Sociability in Virtual Citizen Science

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ABSTRACT
Past research suggests that sociability can enhance volunteers' experiences of virtual citizen science (VCS). We define four types of sociability. We also describe how outreach events - *'Thinkcamps'* – can be used to support the design of social tools for VCS platforms.

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Citizen Science; Sociability; Communities; Serious Games; Design.

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H.1.2. User/Machine Systems: Human Factors.

General Terms
Human Factors.

INTRODUCTION
Virtual citizen science (VCS) is a unique form of computer-mediated interaction, where members of the public collaborate with professional scientists to conduct scientific research [14]. Volunteers participate because they are intrinsically motivated to contribute to a scientific project by an interest in the topic e.g. astronomy [8], protein-folding [7], brain-mapping [6], theoretical physics [17], volunteer computing [1]. There are a wide variety of VCS projects, all with their own research questions and tasks/games for participation.

Similar to MMORPGs [3], sociability is thought to enhance the experience of VCS volunteers. Many VCS projects include social tools - such as forums, blogs and social media – to support collaboration between volunteers and scientists [14]. Some VCS projects also involve team-play and competition. For example, in *Foldit* [7], players compete against one another in teams. The use of game elements in non-game contexts (such as VCS) is referred to as *'gamification'* [5] *or 'games with a purpose'* [20].

However designing for sociability in VCS presents several design challenges. As Crowston and Wiggins [4] explain:

"[V]CS projects share characteristics with other kinds of open communities, but with significant differences due to their scientific goals. The increasing scale of [V]CS projects suggests a need for additional research on appropriate technology support for this mode of scientific collaboration." Similarly, Newman [11] writes: *"Additional features to support social interaction between volunteers, project managers, and scientists are needed."*

In our research we believe it is important to include scientists and volunteers as part of the design process. First we review previous research and define four types of sociability in VCS. Then we describe our plans to run a series of outreach events with scientists and volunteers – *'Thinkcamps'* – to support the design of social tools in our own VCS platforms.

PREVIOUS RESEARCH
Existing studies of VCS projects suggest that sociability is one of several reasons why volunteers are motivated to take part. Raddick et al. [13] surveyed volunteers of *Galaxy Zoo* [8] and identified 12 motivation categories, including *'Contribute'* (I am excited to contribute to original scientific research).

Nov et al. [12] surveyed volunteers of *Stardust@home* [18], and reported that *collective motives* (the importance attributed to the project's goals) were most salient, alongside intrinsic motives (enjoyment).

Rotman et al [16] surveyed and interviewed volunteers of ecological Citizen Science projects. They found that volunteers' motivations were dynamic and changed over time. Although initial motivations may be very diverse, social factors played an important role in secondary motivations and staying with a project.

DEFINING SOCIABILITY
It is evident that social factors are important for sustaining volunteers' engagement in VCS projects. However we should define more precisely what we mean by sociability in VCS. Based on our work so far (participant observations and interviews with several VCS volunteers), we hypothesize that there are four types of sociability in VCS.

1. Sociability Among the Larger Scientific Community

Most participants in our interviews report the feeling of contributing to current research in the scientific community as an important motivational factor for taking part in VCS projects. Their initial participation is grounded in their personal interest for science and further encouraged by the presence of key actors in the scientific scene. For example, one participant of *Eyewire* [6] said: *"I have a lot of friends who are neuroscientists so also the brain activity all that is really interesting to me."*

Open and quick feedback from the scientific team in the forums is appreciated and may encourage increased participation. For example, one participant in the *Test4Theory* project [19] reported his joy of being able to interact with one of the founding developers of the platform: *"(...)one of the creators of Boinc was here, discussing in the forum, answering our questions and taking into account our feedback, I thought wow this is nice and very dynamic..."*

Other tools and activities, like blog posts on scientific progress and discoveries, virtual lab visits, co-publication of scientific papers, may increase this feeling of participation to the scientific adventure in a world-wide community.

2. Sociability in the Gamers' Community

Some participants also report the feeling of belonging to a larger community of players. They have common problems and objects to discuss.

Some tools strengthen this sense of belonging to a community. For example, ranking systems induce comparison to others and some awareness of who the best players are. There are also tools to share work-in-progress - showing your results to others in galleries, comparing your work with the work of others, checking what others did, etc.

Forums are important tools for community expression and management, as well as for seeking support and providing advice. For example, one participant of *Eyewire* [6] said: *"I really like the forum, because they seem very active. They answer quickly(...) At the beginning I had some problems so I went there and you can sense that there is a small community, but active, so that's interesting."*

3. Team Sociability

Some VCS projects - like *FoldIt* [7] - open the possibility to play in teams. Team members collaborate to achieve their goals (mainly in a competitive way with other teams) or cumulate their points. They exchange ideas, strategies, plans, programs, thoughts, scripts or recipes. One of our hypotheses is that – similar to previous research findings for MMORPGs [3] - the feeling of belonging to a team is a strong motivational factor for long-term participation in VCS projects.

Teams may select players because they have already demonstrated that they can achieve high scores. For example, one *FoldIt* [7] participant said: *"Most groups are closed, most of the time we ask players to join when we see that players have prestige."* Teams also establish rules: *"(...)if someone is not behaving well, I can kick him off the group".* In this case, team sociability is a kind of collaboration to improve one's own scoring as well as team scoring in the game.

