how the individual is viewed by their peers. This shows the importance of peer effect and social comparison on open collaboration platforms. Social exchange theory (SET) (Blau, 1964) explains why individuals engage in activities that are not formally rewarded. Reputation is an important belief in SET, and is related to the motivation for the user to engage in these communities, since by gaining a reputation, a professional can advance in his career. There is evidence that reputation is a strong motivator for the user to participate in online professional communities (Wasko and Faraj, 2000).

Another important concept in SET is trust. According to Blau (1964) trust maintains social exchange relationships and can lead users to engage in these communities. SET also explains that actions are motivated by the expected return on them. The citizen engaged in virtual environment of social participation can get involved because the return he or she expects is the improvement of his or her community. There are still those who will engage by advocating some specific agenda (Connors et al., 2012). Based on the phenomenon of 'social influence' in the social network domain (Cha et al., 2010), it is also possible for a citizen to engage in observing the engagement of his friends. As noted by Hwang and Kim (2015), those who use social media were identified as having higher levels of intention to participate and real participation in social movements. This reinforces the importance of having the online participation environment related in some way to social networks.

4.2.4 Personalised information

In order for the citizen to engage, it is also important that the individual receives personalised information, according to his or her interest. Muralidhar et al. (2015) argue that even highly engaged users tend to disengage with a website when the content they are served is not interesting to them. Casello et al. (2015) believe that this approach creates a positive feedback loop where stakeholders can motivate community members to increase their engagement level by requiring new and more sophisticated messages, which makes the cycle repeat again.

4.3 Other issues identified

I must emphasise that the articles read in this systematic review sought to provide a unique solution in the attempt to engage the individual. This is because these works usually measure engagement in time dedicated to an activity. And this time is usually no more than a few hours, as done by Darzentas et al. (2012), who arranged a focus group session to evaluate their proposal, Brandtzæg et al. (2012) who conducted group interviews with young people or Cegarra et al. (2014) who conducted telephone interviews with users.

Nonetheless, we can not consider engagement as an isolated action in time. We must consider that there are different stages (engagement point, engagement period, disengagement and reengagement) in the engagement process, as presented by O'Brien and Toms (2008). In this way, we can not try to present a single solution to a problem that change over time.

The literature review by Skoric (2016) also showed that the individual's behaviour in online environments reflects their off-line participation – the same was also observed by Zheng (2017) – and their online participation reflects preexisting interests and motivations to participate in civic and political activities. In this way, it is not interesting to try to engage the citizens in all the subjects under discussion, but to identify the subjects of their interest and to try to engage them in the discussions related to these subjects. It is necessary to be careful because not delivering benefits deemed essential by citizens can make them even more reluctant to participate in virtual environments of social participation, as shown by the results of Royo and Yetano (2015).

When trying to engage the citizen in online environments, it is also necessary to have highly active members who encourage the participation of other users by proposing new discussion topics. This showed a good result in the work of Gutierrez (2012), who verified the failure of his online environment when the 'manager' stopped working in the system.

It is also important to take into account that most users of online environments only consume information, but do not contribute, or rarely do, are so-called lurkers. This has been observed in studies such as that of Elevant (2013), who observed that only 10% of the users of a network of meteorological conditions were identified as frequent contributors. One reason for low participation is that some people do not feel the need to make themselves heard when others represent their opinions (Nonnecke and Preece, 2003). However, we must consider that lurking may also be a reaction to the online community or the style of interaction found there (Preece et al., 2004). In this way, the online environment should favour interaction and not inhibit the citizen, who may be reluctant to express himself because of the fear of the reactions of the other participants (Noelle-Neumann, 1993).

5 Conclusion and future work

This paper presented a systematic review to understand how the engagement of citizens in virtual environments of social participation is studied in the literature. Systematic reviews are useful to identify and consolidate work to date and guide future research.

The conclusions reached are an important step towards expanding the body of knowledge about citizen engagement in virtual environments. Based on these results, some directions for future research are outlined in Section 5.2.

With regard to engagement in online environments, the systematic review has shown that solutions for engagement in these environments use one of the following approaches as a solution: social networking and collaborative contribution, games and game design, gamification, and personalised information. There is still a gap to be filled with solutions specifically for virtual environments of social participation. Among the solutions found in the literature, I believe that social networks and personalised information are more promising for the context of VESP (as will be published in future work). I understand that the possibility of social influence in social networks increases the importance of having the virtual environment of social participation integrated into these networks. Therefore, from a social influence achieved can be sent to the user information more appropriate to their interests, contributing to the maintenance of engagement.

