Engagement with participatory GIS: the role of Intermediaries

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ABSTRACT
This paper examines the role of Intermediaries in supporting digital engagement, by drawing from a study of Participatory Geographic Information Systems (PGIS). Working alongside the social enterprise Mapping for Change, four organisations and charities that developed Community Maps were asked to take part in semi-structured interviews emphasising how PGIS could be designed to cater for broader inclusion of community needs. Results showed that organisations involved in PGIS blur role and responsibility sharing within Participatory Mapping activities, which makes them highly fluid and hard to categorise. The use of Intermediaries within a design context is discussed as a means of reducing the functional problems encountered by communities. Specific reference is directed to four key characteristics: Moderation, Seed data perspectives, Representation, Evolution and Iteration.

Keywords
Participatory Mapping, GIS, Intermediaries, Usability

1. INTRODUCTION
Participatory Geographic Information Systems (PGIS) are widely cited as an effective means of engaging Community Groups to compose spatial information into online maps. The central premise to PGIS is that it is the Community that takes control over the decision-making processes, managerial power, and responsibility to the extent that they can manage the GIS for themselves. Haklay *et al.* [1] describe the Participatory Mapping Process as a means through which Communities identify initial project priorities, demonstrate focused evidence gathering and map general perceptions, before digitising spatial data for visualisation in online maps. The idea of sourcing participation from a wide group of people is often seen as the ideal outcome of a project, but is commonly hindered by the lack of an effective communication mechanism.

Related to communication, usability is also an issue with participatory GIS. A study conducted by Ellul, Haklay & Francis [2], which focused on Mapping Change for Sustainable Communities, highlighted the mismatch between the web skills of active community group members, and the web skills required to access and process information provided using Web GIS. The study concluded that a secondary digital divide had emerged in the context of skills when using Web GIS. It was asked whether users were actually literate with concepts such as layers, zooming, panning, and interrogating maps to identify further information about objects shown.

Mediation between technology and the community is therefore necessary to ensure that the community has a "level playing field" or shared understanding of the resource that they have access to. Almost invariably in Community Maps there exists a hierarchy of mediation between the GIS and the participatory population. These select groups of people, intermediaries, are often responsible for educating and facilitating the Community – in essence they are the 'Gate Keepers' of the technology. In a participatory mapping context the balance of roles and responsibilities has been discussed in terms of a graduated hierarchy [3], spanning from a *Dictatorial* enforced approach to participation through to a *Self-Mobilising* or truly bottom-up initiative. Clearly, a Participatory GIS approach that emphasises the importance of egalitarian *"bottom-up"* mapping must address educational constraints to ensure that all users have the literacy to contribute in a digital and physical environment.

Therefore, intermediaries offer a window into the dynamic structure of role and responsibility hierarchies within communities. They are ideally placed to consider notions of power balance between technology owners and participatory communities, but also involved enough to understand the functional strengths and weaknesses of a product offering. This may be based on their own experience and on the interaction with the community that they facilitate. This knowledge is crucial to understanding how to effectively develop PGIS to cater for generic and bespoke functional needs of a particular initiative, in order to inform both successful technology (including UI) design, and the deployment processes that are necessary for PGIS success.

To that end, the following study worked with intermediaries associated with the Mapping for Change [4] programme. Mapping for Change provides community initiatives, such as those involved with urban reclamation, sustainability and community action, with the technology and support required for PGIS.

2. METHOD
Working alongside the social enterprise Mapping for Change, four organisations and charities that developed Community Maps were asked to take part in semi-structured interviews emphasising how PGIS could be designed more effectively to cater for broader community needs. These groups were each formed for different reasons, including: Raising awareness of an initiative; Improving GIS literacy; Urban planning; and fostering communities with shared goals. Seven Intermediaries were chosen with varying levels of responsibility. All were interviewed regarding their role within their organization, and their perception of the successes and issues of using PGIS. For three of these participants, part of the interview took the form of a cooperative evaluation [5] where the participant was guided through the Mapping for Change software and offered their perceptions on particular strengths or weaknesses. Each of the participants had enough technical literacy to be able to navigate to the Mapping for Change website through a web browser, but none had the prerequisite knowledge necessary to be able to create and maintain a map independently. 3 semi-structured interviews were also conducted with the chief executive and technical staff of Mapping for Change to better understand their relations with intermediaries.

