

Urban Social Tapestries

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Urban Tapestries is an exploration into the potential costs and benefits of public authoring, that is, mapping and sharing of local knowledge, memories, stories, sensed information and experiences. It aims to reveal the potential of pervasive computing to create and support relationships that surpass established social and cultural boundaries and enable the development of new practices around place, identity and community. UT was conceived and initiated by Proboscis, an artist-led studio, in 2002 and since then further developed in collaboration with several technical, academic and civil society partner organisations [6, 8]. The core enabler of the playful experiments conducted within UT is a pervasive computing platform developed specifically to support public authoring in its many expressions.

Public authoring implies a rift with the concept of a publicly authored knowledge in the traditional way—in which information is passed from a centre to the margins as generally encountered in the broadcast model of newspapers, television and radio. In contrast to the passivity and narrow focus of this model, public authoring suggests an alternative *experience commons* where people are presented with the opportunity to be agents, actors and authors. In this sense, UT has an intimate relationship with practices of participatory or citizen's media: alternative and community radio, television, fanzines and other print media have similar aims with UT [3], and more recently, BBS, Indymedia and of course blogging, which is perhaps most reminiscent of the public authoring framework, also use technology to enable content production and distribution through public participation [1].

Rationale and objectives

Public authoring was initially proposed as a counterpoint to the prevailing view of cellular mobile and location sensing technologies of the early 2000s that saw the tourist as the principal general user of such technology. But if most people are only tourists for a couple of weeks of the year, what location-sensitive services are being devised for the other fifty weeks? The answer seemed to be mobile advertising, spam, and coupons for loyalty card type services triggered by presence at a particular location. This vision is unnecessarily impoverished and we undertook to explore what it was about local places that mattered on an everyday basis to people as they went about their very mundane routines of daily life: going to school, work, shopping; dealing with neighbourhood issues, planning, access to local services and so on. It soon became apparent that the most knowledgeable people were also those who would be considered the consumers of such information by the traditional view adopted by broadcast media. True daily life is richer and more complex, relying as much on social networks, personal experiences and chance interactions and connections, and pervasive computing applications should attempt to reflect this richness and complexity.

At the core of such diverse everyday activities lies social knowledge, a term used in UT to refer to the passing communications that are the glue of society and communities: the everyday and essential sharing of information, stories, knowledge and memories with friends, family, neighbours and strangers. Social knowledge posits communication as storytelling, a social and cultural practice that is not just informational or practical. It is a term that attempts to indicate the broad variety of human activities, concepts and ways of being social. Seen from another viewpoint, social knowledge is the hidden or obscured resources and assets of a locale or of a community – created between and around people as they go about their daily lives. From early on UT sought to define more clearly what constitutes social knowledge, to articulate its significance and to make concrete what can often appear ephemeral or intangible as something that has intrinsic value within a context of locality and community, if not a clear relation to monetary value. In fact, the more deeply embedded such knowledge is, the harder it is to gauge its value. Public authoring as implemented by UT offers a means to expose this knowledge and the social networks that support it.

The practice of public authoring can offer opportunities to individuals and groups to intervene in situations that have previously been tightly controlled. An example of this might be a museum or gallery where interpretation of the works displayed is the preserve of the curators and experts employed by the institution. With public authoring one can easily imagine alternative interpretations digitally annotated that challenge an institution's position and which the institution would not permit being voiced or written within its physical domain. Another example is offered by the UT *Eyes on the Street* project: Residents of the Havelock Estate in Ealing are engaged in public authoring with a view to employ local knowledge to support the operation of a tenant organisation that aims to take over the management of their estate. This implies that a public authoring approach may provide unique insights by creating a record of living that far exceeds what is

possible through the typical estate management services. Such activities should not necessarily be seen as threats to established authoritative sources of knowledge but rather as people's desire to participate.

