Locating the Territory

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Beverley Hood[1], Chris Speed[1], Ben Butchart[2], Janet Dickinson[3] & Julia Hibbert[3]

[1]School of Design, Edinburgh College of Art, University of Edinburgh

b.hood@ed.ac.uk, c.speed@ed.ac.uk

[2]Edina, University of Edinburgh

b.butchart@ed.ac.uk

[3]School of Tourism, University of Bournemouth

JDickinson@bournemouth.ac.uk , jhibbert@bournemouth.ac.uk

Abstract

The advent of smart phones equipped with GPS technologies and constant connection to the internet has fostered a suite of applications allowing developers and owners to associate data and information with physical locations. Longitudinal and latitudinal coordinates create geofences around physical locations and platforms such as FourSquare use a combination of established addresses and crowd sourcing to add locations to their database. FourSquare as a social media game, with members vying to become the mayor of a location, has led to the FourSquare database becoming amongst the largest and most active index of georeferenced places on the internet. The virtuous circle of users of the mobile app, ascribing their attachment to a place by 'checking-in', and places wanting to be part of a global map, means to have your longitude and latitude in the FourSquare database is an important survival strategy. The database is the new map, and if you're not in it, you won't be on it.

In this paper the authors present a series of funded research projects that introduce the application of locative media to moving things: people, buses, clouds and basemaps.

What is your location?

In the emerging battleground for locative media services, Google Maps appear to have a distinct advantage, dominating mapping services (43% market share), however, it transpires that they do not own all of the data that matters to people. Owning a base map is one thing, but owning a database of coordinates that people tag as valuable is likely to be even more prized. In digital and network mapping, the numbers that are in the database that refer to longitudes and latitudes are becoming the new map. Numbers that are placed in the database by ordinary people and not cartographers or institutions. This paper presents projects in which personal and social databases are developed that correspond to specific groups and communities..

Who are you?

It is arrogant to presume that all potential users will have the same recognition and understanding of cartography and basemaps currently in distribution. What if the users have an unreliable or unestablished relation to cartography? How do we design for and work with user groups to prevent technological marginalization through factors such as disability or social and cultural issues?

This papers attempts to address this question through the presentation of three research projects: Mapping & Tracking and Spatial Memories, which use participatory design methods to create and use locative media tools with users who have a wide spectrum of learning disabilities, and the LinkLocal application that was developed for the Wester Hailes community in Edinburgh, Scotland to explore community sharing.

Mapping & Tracking

Mapping & Tracking was a short-term participatory, collaborative project, exploring GPS tracking via mobile devices as a performative drawing material, blending technology and creativity. Using the Forth Valley Royal Hospital, Larbert, Scotland and the surrounding forest as a canvas, the project was a collaboration between artist, lecturer and researcher Beverley Hood, visual artist Sharon Quigley, audio-visual artist Emma Bowen and participants of the Abrupt Encounters program (http://www.abruptencounters.com/). Abrupt Encounters was a live arts programme developed by a collective of creatively engaged participants with learning disabilities predominantly from Central Scotland [1], organised by Artlink Central, a leading participatory arts agency in central Scotland. The Abrupt Encounters group have a broad range of disabilities from autism, partial sight, focus and memory issues, Downs, epilepsy and motor coordination problems, some living independently, some in supported housing, with an age range from 17 to 70. The Mapping & Tracking project attempted to establish an

open, collective and participatory dynamic within the group, where all participants were engaged as active performers and contributors.

Fig 1. *Mapping & Tracking GPS walk*, 2013, Abrupt Encounters, locative media, ©Emma Bowen

Over a two week research and development period, the project group collectively explored the Larbert forest, its trails, desire lines and off-road routes through a series of daily walks, undertaken to generate a series of digital GPS drawings, as alternative systems of mapping. The project used locative media as a way for participatory creative practice *"to renew with the tradition of site-specific art that left the rarefied air of museum and gallery to investigate the world outside."* [2]

The group utilised 8 Apple iPhones, with two GPS tracking Apps installed, FieldTripGB a freely available App developed by Edina, and GeoArtist, a pilot App, developed specifically for the project by App Development company Bluemungus.