5.1 Limitations

The search protocol was used in two large databases, IEEE Xplore and Scopus. Papers that are not indexed in these databases were not captured. The unavailability of papers in both databases prevents them from contributing to the topic, even if they have potential to do so.

Data sources such as Google Scholar, and academic theses and dissertations on the topic, are not used by this study. The protocol could not be executed in Google Scholar, which even in advanced search mode does not admit the whole search string. Although to date there is no database that indexes thesis and dissertations and can be used for searching whole strings, such thesis and dissertations often do generate papers that can be captured in the databases that were used.

Data extraction was performed by only one researcher, which may increase the risk of threats to internal validity. Finally, as an emerging field, there is a scarcity of works addressing engagement of citizens in virtual environments. Even so, this paper offers many important observations that represent a significant starting point for future research on this topic, as presented in the following section.

5.2 Directions for future research

The first opportunity for future research lies in re-execution of the protocol, to capture references to more recent work that extends the search space chronologically. This could also include other search engines, such as Google Scholar and Association for Information Systems Electronic Library (AISeL), in an attempt to retrieve documents only indexed by these machines, which would extend the search space geographically. Finally, the search can also be expanded to include: books, thesis, dissertations and technical reports. Although the systematic approach adopted ensures the reliability and completeness of this study, it can be amplified by these extensions.

In recent years we have seen the use of social networks as a place of political discussions and exposition of ideas. However, it can be seen that such discussions are limited to a social network that, despite being an important space for discussion, does not favour citizen participation in the decision-making process. VESP, on the other hand, not

only provides the discussions but also provides a more effective social control. It is thus perceived the need to combine social networks and VESP taking advantage of the potential of each environment in stimulating citizen engagement. Thus, using the possibility of users engaged in VESP influence others who only use social networks to use the VESP. Thus, these influenced users would participate in the decision-making process.

As future work, I intend to create a methodology that combines AVPS and social networks to take advantage of the benefits of each space as effectively as possible. It is observed that one of the most promising approaches cited in the literature for user engagement in online environments is the use of social influence. Social influence occurs when a person changes his behaviour as a result of the induction of another person or group (the influencing agent). In the process of social influence the influencing agent offers a behaviour to the person and communicates to him the probable results if he adopts this behaviour. However, in order to achieve a better result, one should not attempt to influence the person in all situations.

It is important to consider that the interest of the individual can be stimulated by giving him or her specific information, that is, information that is aligned with his or her interests (Pham et al., 2016). The delivery of unwanted information to the user can cause even highly engaged users to disengage (Muralidhar et al., 2015). In this way, it would not be interesting to try to influence the user to participate in something that is outside their areas of interest.

Thus, the approach I intend to use to address low engagement considers the use of social influence and recommendation systems to enable engaged users to influence others not engaged by sending them recommendations for participation in VESP topics.

References

- Alharbi, A., Kang, K. and Sohaib, O. (2016) 'Citizens engagement in e-participation on e-governments websites through SWAT model: a case of Saudi Arabia', *PACIS. 2016*, p.360.
- Alomari, M.K. (2014) 'Towards e-democracy in the middle east: e-voting adoption', *9th International Conference for Internet Technology and Secured Transactions (ICITST)*, London, UK, pp.73–77.
- Anttiroiko, A. (2003) 'Building strong e-democracy – the role of technology in developing democracy for the information age', *Communications of the ACM*, Vol. 46, No. 9.
- Araujo, R.M., Maciel, R.S. and Boscarioli, C. (2017) *I GranDSI-BR: Grandes Desafios de Pesquisa em Sistemas de Informação no Brasil (2016-2026)*, Relatório Técnico, Comissão Especial de Sistemas de Informação (CESI) da Sociedade Brasileira de Computação (SBC).
- Blau, P.M. (1964) *Exchange and Power in Social Life*, Transaction Publishers, New York, USA.
- Brandtzæg, P.B., Følstad, A. and Mainsah, H. (2012) 'Designing for youth civic engagement in social media', *Proceedings of the IADIS International Conference of Web Based Communities and Social Media*, Lisbon, pp.65–73.
- Buchem, I. (2015) 'Gamification designs in wearable enhanced learning for healthy ageing', *International Conference on Interactive Mobile Communication Technologies and Learning (IMCL)*, Thessaloniki, Greece, pp.9–15.

