

Participate: Pervasive Computing for Environmental Campaigns

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Abstract. Participate was a three year collaboration between industry and academia to explore how mobile, Web and broadcast technologies could combine to deliver environmental campaigns. In a series of pilot projects, schools used mobile sensors to enhance science learning; visitors to an ecological attraction employed mobile phones to access and generate locative-media; and the public played a mobile phone game that challenged their environmental behaviours. Key elements of these were carried forward into an integrated trial in which participants were assigned a series of environmental missions as part of an overarching narrative that was delivered across mobile, broadcast and Web platforms. These experiences use a three-layered structure for campaigns that draw on experts, local groups and the general public, who engage through a combination of playful characterisation and social networking.

1 Introduction

This short paper aims to give a whistle-stop tour of the Participate project. At the turn of the 21st century we have become involved in a global debate about the nature and impact of climate change and our role as individuals and societies in managing this. To pursue this debate we must address three key challenges. We need to gather information about the environment on a greater scale than ever before, including scientific measurements, documentation of local conditions and accounts of people's behaviours [1]. We need to inform debate by conveying environmental knowledge in new ways that engage the widest possible audience. Ultimately, we will also need to persuade people to change their behaviour. Pervasive computing has the potential to play a unique and vital role in addressing these challenges. Networks of wireless sensors can gather data on an unprecedented scale, while millions of mobile camera phones can annotate scientific measurements with documentation of local environmental conditions [2][3]. Context-aware computing [4] can deliver environmental information in situ, engaging people at the most appropriate times and locations. Finally, a new generation of mobile experiences such as pervasive games that are interwoven with the patterns of daily life and our location may reach new audiences,

encourage them to participate, and persuade people to reflect on and change their behaviours. In short, we believe that pervasive computing can ultimately engage millions of people in mass participation environmental campaigns, raising awareness of environmental issues, supporting education, activism and democracy [5], and delivering environmental data on a scale never before possible. The literature demonstrates the breadth and depth of the research, relating to the new and rapidly evolving fields of pervasive, persuasive computing and their application to environmental-behavioural change [6].

2 Participate

There is an established history spanning more than twenty years of ‘big science’ projects in the UK in which broadcasters encourage the nation to gather data that is then distilled and fed back through television programmes. For example, the BBC’s annual Springwatch TV series harnesses the reach of television to recruit hundreds of thousands of people to record the first signs of spring in their gardens, each contributing to an evolving national map of climate change. The emergence of pervasive computing can greatly enhance such campaigns by enabling the public to document the world about them in far richer detail, while also delivering analysis to them in context, directly enhancing their understanding of a particular place or activity. Building on this tradition, Participate was a UK project that brought together broadcasters (BBC), telecommunications companies (BT), computing companies (Microsoft), artists (Blast Theory) and Universities (Nottingham) to explore the potential of pervasive computing to support widespread participation in environmental campaigns. Our collective aim was to explore how the convergence of mobile, online and broadcast media might enable a broad cross-section of the public to contribute to, as well as access, environmental information – on the move, in public places, at school and at home. We followed the approach of ‘research in the wild’ in which iterative public trials and observational studies of emerging technologies inform the generalisation of broader concepts and platforms. In the early stages of the design-cycle of the project we consulted with institutions such as the World Wildlife Fund and used information provided from the Energy Savings Trust in order to further understand the issues associated with behavioural change in regard to environmental issues. Throughout the design-cycle we also fed in the feedback that arose from the each of the trial stakeholders. We briefly discuss two of our first iterations that related complemented in different settings (Stories@Kew and Prof Tanda), while the second iteration drew these together into an integrated cross-platform campaign called Bicker Manor.

3 Stories@Kew

A way to engage people with environmental issues is through visitor attractions, which champion environmental themes. The Royal Botanical Gardens at Kew in London is one such attraction, combining a leading research centre working at the

forefront of conserving plant life worldwide with a major public attraction set in 300 acres of parkland. This provided the setting for our second trial, in which we explored how visitors could use mobile phones to access and create location-based media. Stories@Kew invited members of the public to explore Kew Gardens and discover bundles of media virtually located at key Points of Interest (POIs) distributed throughout the park. On discovery of a POI participants were able to view professionally created editorial material as well as user-generated content (UGC) from previous visitors, after which they were asked a question and prompted to publish their own stories in return. Two systems were trialed. Our 'low tech' approach used a Nokia 6630 mobile phone, a physical map and signage placed at each POI location. Once a user had made their way to a POI using the provided map they keyed in the number displayed on the signage in order to access the relevant media. This system also used a third party GPRS media communications service provided by Shozu to upload user-generated videos to a specified email account that was monitored by the production team. Our 'high tech' used a Nokia N73 paired with a TomTom GPS receiver. Approximately 130 groups trialed Stories@Kew. Our observations, interviews and questionnaires revealed that both the editorial media and UGC engaged users. Although UGC was generally accessed less than the editorial content, participants were typically still able to recall a favourite user generated video clip. We found that being able to view others' content was an important part of the creative content generation process, with participants referencing others' videos before creating their own responses.