Methods of engagement with the technology included both passive and active. Passive engagement with the technology included exploratory walks to familiarise group with the local environment, nature walks led by Forestry Commission Ranger, and gamified approaches to landscape adopting classic game premises such as "follow my leader".

The active methods of engagement with the technology included creating intentional shapes and adopting other gaming premises as the basis for performative drawing techniques, such as dot-to-dot. In both methods participants held, passed and wore iphones via armbands.

These methods operate as a contemporary extension to the methods of British artist Richard Long, which he defines as "simple creative acts of walking and marking about place, locality, time, distance and measurement. Works using raw materials and my human scale in the reality of landscapes" [3], similarly exemplified in recent works by Jeremy Wood, Masaki Fujihata and historical and contemporary psychogeographic practice*.*

Fig 2. *Mapping & Tracking GPS walk*, 2013, Abrupt Encounters, locative media, ©Alicia Bruce

Coined in 1955 by Guy Debord as "the study of the precise laws and specific effects of the geographical environment, consciously organized or not, on the emotions and behavior of individuals" [4] psychogeography was itself an extension upon Baudelaire's 'urban wanderer', the flâneur, writing the city through the action of walking. The Situationists created the action 'Dérive', to drift, as a psychogeographic procedure, which has more recently been developed in multiplicious incarnations as a variety of Apps, including Dérive, developed at V2 and led by Eduardo Cachucho, Drift, developed by Justin Langlois in collaboration with Broken City Lab and Mark Shepard's Serendipitor.

The locative methods used revealed a cartographic naivety within some of the Mapping & Tracking participants, in particular some members of the group struggled to identify their own location on the map and to be able to identify common cartographic symbols within British Ordinance Survey maps. This was addressed and a general working knowledge developed over the two weeks by walking the landscape, monitoring the maps out in the field on phones, and reinforcing this through the use of

paper based maps both on location and back at the project space, within the hospital. As part of the participatory workshop sessions, the group also explored alternative visual mapping, as creative exercises to develop idiosyncratic and personal systems using cartographic symbols as starting point.

Fig 3. *Mapping & Tracking mapping exercises*, 2013, Abrupt Encounters, pen on paper © Emma Bowen

Specific methods also elicited specific physical responses or behaviors. For example, attempts to create in App dot-to-dot drawings induced what is commonly described as the "Drunken Bee Dance" of Geocaching, i.e. the erratic movement of a user zigzagging an area, in an attempt to pinpoint Ground Zero (the Geocache centre). Such distinct and specific behavioral responses reinforce Susan Kozel's argument that "All our devices invite a set of physical gestures…The mobile phone is a vibrant example…Qualities of performance – ephemerality, expressivity, humor, poetry, physicality – integrated into the design and use of wearable devices can act to disrupt, to delight, and to challenge conventional uses of devices". [5]

Fig 4. *Mapping & Tracking dot to do GPS drawing*, 2013, Abrupt Encounters, locative media © Emma Bowen

The two weeks concluded with a public information day, presenting the many digital drawings created as a visual display within the project space and a scheduled GPS walk around the forest of Forth Valley Royal Hospital for the general public, led by Abrupt Encounters participants.

In conclusion, none of the participants had been smartphone users at the outset of the project and this did present some challenges operationally, largely around the initiation of the technology, which as a result was undertaken by Beverley Hood and Artlink staff. Despite this there was evidence that the participants invested in the project, at times displaying frustration at technical problems but also demonstrating personal ownership of drawings and active control of development, such as invention of new methods of engagement with technology and games. The permeable, hybrid space between physical and virtual space created using these Apps did appear to reinforce the cartographic and locative system, but this overlapping space can also be disorientating, almost literally tripping the user up, particularly those who have spatial awareness problems.

