VR-Participation & Dialogue: Towards Integrated Framework for Virtual Reality-Mediated Consensus and Community Building

Lukasz Porwol
Insight Centre for Data Analytics, National University of Ireland Galway
lukasz.porwol@insight-centre.org

Adegboyega Ojo
School of Business, Maynooth University
Adegboyega.Ojo@mu.ie

ABSTRACT

Successful e-Participation requires a thriving community of users-citizens who engage and collaborate with governments and decision makers on key democratic and social maters. Effective community building and meaningful social interactions are contingent on strong, organic consensus achieved through engaging dialogue rather than discussions or argumentation.

The emerging social Virtual Reality platforms offer new means of immersive communication that brings an opportunity to overcome some of the challenges identified to be hindering state-of-the-art e-Participation from supporting constructive citizen-to-government dialogue. In this paper we investigate the key concepts and explore the principles of dialogue and consensus building in the context of e-Participation. We match those principles with specific VR affordances and propose an Integrative Framework for Virtual-Reality-Mediated Consensus and Community Building. Finally, we discuss the application of the framework to e-Participation.

CCS CONCEPTS

• **Information Systems**; • **Information Systems Applications**; • **Collaborative and social computing systems and tools**;

KEYWORDS

VR-Participation, e-Participation, Next-Gen e-Government, Framework

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1 INTRODUCTION

e-Participation is defined as technology-mediated dialogue between citizens and decision makers [36] that ensures improved, fast-feedback-enabled, public participation [8] while also introducing new, innovative channels for political participation [10]. Even though the definition points to dialogue in contrast to discussion, it is actually the "online discussions" that are in the core of e-Participation research [17, 39]. That is particularly related to the common technical implementation of e-Participation platforms as "discussion forums". Despite significant efforts and investments, the classic e-Participation initiatives showed to have rather limited impact due to low user engagement [22, 30]. The improved social-media-driven e-Participation brought a promise of alleviating the major engagement-related e-Participation issues. Nevertheless, the late social-media powered e-Participation also resulted in modest impact due to lack of tangible outcomes by often locking participants in meaningless discussions and as a result, disengaging both citizens and decision makers from contributing any further [29]. Successful e-Participation requires a thriving community of users-citizens who engage and collaborate with governments and decision makers on key democratic and social maters. Effective community building and meaningful social interactions are contingent on strong, organic consensus achieved through engaging dialog. Unlike in the case of argumentation and discussion where participants are being convinced to follow specific point, dialogue enables participants to explore different views and collectively arrive at distinct conclusion or construct a new solution [15]. The contemporary social-media-based e-Participation by lacking relevant support for meaningful dialogue and lacking sufficient consensus building affordances often results in polarized discussions [9]. Sia et al. [42] argues that increased polarization of discussions is mainly a result of reduced social presence. The emerging social Virtual Reality platforms offer new means of immersive communication with a strong user-presence and community building capabilities that may overcome many of the challenges hindering state-of-the-art text-based e-Participation [31, 32]. In this paper we investigate the key concepts in the domain of dialogue and consensus building in the context of e-Participation. We explore the specific VR affordances that could support the major dialog and consensus building factors that impact the success of the engagement. We propose an Integrative Framework for Virtual-Reality-Mediated Consensus and Community Building. Finally, we discuss the application of the framework to e-Participation and elaborate upon the next steps.

2 METHODOLOGY

The research questions we attempt to address in this work are as follows:

- Can Virtual-Reality-based group-communication afford effective dialogue and consensus building?
- Can VR-Dialogue help in addressing some of the e-Participation challenges towards achieving effective VR-Participation?

