Integrated Project on Interaction and Presence in Urban Environments

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Demonstrator of City Tales Applications

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Table of Content

Abstract

This document provides an overview of the research and development activities undertaken in the City Tales work package of the IPCity project. City Tales concentrates on the HCI (Human-computer interaction) aspects of presence through a range of ubiquitous technologies and systems. Two systems are discussed Bärlin, which is a story telling bear and StreetBeat which is a mobile application about the sub-culture of Berlin. The report discusses the design of these systems, some early prototypes and exploratory studies.

Intended Audience

This document is intended as a public document to introduce city tales mixed reality applications. This purpose for this document if to provide a summarized and structured presentation of the IPCity city tales applications planned and developed within the first year of research to other interested researchers and user interface designers.

1 Workpackage Objectives

Objectives Phase I	• Enable the creation of user generated mixed reality content for large audiences • Simplify mixed reality applications in order to make them accessible to as wide an audience as possible • Explore the **HCI** (Human-computer interaction) **aspects of presence** and **place** and more specifically mixed reality. • Design user interfaces that are **easy to use** and easy to understand, that meet the needs of the intended users and that **support users in procuring mixed reality content**. • Storytelling aspects are the purpose the tasks that a user is asked to fulfill and not the main aspect of City Tales. The **main aspect** is the way in which **story telling.** • One of the driving research aims within IPCity is **enabling user to create a mixed**.
Results Phase I	• Two deliverables, one focuses story telling and the other on story browsing. • Two early technology probes • The focus on sense of place research for the initial research of city tales enabled us to create interesting narratives and enhance the user's sense of immersion. • Define an overall technical approach and provide technical requirements for WP 4&5 for the 3rd prototype "Leo's Adventures" • Define a common mission and integrate the concepts from across this work package. • User Interface design for a second story telling tool.
Evaluation Results Phase I	• Results from our initial evaluation using the early technology probes are as follows: o Use existing and known mediums to encourage mixed reality story telling. o Create simple user interfaces with few options (e.g. a step by step web based interface with a number of animation options and the option to upload a video or use default videos) o Create browsing technologies which are based on what is already available (e.g. on a Sony Ericsson phone or a PSP with GPS adapter) and utilize existing technology or channels. o Do not scare users with modern hardware it will detract them from the actual task.

	• The technology functionality was evaluated during several sessions using an iterative approach where we tested the application in a real scenario and then carried out bug fixing. • Two small scale field trials were conducted: o Bärlin: story telling event which involved: one mother and one child and one story (see details in section 2.1) o StreetBeat: browsing event where we tested the application during 3 different sessions on 10 individuals (on test explore presence and some early results can be found in 2.2)
Objectives Phase II	• Develop measures and tools that encourage mixed reality content creation. Explore how we can create an atmosphere and natural approach towards mixed reality content creation for “ordinary” people. • Identify the appropriate metaphors and tools for the intended target groups • Create a web based story telling tool “Leo’s Adventures” as an integrated application building upon WP4&5 infrastructure and tools provided. Utilizing the Web 2.0 user generated content trends • Create one common mixed reality story storage system • Forster mixed reality story telling based on the developed story telling tools developed as part of City Tales phase one.

2 Field Studies and Initial Concept

2.1 Early Technology Probe

An early pilot study was conducted at a Sony DADC manufacturing plant outside Salzburg. The study was conducted on the day of the summer party when in addition to employees young children and many non-technically minded adults were present. A small area (see Figure 1) was set aside where we tested some traditional AR technology (via head mounted displays) using two technology probes one covering augmented memory (see Figure 2) and the other based on an augmented reality music application.

Figure1: Booth

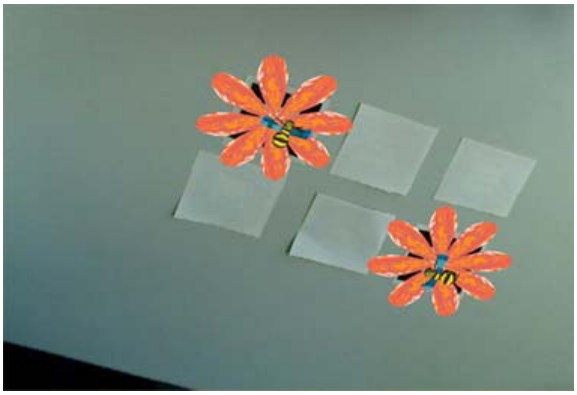


Figure 2: AR Memory

2.2 Early Technology Probe Conclusion

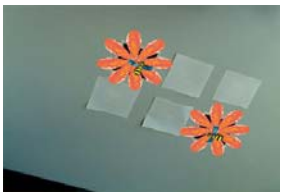
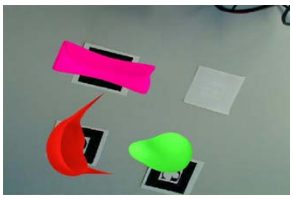
Results from the study indicated that the users would prefer one unified interface as they were confused when presented with two interfaces i.e. one for visualization and the other for marking. Users wanted to look at the markers rather then in the monitor and when using the data glasses. Moreover, a lot of the participants took a long time to get used to the technology and due to health concerns most parents didn't want their children to try the glasses, This led us to the conclusion that we need to develop technologies which are less complicated and scary for the end users, especially when targeting very young people.

Testing the technology in an exhibition style environment was not suitable, as users need to get used to the technology, the technology is quite invasive and finally telling stories in such settings is difficult. We found that the small children responded well as they used their imagination and were not so interesting in finding out what exactly happens behind the scenes. They just played the game and looked at the bee and used their imagination to fill in what ever they thought was missing, however it was noted that they may have responded better if they only had to contend with one interface.