Spatial Memories

Spatial Memories was a Proof of Concept App and Authoring Tool that was developed during the period from February to July 2014, funded by the Jisc TechDis, Small Business Research Initiative programme 'Good to Go', which aims to increase independence for technology users with disabilities, in unfamiliar or challenging environments.

The project was developed as a follow on to the Mapping & Tracking project, bringing together the previous partners from Artlink Central (Sharon Quigley and Emma Bowen), members of the Abrupt Encounters group and staff from Edinburgh College of Art (Beverley Hood), this time in combination with engineers from Geospatial and data services company, Edina (http://edina.ac.uk/), the developers of the FieldTrip GB app. The aim was to expand upon the GPS locative drawing process of the Mapping & Tracking project, into a more spatially complex approach, combining GPS tracking with geofenced data collection and collation, and to examine the exciting basemap.

The Spatial Memories App enables users to create GPS tracks, with images, audio and text "Digital Memories" that are geofenced at specific GPS locations. These geofences alert the user (using a proximity trigger) when the journey is retraced. In practical terms, the previously created image, text or audio 'Digital Memory" is triggered and displayed or played when the user enters the vicinity of the GPS location, where they were made. It's a simple way to create visual, textual or audio landmarks, reference points and routes that are meaningful, based on the ground truth rather than online mapping databases and routing algorithms.

The framework for the Spatial Memories project was based on EDINA's "Fieldtrip Open" (https://github.com/edina/fieldtrip-open) architecture which already incorporated many of the essential components, such as Camera, Audio, Geo-positioning and geo-fencing and provided a flexible framework for the additional functionality needed for the Spatial Memories project. A significant element of this adaptation process involved stripping away layers of the FieldTrip interface, to design more accessible, and simplified, user experience.
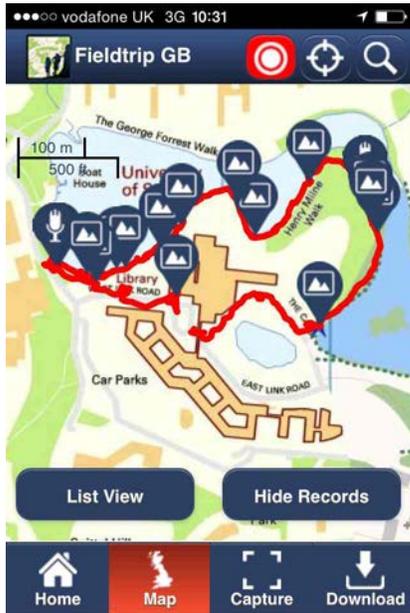

Fig 5. *Spatial Memories App*, 2014, Edina, interface screengrab, © Edina

Fig 6. *Spatial Memories workshop walk*, 2014, digital photography © Emma Bowen

Fig 7. *Spatial Memories workshop walk*, 2014, digital photography © Emma Bowen

There are many Apps with similar features (BlindSquare, MyTracks, Sandero GPS, Google Keep to name just a few), but what is distinctive about the Spatial Memories App is the ability to organize these Digital Memories into a spatial narrative, a track which you can replay, adapt and share. Importantly, this is not just about checking into a known place, as in the FourSquare premise, but creating your own places, an idiosyncratic spatial footprint of your own making.

In April 2014 we held a three day participatory design workshop at the University of Stirling, bringing together the different partners to evaluate an early baseline version of the App, generate lots of information on usability issues and ideas for subsequent development.

During the workshop we also worked with participants on a number of activities to evaluate map styles, and cartographic design and symbols, to potentially incorporate alternative basemaps into the Spatial Memories app.

Spatial Memories uses the Open Layers Javascript library (http://openlayers.org/) to display maps, map controls and gestures (panning and zooming), mostly using the public Open Street Map server for evaluation of the App. In preparation for the April workshop, some custom styled maps were created of the University of Stirling campus location combining data from Open Street Map and Ordnance Survey (Open data). The intention was to create several versions of the same map using different layers, features and styles, and use these maps in the workshop design sessions, in order to evaluate whether different cartographic styles might suit some users more than others.