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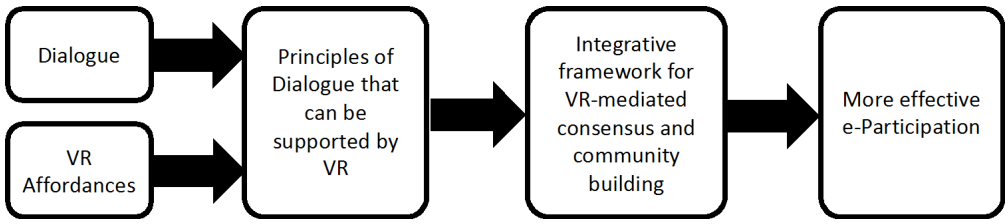

Figure 1: Methodology - Steps Flow

To address this question, we apply desk research approach. In particular we applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [25] to our analysis. Specifically, PRISMA distinguishes four phases for systematic review: 1) Identification, 2) Screening, 3) Eligibility, 4) Inclusion. We applied PRISMA to three distinct methodology analytical stages related to Dialogue, VR and building framework for e-Participation. The major steps in our methodology are presented in Figure 1

2.1 Dialogue

In the identification phase we used the SCOPUS database and searched for most cited articles in the Dialogue domain using "dialogue" query. The search was limited to works in English only. We did not restrict the list of results to specific time window since the well-established works elaborate upon fundamental concepts in communication and interaction domain in Dialogue from 1980s did not lose anything of its meaning and relevance to current works, making them very valid to contemporary studies on Online Dialogue. We identified five major best-cited papers relevant to our study and applied snowballing technique that gave us about a hundred of articles. In the Screening phase, we have removed duplicated documents and excluded thematically irrelevant articles that gave us about 60 articles.

In the eligibility and inclusion phases, out of the set of thematically relevant papers again we selected the most cited and the ones dealing with topics strictly related to dialogue as particular communication protocol (leaving us with 18 papers). We analyzed those articles in full text as for the rest we investigated only abstracts and summaries. Those were included in our analysis of that was focused on identifying data/information items conceptualizing Dialogue. We identified relevant theoretical framework describing the key components of successful dialog built upon well-established works in Dialogue domain.

2.2 VR Affordances

In the Identification phase for the extended set of articles we looked at publications not older than 2000 (in English) since we investigate the contemporary understanding of Virtual Reality. We identified about 80 articles. At Screening stage, we discarded about 60 articles as majority of them referred to Virtual Communities and Virtual Spaces when referring to Online Communities and Online Spaces not Communities and Spaces in immersive Virtual Reality environments as we would have expected. We also used non-scientific articles, web-blogs and websites to get more information on most popular and most recent Social VR platforms and we have been using them for initial experimental engagements. Additionally, we have organized three experimental VR small-scale sessions with professionals coming from ELSVIER[1] and Mendeley[2] where we implemented some elements of dialogue to discuss the future of training the trainers in VR. That resulted in collaboration and tentative support of our VR research[3]. Those brief, grassroots engagements complemented by the literature enabled us to get insights into the sense of community and consensus building on contemporary social VR platforms, understand well their affordances and inspiring premises for investigation in this paper.

2.3 Framework

Once we gathered data on Dialogue, especially identified relevant Dialogue Framework, based on our previous studies, we combined it and linked it to specific VR affordances acquired from scientific and non-scientific sources and those inspired by empirical trials. As the result, we constructed and Integrative Framework for VR-mediated consensus and community building.

In the final stage we used our Framework to structure VR-Dialog in the context of e-Participation to ensure more effective VR-Participation.

3 BACKGROUND

3.1 Dialogue Principles Review

Dialogue has been defined in the literature as an independent, distinct process of communication. Most importantly, the widely recognized works by Bohm [4, 5] put emphasis on dialogue as exploration of manner in which *thought is an inherently limited medium, rather than an objective representation of reality—is generated and sustained on a collective level.* Therefore, literature [4, 41] (further refined and explored by [15]) distinguishes dialogue as a very different type of communication to discussion. The inherent problem of e-Participation is that is built around interaction of citizens and decision makers through discussion, either led by government or self-organized by citizens, such us political deliberations on social media [29]. However, as [41] points out, the discussion in its core does not lead to real consensus. It is rather a battle where different sides present their views and are criticized and ultimately want to win and have their viewpoint accepted. The sides are not actually convinced, instead, it is a mere compromise that leads to "constrictive results" in a discussion. The authors stress that Dialogue on