To foster the development of public authoring UT was designed around four principles:

- *Content co-creation.* UT relies on the co-creation of its own content by the people who participate in sharing it, rather than the consumption of mass-produced content offered by media organisations. Essentially it is another form of personal communication, differing mainly in its link to geographic places and the public nature by which it is shared.
- *Organic growth.* Publicly authored content grows and fades with time, at the pace set by the people who participate in it. It adds persistence to local memories and knowledge that otherwise might completely disappear. It reflects the complexities of the world we live in and does not attempt to simplify it or to replace any aspect of our human interactions.
- *Decentralised operation.* Maintenance and distribution of publicly authored content is carried out over a cooperative and largely anonymous service fabric. The sharing of pervasive user-generated content that people consider of interest to others is supported by a network of peers and depends on trust networks, risk and chance for its validation.
- *People-centric functionality.* UT assists and augments everyday life rather than seek to replace any aspect of it. It is the trigger for social encounters and enables participation in social and community activities. As such, priority is given to those facilities that empower individuals and communities rather than those dictated by engineering constraints.

The UT experience

According to public authoring, users are both authors and consumers of media. In UT, users as authors go about their everyday activities as they usually do, but whenever they wish to add new content they do so using their mobile phone. This task is facilitated by the UT client (see Figure 1) that displays the current position of the user so that she can mark the boundaries of the specific location that the published content relates to—thus creating a so-called *pocket* (of content). Then the user adds media to the pocket, which can be text, sound, images or video. Pockets can be persistent or can be set to expire after a short period of time. Time limited pockets are a means to create digital street graffiti that enables users to leave messages tagged to locations.



Figure 1. The Urban Tapestries client interface: (a) exploring all existing threads at a specific location, (b) selecting the location of a new pocket, and (c) browsing a location using the latest Java-based client with Google maps (2007).

When pockets share a common theme, for example historical, personal or a practical topic, authors can link them together into pocket-sequences to create so-called *threads*. Threads and pockets are made public on UT and are shared with other users of the system. By weaving together the different threads authored and published by all users, UT effectively creates an accretive information tapestry overlaid on the urban fabric (see Figure 2). Subsequently, users as consumers of content can search for, browse and access content published by other participants, also using the UT client application on their mobile phone. For example, they can search for all available pockets in their immediate vicinity and select one that belongs to a thread with a theme that interests them. They can then join the thread and follow it across the city, thus consuming the content produced by others. Pockets also support a rating and commenting system whereby users may express their opinions or comment on existing material

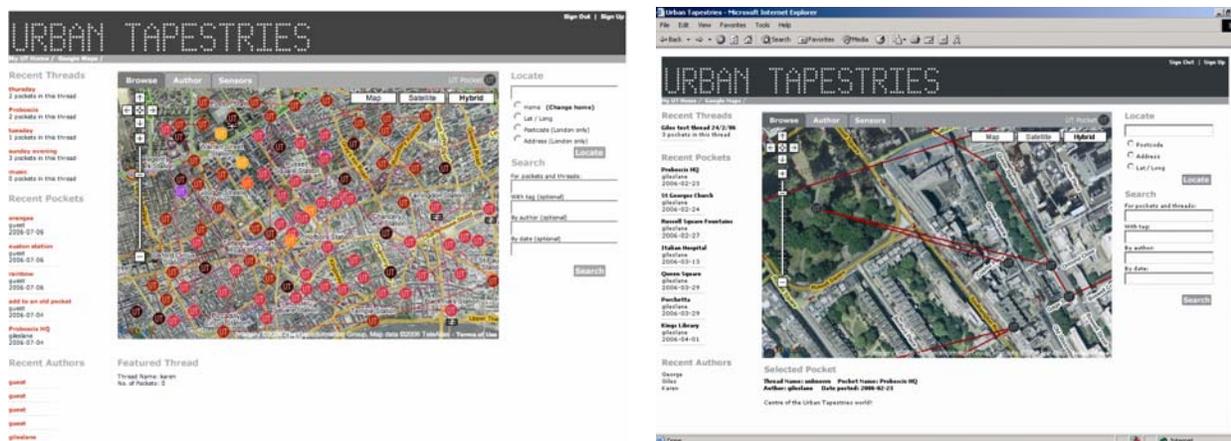


Figure 2. Urban Tapestries thread browsing interface for the web: (a) viewing all threads, and (b) following a thread around Russell Square in London.