We had envisaged that some users might prefer different cartographic options and map styles, in part because the Mapping & Tracking project had highlighted some cartographic naivety in the user group, but our design sessions suggested the contrary. Users did not have strong individual or disability driven preferences for map styles and these styles did not appear to enhance or negatively affect legibility or comprehension in any significant way.

Fig 8-11. *Spatial Memories basemaps*, 2014, Edina, screengrabs, © Edina

Within this enquiry we also evaluated the potential to use photos that participants had captured as bespoke map symbols. Although the notion of turning a photo or "sketchified" image (created via existing App's such as Roid App's Sketch Guru) into a user generated map symbol is potentially a rich visual research topic, we found that in practical terms, bringing together multiple users content, meant that the map quickly became too crowded and was confusing in its aesthetic diversity, in comparison to the holistically pre-designed map symbols.

Fig 12. *Spatial Memories user generated map symbol workshop*, 2014, digital photography © Emma Bowen

Following participatory design workshops in April there were some changes to our evaluation and development plan. One of the main technical enhancements to the Spatial Memories App interface following the workshop in April, was to make the GPS track the central design concept, ensuring each Memory is associated with a single track. On a workshop level, follow up sessions with three members of the Abrupt Encounters group (selected as a range of users with a broad spectrum of ability) were organised for June 2014. One of the main obstacles identified in the April workshops was the fact that only one of these users owned or used smartphones themselves. So in an attempt to address this, as part of the follow up sessions the three participants were given devices to take home and use freely for a period of ten days. Midway through this period, the development group (always with at least one engineer and one creative) accompanied the three users on an individual journey, which had some personal relevance, in an attempt to gain insight into how these users might utilise the Spatial MemoriesApp in their everyday settings and locations.

We encountered a variety of usability issues throughout the project. These included simple technological challenges such as intensive battery consumption, through the screen brightness and non-energy saving set-up requirements for the specific user group. Several users had problems with touchscreen gestures, often depressing a button for 1 second or more. For example, the current interface listens to Javascript onClick() events which only fire if the press is less than 500ms-1000ms.

Fig 13. *Spatial Memories individual walk*, 2014, digital photography © Emma Bowen

The workflow of the default Cordova camera App, was problematic for some users, in particular the confirming process of whether to "Use" or "Retake" the photo was often misinterpreted and front facing camera mode mistakenly switched. As a result, the Spatial Memories engineers implemented a much simpler, revised Camera App.

In retrospect, in order to address some of these more operational issues, it would have been useful to provide the Abrupt Encounters group with Smartphones from the earliest stages of the project, providing training in general Smartphone usage for several months, so that a smartphones became part of their everyday life, ahead of running evaluations of the prototype. We found working with users who are not using smartphone technology in their daily lives was not conducive to evaluating the usefulness of the concept. This may require fostering long term relationships with user groups in the future, that span multiple projects and software evaluations.

One of the biggest challenges the Spatial Memories project faced was the difficulty to evaluate unfinished, buggy software with end users who already face a number of challenges interacting with smartphone interfaces due to their disabilities. Users tended to place blame for things not working properly on themselves rather than lay blame on the incompleteness or poor design of early software iterations. There appears to be a tension between a rapid proto-typing methodology, with a short, iterative versioning approach and developing assistive technology, which requires consistently high quality, un-buggy software, which will actually be useable by someone with disabilities. As a result of interaction with Abrupt Encounters group in this project, the Spatial Memories designers and engineers have a far better understanding of how disabilities such as memory and focus issues, fine motor co-ordination and visual impairment can create problems for users interacting with Smartphone interfaces.