[1] https://www.elsevier.com
[2] https://www.mendeley.com/
[3] https://www.elsevier.com/connect/can-virtual-reality-revolutionize-education-and-communication-meet-the-researcher-looking-for-the-answer

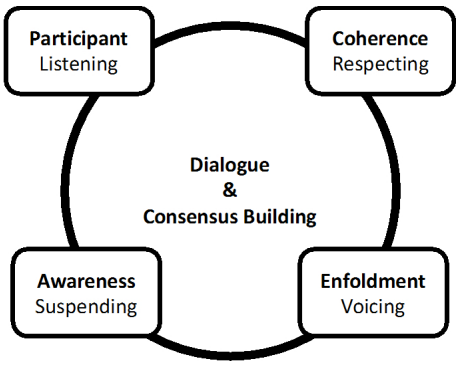

Figure 2: Principles of Dialogue - Adapted from [27]

the other hand is about *finding and developing a pool of shared meaning*. Therefore in dialogue the participants explore different views and create a new common view. [4] presents three conditions for effective dialogue: a) participants do not make assumptions or hold to their initial views b) participants treat others with respect and consider them partners, c) the presence of moderator is pivotal. Authors such as [40] argue that dialogue leads to *reflective policy inquiry* and is grounded in practice. [12] adds to that understanding of dialogue to be a *transformative learning experience* which results in innovation and self-generation. Finally [15], reflects on previous works and corroborates those statements, arguing that consensus building in dialogue is not just communication but learning process. [3] also argues that true consensus building in a constructive dialogue that can be encountered in highly engaged groups, such as role play game participants, is substantially different from the concepts defined in the literature on negotiation [7, 26, 45, 46]. In particular, authors stress that in the negotiation domain the consensus is a goal on its own and requires special meeting management techniques.

In terms of Dialogue and Consensus building O'Neill et al. [27] took the four principles of Dialogue by Bohm – Participant, Coherence, Awareness and Enfoldment [4] and reframed it with four principles by Isaacs [16]. The resulting framework is presented in Figure 2. The resulting principles are as follows:

1) Listening – relates to listening together and working towards mutuality (learning)
2) Respecting – participants engage in an inclusive space and embrace differing perspectives (multi-perspective view)
3) Suspending - participants examine their own and others' opinions to deepen common understanding (common viewpoint building)
4) Voicing – authentic, genuine voicing of opinions without common unconstructive responses (common emerging viewpoint evaluation)

In our work we argue that those principles of dialogue presented in [27] discussed in the context of consensus building and elaborated extensively in [15], can be also mapped to the space of immersive Virtual Reality-based communication & interactions.

3.2 Online Dialogue Games

In this section we would like to briefly relate to the concept and the field of Dialogue Games that attempts to structure the discussions in a framework that enforces dialogue and collaborative learning [13]. The latest representation of Dialogue Games which has been implemented as Web 2.0 tools has been widely adopted as online representation of face-to-face dialogue. In the case of Online Dialogue Games authors stress that successful dialogue is contingent on balance between enforced structure and flexibility and openness [33, 35]. An interesting observation can be made that the structure of posts and replies in Online Dialogue Games (DMG) resembles the updated post structure on popular Social Media such as Facebook. However, the social media implementation is very general and does not distinguish attacking or supporting voices, does not distinguish roles in discourse and supports rather free flow of argument exchange. That limited open approach in contemporary Social Media is in fact in line with recommendations by Prakken [35] who argues that there is strong need for more learning approaches to online communication to ensure more collaborative behavior.