To offer a specific example of how pockets and threads are used, consider a thread across Bloomsbury about the rich literary history of this downtown London neighbourhood. One pocket in this thread could mark the house of Virginia Woolf at 46 Gordon Square and hold a picture of the building as it stands today as part of Birkbeck College taken by the author of the thread on her way to work using the UT client on her smart phone. This pocket could also contain a hyper-textual annotation and an audio clip—also recorded using the UT client—reminiscing a memorable evening spent reflecting on the nature of perception while reading “To the Lighthouse.” Another pocket in the same thread could be placed at the Elysée Taverna off Tottenham Court Road, where George Orwell used to enjoy dinners with his companions. This pocket would hold a picture of the infamous reproduction statues by the entrance of the restaurant and text commenting on the current use of the property as one of the few remaining plate-smashing Greek music venues.

In its broadest form, UT enables the sharing of socio-cultural meanings embedded in or associated with place through the publication of user-generated threads. UT invites people to get involved in negotiating place and their own spatial practices thus enabling a user-generated articulation of meaningful or interesting behaviours. UT realises the translation of space into place in that it is designed to reveal the layers of presence in urban environments across time. It allows individuals and communities to communicate and understand the intimate knowledge that makes a place home or conversely, what makes it not home; to share what parts of the landscape hold meaning for people; and reading the individual markers people use to make sense of the city. Moreover, UT enables the exploration of the social, historical and tangible materials that define the social qualities of place and the repository of the largely invisible pathways left by urban occupants in order to better understand the identities and specificities of place – what we refer to as *urban social tapestries*.

Since its initial design UT has evolved to reflect the rapid developments in pervasive computing and our developing understanding of everyday public authoring practice. Several sub-projects have been developed within UT notably, Feral Robots, Snout and Everyday Archaeology, to focus on particular aspects of public authoring and taking different points of view for example, learning, entertainment or community building. Since it is not possible to report on all developments here, in this article we aim to highlight the main lessons learnt and record our changing perceptions, priorities, interests, and the current state of UT. That is not to say that we are not aware or appreciative of parallel avenues of exploration followed by other researchers and groups in this area but rather that we wish to use this opportunity to share the experience of UT and communicate the insights into the practice of public authoring.

Constructing UT

UT has been designed as client-server architecture with the UT server constructed as a peer-to-peer federation of content repositories established and maintained by independent organisations. UT clients are pervasive computing devices that associate and communicate with servers via well defined service access points and protocols. The first version of the UT platform was developed in 2002-2004 using proprietary APIs, and was subsequently redesigned and redeveloped from scratch during 2005-2007 as an open source system. The current version is implemented in Java on top of PostgreSQL (with some PostGIS extensions) and Apache Tomcat, with web service interfaces to clients supported through AXIS SOAP and a custom Java Servlet implementation. Flexible data management and object-relational mappings are provided by Hibernate ORM. This version was developed with a view to support the rapid development of new client services tailored

to a variety of non-mobile phone pervasive computing devices for example the Feral Robots toy data harvesters and the Snout participatory sensing garments [7].

The latest version introduced new functionality to pockets and threads. Pockets of different shapes are supported including arbitrary free-form polygons, and have a content-aging property so that they can expire after a period of time selected by the user. Pockets can also record user comments and ratings in the blogging style. User group-based access control has been extended to threads and a categorisation scheme has been introduced for thematic classification of pockets and threads. Moreover, a significant performance enhancement has been introduced in meta-threads which provide aggregate thread classes in a single object reference. System logging and usage analysis has been extended and thread-related RSS feeds can be published to subscribers. GPS tracks, a new data primitive, were introduced to support sensor data in addition to the usual user-generated media content.

The latest UT smart phone client is implemented using Java mobile MIDP 2.0. Several additional J2ME interfaces are used to provide the facilities required by UT including JSR75 to support reading and writing files to persistent memory; JSR135 for interacting with web services; JSR82 for Bluetooth connectivity to external devices including standalone GPS receivers; and JSR179 is used to manage location services for example GSM beaconing. Maps are retrieved on-demand using the Google maps API.

There are also two web-based interfaces: a simple Macromedia Flash application to visualise threads and a richer Javascript-based application that can be also used for authoring. More recently, we have developed an open source hardware and software sensor network platform to support participatory sensing in UT, which was employed in the Feral Robot and Snout experiments. UT threads and pockets can be extracted to Google Earth through a semi-structured process and can be printed as hard-copy foldable storybooks or story-cubes using the DIFFUSION generator (see diffusion.org.uk).