Potential uses of the Spatial Memories App are multiple and varied. Some users in the group utilised it as a creative tool, others a bespoke narrative journey, as a system of geospatial reminders i.e. what to look out for, what you need to do next, or just to get your bearings. For some, such as autistic users who are not verbally articulate but are at the same time are technically capable, such as Gus, a 13 year old Autistic boy with a profound complex, assistive relationship with Siri [6], The Spatial Memories App provides the potential to demonstrate, explain and engage with personally relevant routes and places.

The Spatial Memories App's uniqueness is in organising your memories into a spatial narrative, a track which you can replay and revisit.

LinkLocal

LinkLocal is a collaborative community smart phone app which is an outcome of a UK Research Council project: Communities within Spaces of Flows (Flows). The project follows on from a locative media platform developed through the Sixth Sense Transport project, also funded through UK research councils. The Flows project that took place in an urban setting draws on findings from previous trials that took place in the Sixth Sense Transport project which took place in rural contexts. The app aimed to facilitate collaboration and communication between users, therefore enabling users to create/join a network which facilitates the pooling of resources. The app also enabled participants to see the collective movements of other people in their social network over time and interact with one another by sharing information and posting various requests, such as shopping, general help and lift requests. The app, as part of Sixth Sense Transport, was originally designed for use by a campsite community but was adapted to meet the needs of rural and then urban communities. After consultation with a local community activist, the app was rebranded to be more relevant and recognisable to the local community involved in the latest trial.

Fig 14. *Wester Hailes*, Edinburgh 2014 © Chris Speed

The context for the trial was Wester Hailes in Edinburgh which was the last major local authority housing estate constructed in the UK with the City of Edinburgh Council beginning construction on the suburban site in 1968. Since the mid-1970s the neighbourhood has undergone a vast amount of transformation driven in a large part by bottom-up community activism. All of Wester Hailes is within the bottom 15% (most deprived) of the Scottish Index of Multiple Deprivation, despite the neighbourhood receiving vast amounts of regeneration investment in the 1980s and 1990s. This regeneration led to massive physical changes in the neighbourhood, for example, 18 blocks of high-rise flats, 1600 homes in total, being demolished. However social challenges around community development remain in terms of engaging residents with their community and neighbourhood (bridging social capital).

The LinkLocal trial set out to explore two primary issues for the community:

1. to better understand how locative media apps may be deployed into community support networks to improve quality of life and enhance well-being.
2. to analyse ways in which social network technology can bring about new place related affordances for communities and unlock community potential to achieve well-being gains.

Based upon these aims, the trial had the following objectives:

1. To provide participants with a means to visualise the community's travel patterns
2. To provide a platform in which users could communicate and share local information
3. To examine the ways in which participants communicate with each other
4. To explore the potential for collaboration amongst a community of users

Eleven participants were recruited through the West Edinburgh Time Bank. Members were contacted by Time Bank facilitators and invited to be involved in the app trial. They attended a meeting where they were given further information about the project and a demonstration of the mobile phone app. Four participants were recruited after the meeting took place and were provided with the same information on a one-to-one basis.

Participants were either loaned iPhones (n=9) for the duration of the trial or had the app installed on their own phone (n=2). During the trial, one participant required further assistance on how to use the app. The trial took place over approximately 7 weeks during, April and May 2014. A focus group was held after 5 weeks and 5 participants were interviewed at the end of the trial.

Participants reflected a range of ages from mid 30's to 70's and contrary to previous trials, car users were in the minority (n=1). Not all participants were known to each other but all were known to the Time Bank. One of the most active users was someone who had initially struggled with the technology but persevered because of the desire to help others through the app. This person was also one of the older users, however, we have found that age is not a factor when considering engaging with the technology or the app.