- Casello, J.M., Towns, W., Bélanger, J. and Kassiedass, S. (2015) 'Public engagement in public transportation projects: challenges and recommendations', *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2537, pp.88–95.
- Cegarra, J.L.M., Navarro, J.G.C. and Pachón, J.R.C. (2014) 'Applying the technology acceptance model to a Spanish City Hall', *International Journal of Information Management*, Vol. 34, No. 4, pp.437–445.
- Cha, M., Haddadi, H., Benevenuto, F. and Gummadi, P.K. (2010) 'Measuring user influence in twitter: the million follower fallacy', *Icwsm*, Vol. 10, Nos. 10–17, p.30.
- Coleman, S. (2007) 'e-Democracy: the history and future of an idea', in Mansell, R., Avgerou, C., Quah, D. and Silverstone, R. (Eds.): *Oxford Handbook of Information and Communication Technologies*, Oxford: Oxford Univ. Press, pp.362–382.
- Connors, J.P., Lei, S. and Kelly, M. (2012) 'Citizen science in the age of neogeography: utilizing volunteered geographic information for environmental monitoring', *Annals of the Association of American Geographers*, Vol. 102, No. 6, pp.1267–1289.
- Cupido, K. and Ophoff, J. (2014) 'A conceptual model of critical success factors for an e-government crowdsourcing solution', *Proceedings of the 14th European Conference on e-Government: ECEG 2014*, Academic Conferences Limited, p.77.
- Darzentas, D., Darzentas, J. and Darzentas, J. (2012) 'Mastering technology for greater autonomy: device familiarisation for older users via games', *Proceedings of European Conference on Game Based Learning, ECGBL*, Cork, Ireland, pp.131–139.
- de Oliveira, R.S. and Rodegheri, L.B. (2014) 'Do eleitor offline ao cibercidadão online: potencialidades de participação popular na Internet', *Revista Jurídica da Presidência*, Vol. 15, No. 107, pp.797–822.
- De Sousa, A.J.A. and Gouveia, L.M.B. (2012) 'A proposal for digital mediation for direct public participation during electoral periods', *7th Iberian Conference on Information Systems and Technologies (CISTI)*, Madrid, Spain, pp.1–5.
- Deci, E.L. (1971) 'Effects of externally mediated rewards on intrinsic motivation', *Journal of Personality and Social Psychology*, Vol. 18, No. 1, p.105.
- Deci, E.L. and Ryan, R.M. (1985) *Intrinsic Motivation and Self-Determination in Human Behavior*, Plenum Publishing Co., New York.
- Elevant, K. (2013) 'Why share weather? Motivational model for 'share weather' online communities and three empirical studies', *46th Hawaii International Conference on System Sciences (HICSS)*, Wailea, Maui, HI USA, pp.781–790.
- Gomes, W. (2005) 'A democracia digital e o problema da participação civil na decisão política', *Fronteiras-estudos midiáticos*, Vol. 7, No. 3, pp.214–222.
- Gutierrez, F. (2012) 'A conceptual model to design partially virtual communities', *16th International Conference on Computer Supported Cooperative Work in Design (CSCWD)*, Wuhan, China, pp.685–692.
- Halavais, A. (2009) 'Do Dugg diggers Digg Diligently? Feedback as motivation in collaborative moderation systems', *Information, Communication & Society*, Vol. 12, No. 3, pp.444–459.
- Hassan, L. (2017) 'Governments should play games: towards a framework for the gamification of civic engagement platforms', *Simulation & Gaming*, Vol. 48, No. 2, pp.249–267.
- Herbert, B. (2014) 'An investigation of gamification typologies for enhancing learner motivation', *International Conference on Interactive Technologies and Games (iTAG)*, Nottingham, Nottinghamshire, UK, pp.71–78.
- Hwang, H. and Kim, K. (2015) 'Social media as a tool for social movements: the effect of social media use and social capital on intention to participate in social movements', *International Journal of Consumer Studies*, Vol. 39, No. 5, pp.478–488.
- Komito, L. (2005) 'e-Participation and governance: widening the net', *The Electronic Journal of e-Government*, Vol. 3, No. 1, pp.39–48.