Exploring UT

From the start UT sought to develop a people-centred approach into the design and development of its pervasive user-generated content platform. To understand the structure of public authoring and its implications three research methods were employed namely, experimental ethnography, bodystorming and public field-trials. Bodystorming workshops focused on playful experience design while in public system trials we adopted an iterative approach in refining the UT client interfaces. Social scientists involved in UT developed a so-called experimental ethnography approach that involved a methodological triangulation of participant observation, phased interviews and experimentation. Although complementary, these methods are also contrapuntal in their points of view and offer particular insights into public authoring [10]. All studies were conducted in or around Bloomsbury with participants drawn from the local communities.



Figure 3. Conducting UT Bodystorming workshops. Left: public authoring on a large map of downtown London. Post-it notes are used to represent pockets (hand-written text and images) and colour is used to link together threads. Right: A table-top version of bodystorming at the community centre. In addition to pockets and threads, the user interface of the client application is also tested using a paper-based prototype.

UT employed bodystorming workshops [9] as a tool to explore the social, cultural and practical dimensions of technological concepts and tools. These sessions focus on the specifics of public authoring, in particular on identifying the kinds of annotations that could be shared and the steps required for their publication. Participants created threads and pockets using colour-coded post-it notes on a large map (20 ft x 20 ft) of Bloomsbury (see Figure 3, left). Starting with

hypothetical scenarios of use, participants are invited to act them out in a series of workshops with people from many different walks of life, including several with a local community centre (see Figure 3, right). These studies demonstrated the limitations of single-instance interfaces and interaction. This was understood to be due to the fact that user-generated content comes in different formats and processes of articulation and having just one or even two ways to share it with others is far too limiting for most people to engage with.

Two open public field trials took place, the first using the initial PDA-based prototype in December 2003 and the second lasting for four weeks during June 2004 across central London using version one of the mobile phone prototype. Individual UT sub-projects run their own trials investigating specific aspects of public authoring including the Feral Robots trial in February 2006 and the Snout community events in 2007. Over the past five years more than one hundred people have used some version of UT in different neighbourhoods of London and participated in a trial or other event. Their experiences were collected and used as feedback and to guide the development process. Especially when users carried the UT client over a period of days or weeks, they were asked to record their experiences online and their writings and reflections were also captured in this way.

Participants in the experimental ethnography studies were selected for their relationship to Bloomsbury between residents, commuters, occasional visitors and tourists. Initially, they were asked to fill-in questionnaires to identify their relationship to technology including their computer skills, the degree of dependence, the levels of importance and the ways in which they value their communication technologies. The second phase of the process was a detailed briefing about UT and its capabilities, which was followed by an in-depth interview on their relationship with Bloomsbury and how they communicated with and between their social networks in or out of these locations. This was followed by a walking tour which the researcher took together with the participant and closely observed their use of UT. For the first part of this walking tour the researcher and respondent first explored existing UT pockets. Respondents were not instructed what, when or where they should start making their own pockets, but when they did, the researcher departed to allow the respondent to author their individual content. Finally, the study concluded with an interview, where respondents were asked to talk about their experiences with UT, where they went, what their pockets were and how they decided what to include in their threads. This section of the interview also probed respondent's vision of the future.

Lessons learnt from UT

Our studies of public authoring with UT through experimental ethnography [10], bodystorming and public field-trials [8] revealed a number of interesting observations related to pervasive user-generated media and the practice of public authoring.

Place, space and the spatialization of user-generated media. UT acts as the catalyst for users to express their embedded knowledge and illustrates their "views from somewhere." In this case user views were firmly grounded in Bloomsbury and local experiences of community and place. To be sure, the concept of threads appears to be particularly effective in providing a conceptual model to record and organise such place-specific user-generated content. Visualization of the UT knowledge commons by overlaying the threads of all users on the urban structure facilitates the exploration and distribution of the produced media. It provides a unique opportunity for participants to reflect upon place and experiment in a way that they have not experienced elsewhere. In these respects, the way UT has elected to construct representations of pervasive user-generated content seems to provide useful mechanisms for both production and consumption of media.