The app works by allowing members to post requests for help at specific GPS locations using a map on the iPhone. These requests are then shared with all users and it is hoped that at least one member will accept the offer to help and then contact the person who posted the message. In addition to messages posted by members of the community the Time bank facilitators also posted messages to promote the use of the application.
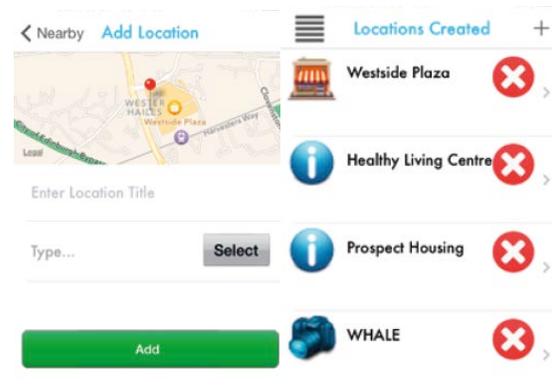

Fig 14. *Adding locations in LinkLocal to which messages can be attached.* © Sixth Sense Transport

It was evident in all of the interviews, aside from the interview with the Time Bank facilitator, that all participants saw themselves as 'helpers' rather than in need of help. *"There wasn't really anything that I needed anybody to do for me. I have a car and it was more if I could do anything for other people."* Margaret.

They frequently spoke of how they could help others. This is consistent with other trials and is partially an outcome of trial volunteers demonstrating a predisposition to help others. However, as users were recruited through a Time Bank group it was thought that they would be open to the idea of not only offering help but would also be comfortable with receiving help.

Examples of sharing: Lift Sharing.
One example of lift sharing took place. This was following a message offering a lift to one specific individual. This was unusual as in previous trials offers of lifts were posted for the whole community to potentially take advantage of. The user who posted this message actually spoke of understanding the needs of other users to be able to help them: *"I don't really know G or R so I don't know what I could offer them"* (Margaret).

Most participants did not drive or have access to a car but did not see the need to ask for a lift. They adapted their help offers accordingly:

"Well I can't drive so I'd rather do a bit of shopping for other people. Well my mum and dad take me shopping on a Saturday to Morrisons in the evening, so if Gary or anyone needs anything, going in my dad's car I manage it." (Robert)

This pattern was evident in non-car users in previous trials. In addition, previous trials revealed concerns about indebtedness as a constraint to access lifts: *"it's not like I could repay the favour"* (Elaine). Location related transport exclusion is a significant problem. Even where app users can visualise other users making trips with spare seats, the norm to reciprocate presents a barrier to accessing this spare mobile resource.

Example of sharing: information sharing

Two Time Bank facilitators took part in the trial and posted messages sharing information about TimeBank events:

"Drop in Monday 14th April – Drop in Mon 14th April is a visit from the local food bank and fixing dates for social activities - hope to see you then" (Mary).

One facilitator thought the app was a good way of keeping in touch with Time Bank members. She stated that she would be very happy to continue using the app as part of the day to day running of the Time Bank and had considered various scenarios associated with its use:

"We [the Time Bank] would use it I think if enough people had smartphones ... as long as we made sure that information was getting to those who didn't have smartphones it would be fine." (Mary)

Other users liked the idea of the app being used to share information about local events or other items of interest locally: *"If everybody had that wee app, they've all got it on their phone, you could just send out a quick message saying we've got this event it's going to kick off here and get some people along"* (Daniel)

One user used the app to let other participants know about a Steam Train that would be passing through the community. This demonstrates the value in sharing information spatially and temporarily relevant information, it was a last minute event and he was able to get information out quickly and without cost to what could have been a wide audience.

"Steam Train – coming through WH, approx. soon." (Daniel)

Two users pointed out that it would be useful to deploy the app across the whole of the Health Agency. This would help share information between groups and might aid unity: *"I do see it as an agency-wide collaboration that would be useful"* (Mary). *"I can see it working for somebody like the health agency, not just the time bank, but we in the health agency we could communicate, you know we are involved in edible estates and the whale arts people we are involved with a lot of different organisations in this area and it would be a handy way to get them involved in it, you know sharing information and just look what's going on here or something's come up there,*

anybody interested in coming along? Because not everybody's got access to their emails but if somebody had that wee app, they've all got it in their phone you could just send a quick message you know this is the event, its gonna kick off here and get some people along, if they want to come along or whatever." (Daniel).