3. DISCUSSION
Data collection yielded findings that reveal highly contextual differences in the application of PGIS, and the role played by intermediaries. First, in all four cases the intermediary played a pivotal role that defied traditional Participatory Mapping categorisation models such as described by Chambers [3]. Roles

Group	Group Aims	Role of intermediary (n interviews)	Patterns of community usage
A	Education	Liaising with Mapping for Change; promotion and training of school teachers (1)	Active contribution by community with supervision during participation phase.
B	Green mapping	Community liaison and ongoing user support (1)	High levels of early community contribution followed by ongoing supervisor contribution.
C	Community promotion	Super user – liaising with Mapping for Change, and delegation (1); user – liaising with community (2)	Very high levels of early community contribution. Contribution rapidly fell after map reached high saturation of information.
D	Urban reclamation	Technical mapping and supervision (1); community promotion and liaison (1)	Passive community participation in early stages but all contribution handled by intermediaries.

Table 1 – Distinctions between the intermediaries

cover a variety of functions – liaising with Mapping for Change about programme requirements, liaising with communities to promote their programme and train users, capturing content to populate maps, and moderate content contributed by the community. Not only did these roles vary between organizations, there could be multiple levels of intermediary within an organization (e.g. super user and user) and roles varied over time.

Second, these roles were indicative of variety generally in terms of how each group operated, the community and community aims they supported, and the requirements they therefore had of the PGIS. A major distinction emerged in terms of how the programme sourced and disseminated content. At one end of the spectrum, content was intended to be provided by the wider community (an 'active contribution' model), whereas others would populate the PGIS themselves, or through a specific group, for the wider community could view (a 'passive viewing' model). In practice, some sites operated in the passive viewing model initially with the intermediary attempting to promote greater active contribution through liaison with the community.

Third, interviews highlighted four characteristics that were important to the success of a PGIS initiative.

Moderation – the process through which different forms of community-sourced spatial information are regulated by the technology provider (in this case Mapping for Change) and Intermediaries. Moderation should be optimised in the context of the ideal number of contributors to the Community Map, and the dissemination model adopted, to provide a path to publishing content that is rapid, while ensuring the veracity of contributions.

Seed Data perspectives - the level of predetermined data that should be presented to the Community at inception of the system. Populating Community Maps with Seed Data should be considered in PGIS environments in which the respective Community has limited technical acumen and will require high levels of Participatory Learning. Seed data can demonstrate the value of a PGIS approach to community members, while giving them concrete examples on which to base their own contributions.

Representation – differences in the perception of cartographic information between system designers and users. Where there is leeway for user-defined cartography, as there is with Mapping for Change, there may be a disparity between the intentions of the contributor and how that content is interpreted by other users in the community. This might be exacerbated by inappropriate design choices (e.g. using blue for a user-defined line which is then confused with a river). It is valuable to guide the use of such functionality, and for moderators to monitor how it is applied.

Evolution and iteration- the degree to which communities may change use of PGIS over time. It was apparent that using a PGIS was a learning experience for both intermediary and community as a whole. As time went on, views may change as to the best model (active vs. passive) for certain types of data or activity, and what is achievable with a given community aim. The PGIS process, as described by Haklay *et al.* [1], should be therefore extended to include an iterative learning aspect.

A limitation of the study is the sample size, however the broad differences in application of PGIS within a small sample demonstrates the diversity of roles fulfilled by intermediaries.

4. CONCLUSIONS

This study has demonstrated the importance of the intermediary in facilitating engagement with technology such as PGIS. Their role is multi-faceted, reflecting the diversity of aims of community programmes. Key characteristics that are important to the success of PGIS have been recognised by Intermediaries as Moderation, Seed Data perspectives, Representation, and crucially Evolution and Iteration. The overarching conclusion is that, faced with a user-base reflecting different skills and needs, the intermediary must be factored in as a key agent for change in initiatives that aim to employ technology to support and involve the community.

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