In other VCS projects, team sociability may add a competitive dimension to the core mechanisms of the game, like on the *Boinc* projects [1], where volunteers chose to create teams, based on language or country, to compete with other teams. When teams are dedicated to progress or competition, it is common for some volunteers to create specific tools for evaluating and comparing performances; advanced graphics or lists based on available scoring systems, for example, are updated and studied to improve future performance.

4. Sociability as Active Community Management

Some volunteers take full responsibility for supporting and animating the social life of those involved in the project. These volunteers change roles to act as moderators or experts in the online community. In these circumstances, sustaining and developing the community becomes their primary objective.

In some VCS communities, volunteers have created game mechanisms in additional to those provided by the projects. For example on the *Boinc* platform [1], some national teams provide community-enhanced gamification for their members, organising internal and external competitions: *"We organise raids, races, limited in time. We select a number of projects to crunch, we contact the admin and discuss with them, once we have their official agreement we integrate these projects in our selection and launch the raid".* These communities, animated solely by players, are by-products of the game.

There are also cases where volunteers themselves take responsibility for maintaining the servers required to host the activities of the community: *"You transform yourself into a small company when you do that!"* explains one of our participants.

Volunteers may also develop autonomous web sites or wikis, and engage in active online and offline promotion of the project: *"(...)we prepared a tutorial to present volunteer computing in universities, we answer people's most frequent concerns and explain what it is about, how and why one should do it".* This sociability is an extreme form, as it implies that a community of players does the support, design and community management work usually done by the professional scientific team.

DESIGNING FOR SOCIABILITY

Overall it is evident that there is potential to encourage many different kinds of sociability in VCS. Some volunteers experience just one type of community feeling, whereas others span the whole range of sociability. But how can we design social tools to support these different kinds of sociability?

In our research project, Citizen Cyberlab (CC), we will be building and evaluating four new digital VCS projects [2]. The science domains include particle physics, disaster mapping, synthetic biology, and community environmental projects. We believe it is important to include scientists and volunteers as part of the design process. Therefore a novel way that we plan to support the design of sociability in our CC platforms is by organizing a series of outreach events called *'ThinkCamps'*. This is a new type of *'un-conference'* format that aims to optimize creative problem solving, where developers collaborate with users in order to design tools to support their needs.

Traditional Un-conference Formats

Hackdays, Barcamps, and other 'Un-conference' event formats continue to grow in popularity as a creative outlet for developers and a way for organisations to engage with a wider community of participants than usually possible. The format of an Un-conference typically starts with one or more presentations about the subject matter of the event. The rest of the content is suggested and delivered by the participants. People then freely flow between the sessions that are the most interesting and relevant to them. At a Hackday (which focuses on creative innovation and learning) or Hackathon (which focuses on moving a body of code or a technology platform forward in a rapid burst of collaborative development), participants form ad-hoc collaborative teams around ideas that they would like to work on together. These usually involve hands-on software or website development, or hardware 'hacking', but can also involve fleshing out a product, service or business idea. At the end of Hackdays and Hackathons, there is usually a series of demonstrations in which each group presents their results. There is sometimes a contest element as well, in which a panel of judges (usually peers and colleagues in the field) select the winning teams, and prizes are given.

ThinkCamp Methodology

Citizen Cyberlab (CC) will progress beyond the state-of-the-art of the varying 'Un-conference' formats by applying and further developing the hybrid 'ThinkCamp' methodology developed by The Mobile Collective. ThinkCamps combine the improvisational creativity of the Hackday, with the self-organising principles of Open Space Technology (allowing participants to fully pursue their passions and interests), and the more focused structure of traditional idea-generation techniques [9]. This provides the ideas that have been developed during the ThinkCamp with a clear developmental path beyond the event itself, and allows the adhoc teams which have formed a more formal role in the delivery of those ideas after the event. The result is a much more strongly engaged community that is actively involved in delivering on a shared mission. The ThinkCamp methodology also incorporates the inter-disciplinary approaches to Open Innovation of the "Fuzzy Front End" of R&D [17], which optimises creative problem-solving by taking the process outside the walls of a singular organization [15].

In CC we will be organizing a series of 'real world' participatory ThinkCamp events for creative problem solving and collaborative learning where scientists and citizens can meet, share their experiences, devise new projects for VCS, and further develop the community toolkit. The experience of several of the partners in the CC consortium shows that this kind of event directly benefits community engagement and participation, provides an opportunity for improvisational creativity and tacit learning, and serves as a litmus test of software tools for VCS.

By involving scientists and citizens from the outset, we hope that this will allow us to effectively design tools that can best support their social needs. Potential design benefits include:

- Developers have the opportunity to engage with real citizens to develop personas of 'typical users';

- Developers will employ participatory design [10] methods by conducting design activities with citizens.

- Citizens can be involved in building and developing the tools.

Another possible outcome is that, due to their early involvement in the projects, these citizens may be more engaged and could potentially form part of the core project community – possibly even becoming the first group of moderators/experts of the respective projects.

CONCLUSION

In this position paper we have presented four different types of sociability in VCS projects. We have also described how Thinkcamps can be used to support the design of social tools for VCS platforms. This is a novel approach, which we hope will allow us to design VCS platforms that are successful in supporting sociability and volunteers' feelings of community membership.

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