Participation. People who participate in UT re-interpret popular culture into more intimate and meaningful ways. But public authoring practice goes beyond this, by also enabling creative expression and encouraging participation in culture and through it in technology. We believe that UT is one if not the first expression of place-cognisant user-generated media enabled by pervasive computing that question the dominant model of broadcasting and proposes to rebalance cultural production towards public participation. Even those participants that, whether due to the technical unfamiliarity, sensations of technological saturation or even outright distrust of new technologies are more reticent, they nevertheless speak about what they do with UT, about their experiences of locality, of home, of their relationships with technology and their perceptions of UT in ways that are both rich and engaging. Users of UT view the experience of public authoring as an enjoyable one—a finding we suggest means that UT is fundamentally a playful technology and in this way promotes participation.

Construction of public space and socialisation. The practice of public authoring appears to also facilitate the tracing, negotiation and marking of individual and collective boundaries. As boundaries and dividing lines are mapped, new levels of exclusion and inclusion are created. Participants in the study engaged with different navigational tactics depending on their relationship to Bloomsbury, and used UT to place themselves in their localities – or as some theorists would argue – to claim ownership over their territories. Then again, UT can support group activity through alternate modes of

socialisation where people have different tasks for example, one group (seniors) have the stories, and another group (youths) have the time and inclination to work the technology. Not only do different age groups have different technological capabilities, but they also have very different motivations for sharing memories and knowledge. For seniors it is not as important that other people have access to the stories and memories they share, but that they come together regularly to share amongst themselves. In fact, the sense of community created by the practice of public authoring in the here and now is surprisingly stronger than the capability to leave memories as traces of their presence in the city.

Reflections on media studies theory. Several of the ideas developed in UT have an intimate relation to the work of theorists of the urban and the everyday (for a readable overview of this area refer to [5]). This is due to UT raising questions about the relationship of space, time and the social, which force a re-examination of our assumptions about the city and media consumption. These ideas seem to fit particularly well within the frameworks of production of space and place as discussed by Lefebvre and de Certeau in that they also view movement through the city as integral to its experience [4]. Of particular relevance is the similarity between the way de Certeau views the process of re-appropriation of cultural processes by the everyday person to construct their ordinary life as one of a constant struggle to re-use traditions, language, symbols, art and articles of exchange and the practice of public authoring. Indeed, the latter can be seen as a practical way to support the former through the process of producing and sharing pervasive user-generated content using UT.

Urban computing and UT. UT enables encounters with particular types of urban inhabitants and allows observation of their spatial practices. Some of these reflect behaviours of conceptual stereotypes including Guy Debord's *dérive*, the situationist practice of "unitary urbanism" and Georg Simmel's concept of the "stranger" [8]. Walter Benjamin's vision of the city walker, the *flâneur*, and the ability of technology to make the invisible visible are also directly related to public authoring practice [10]. Thread visualisations overlaid on the city map in particular create direct associations to Lynch's city as the experience with districts, edges, paths, nodes and landmarks, and their relational properties [4].

User-generated content and system evaluation. Bodystorming sessions in particular highlighted the role of creating continuous feedback loops to incorporate responses in the software development process. One effective way to do this in the spirit of sharing user-generated content is by putting all the material into the public domain to stimulate informed debate and to share insights. UT maintains a creative lab and public forum, where diverse experiences, event documentation, films, research notes and articles are published, seeking to engage the public in a dialogue about public authoring. This approach was extended to the system trials which employed blogs to capture and immediately disseminate the experiences of the participants.

Conclusion

Urban Tapestries set out to explore locative pervasive media taking an approach that puts users at the centre of production. This break with the typical view of users only as recipients has been well received and has inspired other investigations to follow a similar approach. We believe that UT has succeeded in revealing the potential of pervasive user-generated content to create and support relationships beyond established boundaries and enable new practices around place, identity and community. Several aspects of UT are yet to be explored notably how its use changes within differing spatial context.

Unlike other research projects UT attempts not only to record but rather to effect change. UT has developed today into a comprehensive interdisciplinary research programme, which opens up the questions first considered here, to investigate the potential of public authoring for education and learning, people and the environment, and citizenship, neighbourhoods and public services. In the spirit of public authoring, participation in this debate is always welcome and facilitated through the project website, forum, and discussion lists.

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