- Lampel, J. and Bhalla, A. (2007) 'The role of status seeking in online communities: giving the gift of experience', *Journal of Computer-Mediated Communication*, Vol. 12, No. 2, pp.434–455.
- Lamprinou, D. and Paraskeva, F. (2015) 'Gamification design framework based on SDT for student motivation', *International Conference on Interactive Mobile Communication Technologies and Learning (IMCL)*, Thessaloniki, Greece, pp.406–410.
- Lee, H. and Doh, Y.Y. (2012) 'A study on the relationship between educational achievement and emotional engagement in a gameful interface for video lecture systems', *International Symposium on Ubiquitous Virtual Reality (ISUVR)*, Daejeon, Korea, pp.34–37.
- Luño, A.E.P. (2004) *Cibercidadania o Ciudadania.com*, Gedisa, Barcelona.
- Magdaleno, A.M., Werner, C.M.L. and De Araujo, R.M. (2012) 'Reconciling software development models: a systematic review', *Journal of Systems and Software*, Vol. 85, No. 2, pp.351–369.
- Mahrer, H. and Krimmer, R. (2005) 'Towards the enhancement of e-democracy: identifying the notion of the 'middleman paradox'', *Information Systems Journal*, Vol. 15, No. 1, pp.27–42.
- Maia, R. (2001) *Democracia e a internet como esfera pública virtual: aproximando as condições do discurso e da deliberação*, Universidade de Brasília.
- Maia, R.C.M. (2008) 'Democracia e a Internet como Esfera Pública Virtual: Aproximação às Condições da Deliberação', in Gomes, W. and Maia, R.C.M. (Eds.): *Comunicação e Democracia – Problemas e Perspectivas*, Paulus, São Paulo, pp.277–292.
- Massung, E. (2013) 'Using crowdsourcing to support pro-environmental community activism', *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Paris, France, pp.371–380.
- Muralidhar, N., Rangwala, H. and Han, E.S. (2015) 'Recommending temporally relevant news content from implicit feedback data', *27th International Conference on Tools with Artificial Intelligence (ICTAI)*, Vietri sul Mare, Italy, pp.689–696.
- Nemeslaki, A., Aranyosy, M. and Sasvári, P. (2016) 'Could online voting boost desire to vote? – Technology acceptance perceptions of young Hungarian citizens', *Government Information Quarterly*, Vol. 33, No. 4, pp.705–714.
- Noelle-Neumann, E. (1993) *The Spiral of Silence: Public Opinion, Our Social Skin*, University of Chicago Press.
- Nonnecke, B. and Preece, J. (2003) 'Silent participants: getting to know Lurkers better', *From Usenet to CoWebs*, Springer London, pp.110–132.
- O'Brien, H.L. and Toms, E.G. (2008) 'What is user engagement? A conceptual framework for defining user engagement with technology', *Journal of the Association for Information Science and Technology*, Vol. 59, No. 6, pp.938–955.
- Packham, S. and Suleman, H. (2015) 'Crowdsourcing a text corpus is not a game', *International Conference on Asian Digital Libraries*, Springer International Publishing, Seoul, Korea, pp.225–234.
- Peristeras, V. (2009) *Use Case: Common Public Service Model*, UC-EGIG-SID-009, eGovernment Interest Group.
- Pham, X-L. et al. (2016) 'Effects of push notifications on learner engagement in a mobile learning app', *2016 IEEE 16th International Conference on Advanced Learning Technologies (ICALT)*, IEEE, Austin, Texas, USA, pp.90–94.
- Preece, J. and Shneiderman, B. (2009) 'The reader-to-leader framework: Motivating technology-mediated social participation', *AIS Transactions on Human-Computer Interaction*, Vol. 1, No. 1, pp.13–32.
- Preece, J., Nonnecke, B. and Andrews, D. (2004) 'The top five reasons for lurking: improving community experiences for everyone', *Computers in Human Behavior*, Vol. 20, No. 2, pp.201–223.