Therefore, we argue that building on the principles of contemporary Online Dialogue Games in terms of collaborative learning and consensus making and including new capabilities delivered by VR interaction can ensure more effective Online Dialogue – VR-Dialogue. We argue that VR-Dialogue should implement some of the elements of Online Dialogue Games in form of specific communication protocols fine-tuned to different contexts of deliberation and enforced by designated dialogue moderator.

4 VIRTUAL REALITY DIALOGUE AFFORDANCES

In this section we identify and elaborate upon the specific Virtual Reality affordances than can support the dialogue principles.

First, however we would like to clarify the definition of Virtual Reality as literature refers to Virtual Environments and Virtual Communities in very different contexts.

Therefore, by Virtual Reality, commonly referred to as VR we consider totally immersive, simulated environments leveraging Head Mounted Displays (HMD) and manipulators (controllers, gamepads, pointers) as interface, offering a form of strong telepresence and co-presence, where users are isolated from their surroundings as defined by Steuer et al. [44]. Therefore, we do not include broader understood XR – Extended Reality or AR – Augmented reality in the scope of this work. Contemporary authors in the domain of e-Participation [1, 21, 23, 43] relate to word *virtual* in a very different sense to the concept considered in this paper. The authors understand Virtual as digital platforms in general, in particular social media, while our definition is in line with the one relating to *Virtual Worlds* definition given *by Bell et al.* [2] presented as: *A synchronous, persistent network of people, represented as avatars, facilitated by networked computers.*

In this sense, we argue that the emerging immersive Virtual Reality (VR) technologies, which offer simulated collaborative environments, also often referred to as the "telepresence" [44], thanks to high-interactivity, strong immersion and increased presence capabilities, that gets close to real experience [20], create new opportunities for e-Participation inclusive communications. Since VR

technologies dating back to 1960s (introduction of Head-mounted Display) made a comeback to the consumer market in form of affordable and immersive VR solutions, a new opportunity arises to experiment with more advanced means of communication [3]. In particular, according to [38] there are two distinct aspects of human interaction in Virtual Reality to consider when discussing human perception of virtual world and collaborators:

- Immersion - an objective property of a VR system that can be measured independently of the human experience
- Presence – (sense of presence) is the human response to the VR system

4.1 Immersion

As pointed by [38] immersion is a property of the VR system and is independent of actual human experience and deals largely with the overall performance of the VR solution and includes factors such as degree of field of view, number of sensory systems simulated, quality and speed of image and spatial sound simulation. Therefore, the quality of VR experience is contingent on strong immersion derived from high-performance simulation [48]. In particular Sanchez-Vives at al. argues that immersion in VR "can transform the consciousness of a person in the sense that they respond to the virtual place and to events within that place, and feel their body to be part of that place". This is corroborated by studies in medical impacts of VR where it has been shown that immersion can be so strong that can effectively decrease pain levels or eliminate pain altogether while patients disassociate themselves from reality and "live" within VR [24]. We argue that the strong sense of immersion, discussed by computer science researchers and neuroscientists, can significantly improve VR group interaction capacity to listening and participation. This is largely due to isolation from "real world" and focus only on matters in VR unlike in teleconferencing or social media solutions where participants use screens to interact and get easily distracted and carried away due to the "screen barrier" effect [6]. In this context, we would like to recall here a quite colloquial yet expressive statement: "watching heaven is quite different to actually being in heaven". In particular, Bricken stresses on significant difference between viewing (on screen) and inclusion (in VR) by stating that in virtual reality users: "interact directly with various information forms in an inclusive environment".