4 Professor Tanda

Our second early trial focused on engaging individuals as they went about their daily activities rather than in the specific context of a classroom or visitor attraction. We created a context-aware game for mobile phones called Prof. Tanda's Guess-A-Ware [7] that attempted to build a picture of the player's environmental behaviour over a period of several weeks, inviting them to reflect on or even change their daily routines and to understand what explicitly motivated people to participate in environmental campaigns such as this. Prof Tanda is a character that lives on a player's phone and interacts with them for just a few minutes each day, asking them to answer questions, perform a task or share an activity with nearby people. He will typically initiate contact once a day, although players are free to contact him more frequently if they wish. He is portrayed, in a cartoon style, as being entertainingly egocentric; a quirky character who combines serious questions with playful ones, is obviously well informed about the environment, and yet is not infallible and is shown to have somewhat suspect tastes. His aim was to entertain players while also informing and provoking them, but without being patronising or preachy. Sessions exist such as Prof Tanda instructs a player to measure the amount of water they consume when taking a shower. The key to activities such as this is delivering them in context; that is at those moments when players will be able to engage in them (e.g., at home in the early morning when they might be ready to take a shower). Consequently, the game also

gathers context information to inform decisions about how to schedule activities for individual. The initial trial involved 30 players over two weeks, with feedback being gathered through questionnaires and system logs of interactions. In general, players reported enjoying their interactions with Prof Tanda, especially the use of humour and the way in which he engaged them in local activities: an aspect of the game that they would like to see expanded in future.

5 Bicker Manor

We carried forward the lessons we had previously learned into a final integrated trial called Bicker Manor whose goals were to: engage participants through narrative and character; encourage and direct them to undertake a wide variety of environmental activities, from casual information gathering to more significant experiments and interventions; and enable them to generate, contribute and share their own documentation of these activities. Bicker Manor was driven by an overarching narrative in which a fictitious family named ‘the Bickers’ provided the back-story for the experience and enabled players to share a common goal. Each member of the Bicker family had their own perspective on climate change. Michaela, the teenage daughter, guided participants into the experience and provided an overall and relatively neutral commentary on events, including showcasing the ‘best of’ user generated content. She introduced the campaign as a contest between her parents, Eve and Isambard, who offer directly contrasting lenses through which to view environmental issues. Initially, Michaela asks the public to “Pick a side. Will you pick my mum Eve with her green evangelist views or my Dad Isambard with his thrifty green sceptic ways? It’s up to you to decide.” When participants first sign-up to take part they are asked to choose either Eve or Isambard as their host character. Their choice directly influences their overall experience, as it affects the missions offered to them and the feedback they receive. At the heart of Bicker Manor are missions, the core unit of activity from which the narrative is built. Eve and Isambard set various missions that invite participants to engage in activities such as answering questions, taking photos or making videos. Daily Mini Missions maintain ongoing engagement through lightweight activities that can be completed almost immediately. In contrast, Mega Missions are set every four days or so and involve undertaking and documenting more significant challenges. Missions were delivered across three platforms: Web, mobile and Internet Protocol Television (IPTV) as shown in. The website was at the core of the experience and provided full functionality, enabling participants to respond to and complete all missions, view and rate user generated content, and manage their profile and friends lists. Participants were also encouraged to register their mobile phone, after which they could respond to missions via SMS and MMS, including uploading images and videos.

6 Conclusion

Participate's varied trials have demonstrated a multiplicity of approaches to public campaigns, environmental or otherwise, which might potentially involve many different kinds of participant and technology. Based on this experience, we propose a 'three layer' approach to structuring participation in such campaigns that focus upon the public, local groups and experts. We suggest that a successful environmental campaign needs to engage all three layers and develop synergistic relationships between them, as exemplified by our pilots. We have also explored various factors that might motivate these different participants to engage. Social interaction is clearly a great potential motivator, as seen in phenomenal spread of social networking applications such as Myspace or Facebook, YouTube and others over recent years, and reflected in our pilots through the popularity of sharing data and media with friends and groups.

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References

1. Burke, J.A., et al.: Participatory sensing. Presented at the World Sensor Web Workshop. ACM Sensys, Boulder (2006)
2. Honicky, R., et al.: N-smarts: networked suite of mobile atmospheric real-time sensors. Presented at the Proceedings of the Second ACM SIGCOMM Workshop on Networked Systems for Developing Regions, Seattle, WA, USA (2008)
3. Mainwaring, A., et al.: Wireless sensor networks for habitat monitoring. Presented at the Proceedings of the 1st ACM International Workshop on Wireless Sensor Networks and Applications, Atlanta, Georgia, USA (2002)
4. Schilit, B., et al.: Context-Aware Computing Applications. In: IEEE Workshop on Mobile Computing Systems and Applications, Santa Cruz, CA, US (1994)
5. Joki, A., et al.: Campaignr: A Framework for Participatory Data Collection on Mobile Phones (December 18, 2007), <http://repositories.cdlib.org/cens/wps/770>
6. Froehlich, J., et al.: The Design of Eco-feedback Technology. Presented at the ACM Conference on Human Factors in Computing Systems, Atlanta, GA, USA (2010)
7. Chamberlain, A., et al.: Professor Tanda: greener gaming & pervasive play. Presented at the Proceedings of the 2007 Conference on Designing for User Experiences – ACM DUX 2007, Chicago, Illinois (2007)