- Reeves, B. (2012) 'Leveraging the engagement of games to change energy behavior', *International Conference on Collaboration Technologies and Systems (CTS)*, pp.354–358.
- Rennó, L.R. (2003) 'Estruturas de oportunidade política e engajamento em organizações da sociedade civil: Um estudo comparado sobre a América Latina', *Revista de Sociologia e Política*, Vol. 21, No. 21, pp.71–82.
- Riaz, S. and Mushtaq, A. (2016) 'Emerging themes analysis of learner's aesthetic-emotions in E-learning environments', *Sixth International Conference on Information Science and Technology (ICIST)*, Dalian, China, pp.399–405.
- Rossetto, G., Carreiro, R. and Almada, M.P. (2015) 'Organizações civis e apropriações das plataformas digitais: desafios e potencialidades da web', *Comunicação & Educação*, Vol. 20, No. 1, pp.51–61.
- Royo, S. and Yetano, A. (2015) "'Crowdsourcing' as a tool for e-participation: two experiences regarding CO₂ emissions at municipal level', *Electronic Commerce Research*, Vol. 15, No. 3, pp.323–348.
- Sanchez-Nielsen, E. and Lee, D. (2013) 'eParticipation in practice in Europe: the case of 'puzzled by policy: helping you be part of EU'', *46th Hawaii International Conference on System Sciences (HICSS)*, Wailea, Maui, HI USA, pp.1870–1879.
- Santos, R.D.J.L.D. (2005) 'Modelos de engajamento', *Estudos Avançados*, Vol. 19, No. 54, pp.391–427.
- Skoric, M.M. (2016) 'Social media and citizen engagement: a meta-analytic review', *New Media & Society*, Vol. 18, No. 9, pp.1817–1839.
- Snijders, R. (2015) 'REfine: a gamified platform for participatory requirements engineering', *1st International Workshop on Crowd-Based Requirements Engineering (CrowdRE)*, Ottawa, ON, Canada, pp.1–6.
- Tarrow, S. (1994) *Power in Movement: Social Movements, Collective Action and Mass Politics*, Cambridge University Press, Cambridge.
- Thiel, S.K. (2016) 'Gamers in public participation: a boon or bane? influence of attitudes in gamified participation platforms', *Proceedings of the 15th International Conference on Mobile and Ubiquitous Multimedia*, Rovaniemi, Finland, pp.229–240.
- Thiel, S.K. and Frohlich, P. (2017) 'Gamification as motivation to engage in location-based public participation?', *Progress in Location-Based Services 2016*, Springer International Publishing, Vienna, Austria, pp.399–421.
- Tomaselli, F.C., Sanchez, O.P. and Brown, S.A. (2015) 'How to engage users through gamification: the prevalent effects of playing and mastering over competing', *2015 International Conference on Information Systems: Exploring the Information Frontier, ICIS 2015*, Association for Information Systems, Ft. Worth, Texas, USA.
- UN (2003) *World Public Sector Report 2003: E-Government at the Crossroads*, United Nations, New York, USA.
- Van Deth, J.W. and Elff, M. (2004) 'Politicisation, economic development and political interest in Europe', *European Journal of Political Research*, Vol. 43, No. 3, pp.477–508.
- Vedel, T. (2006) 'The idea of electronic democracy: Origins, visions and questions', *Parliamentary Affairs*, Vol. 59, No. 2, pp.226–235.
- Wasko, M.M. and Faraj, S. (2000) "'It is what one does': why people participate and help others in electronic communities of practice', *The Journal of Strategic Information Systems*, Vol. 9, No. 2, pp.155–173.
- Wei, X., Chen, W. and Zhu, K. (2015) 'Motivating user contributions in online knowledge communities: virtual rewards and reputation', *48th Hawaii International Conference on System Sciences (HICSS)*, Kauai, Hawaii, pp.3760–3769.
- White, C.S. (1997) 'Citizen participation and the internet: prospects for civic deliberation in the information age', *The Social Studies*, Vol. 88, No. 1, pp.23–28.

- Xiong, M., Chen, Q. and Zhao, A. (2014) 'The comparison study on the motivations of staffs' behaviors on public and enterprise social network: evidence from China', *2014 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, Beijing, China, pp.802–807.
- Zhang, T., Wang, W.Y.C. and Techatassanasoontorn, A.A. (2012) 'User participation in self-governance in socio-technical communities', *PACIS*, Hochiminh City, Vietnam, p.108.
- Zheng, Y. (2017) 'Explaining citizens' e-participation usage: functionality of e-participation applications', *Administration & Society*, Vol. 49, No. 3, pp.423–442.