4.2 Presence

As The strong sense of presence of participants in Virtual Reality environments, discussed by computer scientists [20, 44] has been also strongly corroborated by works from the domain of neuroscience [38]. In the latter works Sanchez-Vives et al. argue that if participants exhibit responses to impulses in VR the same way they do in reality that is a sign of strong presence. According to [11] presence is a "mental state in which user feels physically present within the computer mediated environment". The strong sense of presence has been supported by modern VR systems both through visual and haptic stimulation (mainly physical vibration). That approach has been corroborated by studies into remote communication through VR by applying both visual and haptic stimulation which showed that "the sense of being with another person together in a virtual environment" is very strong [14, 37]. The strong presence in simulated environments has been shown in various contexts, in particular in experimentation with public speaking in VR. Specifically, the research shows that participants emotional responses in simulated environment correlate strongly with the experience in face-to-face meetings [28]. In fact [38] suggests that VR-environments, thanks to strong monitoring capacity should be used to study the phenomena of presence and consciousness in reality.

Therefore, we argue that the improved sense of presence in VR in comparison to any other digital medium, can help users to have be more mindful and have greater awareness of their inclusion in specific group engagement & environment and to be more aware of presence of other participants. Therefore, users are expected to examine better their opinions and biases while not hesitating to voicing their genuine concerns and ideas.

4.3 Sense of Community

The third final affordance of VR we are considering in our work is the sense of community. This specific affordance has been inherited from the former technologies such as online forums and social media, but that affordance is given extra meaning in the context of VR. Much has been said about the importance and effectiveness of online communities in the literature [18, 19, 34] In particular authors stress that in terms of "social dynamics, physical and virtual communities (often referred to as virtual communities – even though they do not apply VR in our understanding of the term) are much the same". The contemporary social media leaders are corroborating the former studies on online communities with their mission statement declarations dealing largely with building global community and supporting communities of interest[4]. The new emerging field of highly-interactive social Virtual Reality leveraging immersive virtual simulated environments brings new opportunities to community building and engagement. Therefore, it is not a surprise that the leaders in the domain such as Facebook are also one of the biggest investors into VR especially through their acquisition of Oculus – leading VR gear hardware producer. The premise of VR contributing to stronger community that benefits the participants is corroborated in literature [47]. The grassroots of VR community building emerged already in form of social VR software platforms such as AltspaceVR[5] or VRChat[6]. Social VR platforms offer thematic events and dedicated spaces & environments for specific types of communities such as common interest groups (music, arts, developers) or support groups (like LGBTIQ). Here the two most popular social VR platforms apply different principles in terms of user representation. While VRChat focuses on individualism and custom avatars, AltspaceVR platform offers more unified, business-like avatars. Different participant representation has impact on the communities present on those platforms. Therefore, VRChat has more entertainment nature that attracts young people to play together. AltspaceVR brings more professionals to their virtual spaces. Also, the set of environments available to explore in AltspaceVR that includes many different conference halls with interactive screens supports more serious, business-like engagement than game-like style of engagement in VR-Chat. Both

[4]https://www.facebook.com/notes/mark-zuckerberg/building-global-community/10154544292806634/
[5]https://altvr.com/
[6]https://www.vrchat.net

platforms have their community guidelines published. From those documents it is clear that VRChat appeals more to the young cohort of users who use platforms like Snapchat and Instagram on daily basis: "Every experience you'll have inside VRChat is unique and probably a little weird but definitely enjoyable and even inspiring"[7]. Therefore, while VRChat aims at group "fun" and inspiration, AltspaceVR focuses on communication and communities interacting in some specific events with relevant roles designated for community helpers. Moreover AltspaceVR, event-host moderation tool enables implementation of specific communication protocols. That allows the application of some of the discussed Online Dialogue Games rules hence providing a base platform for VR-Dialogue in particular by realizing the Respecting principle of Dialog leading to better collaborative learning and innovation.

Therefore, we argue that the Sense of Community in VR is strong and there is evidence suggesting that the sense of community is evolving towards more collaborative communities with better learning capabilities and inclusive support for Online Dialogue Games communication protocols.

The selection of VR Community tools is not exhaustive, but we have chosen the most popular Social VR platforms as a good example. In this elaboration we do not include the popular Facebook Spaces[8] VR app connected to Facebook because currently it only supports up to 4 people interacting at the same time which is hard to consider a community. That application also has been now put on hold before Facebook release of successor VR platform – Facebook Horizon, expected to be available in the late 2020.