Requests for help mainly came from Time Bank facilitators, however, there was one example of a request being placed by another user: *"I have couple tonnes of compost for the raised beds we built last week. Needs moving from front garden to back garden. It needs to be transported through the house if anyone about today feels fit enough to help out give me a message for details."* (Daniel). Unfortunately the request was not accepted by anybody.

Reflections

The LinkLocal project was particularly interested in combining messaging with temporal and spatial data across a group of active participants to support collaborative practices. To do this messages were associated with locative data (recording of longitudinal and latitudinal points with time stamps) and shared with others in the study. The project was interested in how this sharing of data could lead to social connections, and through requests for help could inspire to reciprocity [8]. The enquiry focussed upon two primary outcomes of the study: the adoption of lift sharing and the sharing of information across the network.

The user group involved in the study was diverse – some with cars, some without, and some in good contact with members, others who didn't know fellow members. These characteristics inhibited the app from facilitating any significant material sharing. The findings suggest that the participants used to app to manage through their existing bonding capital by using the app to communicate and share stories, but struggled to use the bridging capital made available through app to give or receive material help. Lampinen et al, point to the feelings of indebtedness that members of networks can feel as they enter online exchanges, and how this sense of debt can contribute to a resistance to forms of sharing [9].

Using locative data to constitute platforms like LinkLocal evidently isn't enough, there are significant social and personal issues involved in the development of reciprocity. The interviews suggest that participants struggle to grapple with the nature of receiving and asking for help across a digital network. Happy to share information about the area and keen to help, an exchange network never really began because few people would use the system to ask for help.

Future iterations of the application should better understand how to capitalise on the lopsided resource of having too many helpers and not enough people in need of help.

Whilst the application uses data in the form of a heatmap to visualise where people have been in the network,

perhaps the visualisation of successful exchanges would inspire more 'helpers' to help as the exchanges would appear as rewards. However it is the lack of jobs to help that is the more significant problem and in future studies the team could consider incentivising champions that can ask for help in order to kick-start an exchange platform.

Conclusion

"In one way or another, all [digital art works and environments] are concerned with possible relationships between the physical space and the virtual, and what distinguishes them are the balance between these two realms and the methods employed to translate one space into the other. Some artworks try to translate qualities of the virtual world into the physical environment, others strive to map the physical into the virtual; and yet others are aimed at fusing the two spaces."[7]

The three GPS platforms used as case studies in this paper provide insight into how different community groups are beginning to develop their own mapping databases. The unique nature of each of the smartphone apps was to discover what form of practice would benefit each user group.

The Mapping & Tracking project demonstrated how a bespoke use of an application can offer the personal ownership of drawings and an active control of development, such as invention of new methods of engagement with technology and games.

The Spatial Memories platform allowed participants to take ownership of their landscape through the generation of geo fences that were correlated with personal stories and media.

The LinkLocal app set out to use a spatial logistics platform for residents in a deprived area of Edinburgh to ask and offer help.

All three case studies, despite being limited interventions, establish precedents for the ways in which communities and specific user groups can begin to develop their own spatial databases. Counter to the dominance of FourSquare as the primary database for social coordinates that now informs third party applications such as Apple Maps, the projects presented in this paper have targeted groups to empower them to inspire them in the production of their own geo-spatial datasets.

The projects present a range of opportunities and barriers through their use. Whilst being very engaging in the development of personal data sets and documents of personal geographies, social conventions persist that inhibit the use of data sets to empower groups and individuals.

As the static map as a document or contract of power across space gives way to the database, artists and designers should work hard to develop strategies to empower the individual and group to realise the value of their data. Moving from the passive voice of being a mark on somebody else's map to realising that we are the map is a cultural challenge in which we need to learn how to exercise that power. A power that could invert the representation of space, time and people forever.

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