5 INTEGRATIVE FRAMEWORK FOR VR-MEDIATED CONSENSUS AND COMMUNITY BUILDING

In this section we present our attempt to combine and relate the four principles of effective Dialogue to key affordances of VR that can directly support those principles. As we already discussed in the former section:

1) The strong sense of Immersion, can significantly improve VR group interaction capacity to listening and participation thanks to complete isolation from "real world". It also helps focusing only on VR interaction unlike in teleconferencing or social media solutions where participants are distracted and often carried away due to the "screen barrier" effect.
2) The improved sense of Presence in VR can help users to be more mindful and have greater awareness of their inclusion in specific group engagement & environment and to be more aware of presence of other participants hence voicing their genuine comments more openly.
3) Sense of Community – VR offers strong sense of community derived from better interactivity and more means of control supporting elements of Online Dialogue Games. That notion of more interactive and structured engagement creates and opportunity for more Respecting attitudes to online dialogue.

[7]https://www.vrchat.net/community-guidelines
[8]https://www.facebook.com/spaces

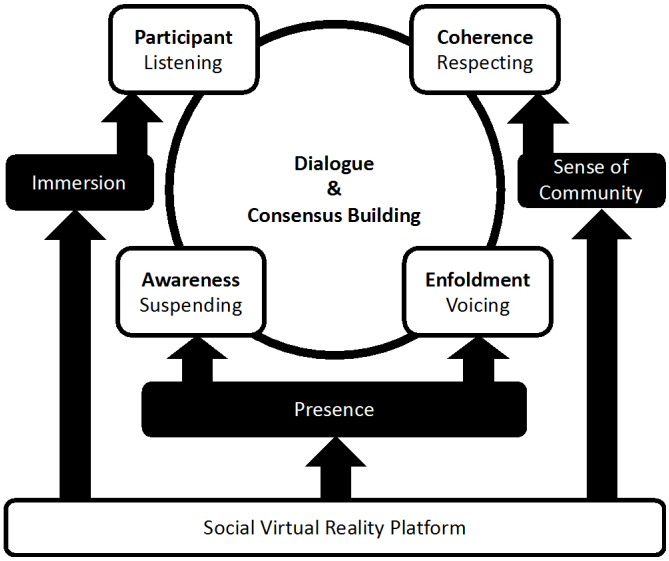

Figure 3: Integrative framework for VR-mediated consensus and community building

Considering the specific alignment between the principles of Dialogue and VR affordances we constructed the Integrative framework for VR-mediated consensus and community building (Figure 3). We argue that those links identified and expressed in the framework design can help to structure the future research into VR and consensus and community building.

Therefore, if researchers would like to investigate how to support better Listening, they can work towards providing better immersion at the VR system level. Similarly, if community analysis shows that there is need for more Suspending and Voicing in the group, researchers can work towards providing better presence by providing new haptic (or other sensorics inputs) impulses and feedback. Finally, when community struggles with Respect among participants, that can be alleviated by manipulating VR environment towards greater affinity (could be through the VR space design or common or identical avatars). That can be also corroborated through application of some of the specific communication protocols (present in Online Dialog Games) to ensure maximum respect and professionalism in interactions.

6 INTEGRATIVE FRAMEWORK FOR VR-DIALOGUE AND E-PARTICIPATION

We designed our Integrative framework strictly in the context of e-Participation. In particular, the VR-Dialog and the Integrative framework for VR-mediated consensus and community building can help the existing e-Participation initiatives to adapt some of the emerging VR technologies in very constructive manner.

We argue that the existing Social VR platforms such as AltspaceVR already provide enough capabilities to realize the foundation for VR-Dialog in e-Participation – hence supporting efficient VR-Participation. Our framework can be effectively used to build and maintain communities in different e-Participation contexts. Dependable on resources available (technical & financial)

the e-Participation initiatives' owners may decide to "invest" into specific support for VR-Dialogue elements whether it is Listening, Suspending, Voicing or Respecting. It is apparent that Listening could be the most challenging to address since that element shows to be strongly rooted in specific technology used. Suspending and Voicing also to large extent depends on the underpinning hardware and software support. Therefore, since e-Participation owners will rather leverage the existing state-of-the-art, of-the-shelf solutions in terms of VR Systems (including platforms and hardware) it is apparent that the largest space for contribution lies in the Respecting where relevant communication protocols need to be put in place. In this context, Virtual Reality and e-Participation researchers should investigate further what elements of Online Dialogue Games can be implemented as effective VR-Dialogue hence supporting the improved VR-Participation. In particular, e-Participation researchers and practitioners should consider the VR-Dialogue-driven VR-Participation as a valuable complementary component extending the existing set of e-Participation communication and collaboration channels. Specifically, e-Participation initiatives can continue building upon existing methods and tools for citizen-engagement and augment it with improved, immersive experiences introducing new means of e-Participation. That said, VR-Participation is not going to replace the classic e-Participation in its entirety but rather augment digital collaboration in very specific public-engagement scenarios and help to improve the legacy digital communication channels with the benefits brought by emerging immersive Virtual Reality technologies.

7 DISCUSSION

In this paper we presented the key challenges of contemporary to e-Participation and attempted to provide a vision of VR-Dialogue that can help to materialize more advanced VR-Participation. Our contribution focuses on delivery of relevant Integrative framework for VR-mediated consensus and community building that combines and relates well established principles of Dialogue with specific VR-affordances. We argue that our framework can help in building more effective VR-communities and to ensure more consensus building hence addressing some of the major gaps of contemporary e-Participation. Our research can help e-Participation owners to embrace the emerging VR technologies and harnessing them for more effective public deliberations as part of next generation e-Participation initatives. We cannot claim the completeness of our framework; however, we argue that our work can help in structuring near future e-Participation developments and research in the domain. The major limitation of this work is that it is largely theoretical, with limited empirical evidence and relevant further experimentation must be conducted to corroborate the premises elaborated in this paper. Therefore, our future work will focus on leveraging the existing Social-VR platforms to organizing e-Participation, VR-Dialogue-driven events and analyze the participant behavior in terms of consensus & community building. In order to do that, we will employ state-of-the-art AI technologies to learn relevant user-behavioral models and support relevant dialogue moderation in various e-Participation contexts. Future experimentation will help us to further stratify our framework and elicit more explicit parameters important for the success of dialogue in VR-Participation.

We are aware of substantial works done in the domain of VR and e-Government especially in domain of planning and training. However, there is a paucity of research dealing with community aspects of e-Participation. We believe that this work, by going beyond the common understanding of "Virtual Communities" in e-Government domain as Online Communities into the emerging field of immersive VR technologies paves the way for the new line of social VR research for e-Participation.

8 CONCLUSION

In this paper we presented a specific, conceptual journey staring from e-Participation and heading towards the possibilities of emerging VR-Participation. In particular, we articulated the key challenges of contemporary e-Participation derived from discursive nature of online e-Participation platforms and social-media-based e-Participation; we identified the key Dialogue principles that, if implemented correctly, should help to address some of the challenges recalled; we presented a relevant Integrative framework for VR-mediated consensus and community building that combines and relates specific Virtual Reality affordances to Dialogue principles; finally we elaborated how the resulting framework can help e-Participation initiatives' owners and stakeholders to make more informed strategic decisions on embarking on the emerging social VR technologies to harness them for e-Participation.

The work presented is limited mainly to theoretical elaboration; however, it is strongly built upon well-established theories and concepts towards robust conceptual framework. Our future work will bring structured, AI-aided experimentation with Social VR-based e-Participation that with analytical support provided by behavioral scientists will help us to validate the links identified in our framework and to allow further stratification of the dependencies and relations between specific affordances and dialogue principles.

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