This test helped us to further define the AR story telling user interface and based on the tests we identified the following objectives:

- Use an existing and known medium to encourage mixed reality story telling.
- Create simple user interfaces with few options (e.g. a step by step web based interface with a number of animations options and the option to upload a video or use default videos)
- Create simple browsing technologies that are based on hardware that is available on the market (e.g. a Sony Ericsson phone or PSP with GPS adapter) and utilize existing technology or channels.
- Do intimidate users by using modern hardware as it will distract them from their actual task.

2.3 Technology Probes Specifications

Hardware and OS	• PC • 6 markers • One USB camera • One large monitor
Software	ARToolKit
Core Features	AR based small scale prototypes to test applying AR in a very familiar setting e.g. playing Memory and see if and how the mixed reality features influence the way in which a user approaches the known functionality.   AR Memory AR DJ (Sound mix with 3D symbols)
Test users	35 kids aged 4-10 tested AR Memory 20 teenagers 11-16 tested AR DJ Passers by at a Sony DADC Summer party.

3 Initial Concepts

City Tales concentrates on the HCI (Human-computer interaction) aspects that are related to presence. We are designing user interfaces that are easy to use and easy to understand, that meet the needs of a non technical users and that support such users in producing and browsing mixed reality content. For City Tales the way in which the user is creates a mixed reality story and the way in which the user browses the content is the core research interest and will drive all other related research aims and functionalities.

All the city tales concepts are integrated through once common mixed reality content database see figure 3 that will host all city tales related stories and will be used for experiencing content via mixed reality content browsing tools.

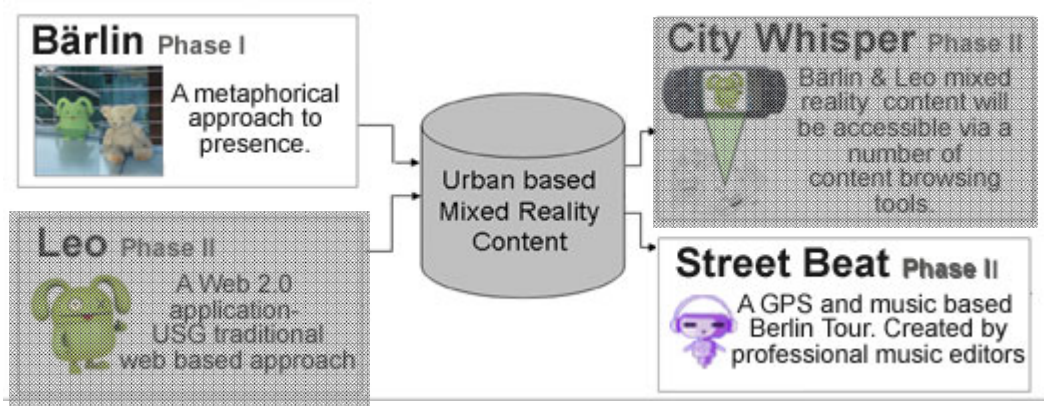


Figure 3: Integrated Concepts

City Tales will be adopting a phased approach. The initial phases focused on one story telling “Bärlin” and one story browsing “Street Beat” prototype.

The second planned prototype “Leo’s Adventures” will allow the end user to create mixed reality content via a simple Web based tool, here we will use modern Web 2.0 designs. The final prototype “City Whisper” will be a large public event in an urban environment (probably Berlin). Here all produced content will be exhibited at the locations at which the stories were told or at the places that are featured in the story.

4 Related Work

Existing research into presence has primarily been related to virtual environments, games, avatars and mobile phones. Although these areas are relevant to the development of mixed reality systems there are also a number of challenges, ranging from how to identify the attributes of a mixed reality system which enhance presence, through to understanding the underlying theories which relate to presence in mixed realities.

4.1 Presence in Virtual and Mixed Environments

One of the more common high-level definitions of presence is “the subjective experience of being in one environment even when one is situation in another” [1], this definition assumes there is a clear division between presence in real and virtual (or mixed) environments. In mixed reality contexts this contention is not quite so clear as the user is simultaneously experiencing real and computer generated cues. In many ways research within the IPCity project aims to create a unified sense of presence where the end-user is unaware of the computer generated augmentations, which in many ways is closer to the definition by Lombard and Ditton [2] who defined presence as “the perceptual illusion of non-mediation”. As graphics and other systems improve then questions will need to be asked as to when it is important to inform the user of this distinction, particularly when health and safety issues arise.

There are also varying types of presence which are relevant to the work within IPCity, these are: physical, social and co-presence [3]. Physical presence is when someone feels they are physically somewhere. Social presence is when they feel they are with others either locally or remotely and finally co-presence is when someone feels they are co-located somewhere with someone else. In both showcases the objective is to replay stories of the city, either from the perspective of its inhabitants or music journalists to end-users. When the systems and stories are combined the objective is to allow the end-user to experience the city and its inhabitants from the perspective of the story teller. As a result the work in here is primarily concerned with physical and social presence.

At a physical presence level the idea is to create new places in mixed reality which through a combination of sound and graphics can make people feel as if they are actually experiencing the story as written by the author. In the context of Street Beat and Bärlin this literally means taking them to the actual location but asking them to suspend reality for a while and for example to imagine what it is like in White Trash - a busy club night during an event. In many ways this is closely related to creating a sense of place (a theme discussed in a later section), even if they are not able to actually enter the building. It is therefore important to consider how the narrative, sounds, graphics and even the user interface can assist in making people feel present within the story.

Among the important questions from a social presence perspective are (1) Does the user feel socially present with the author of the story or the narrator? (2) Is it relevant to consider social presence in this context? (3) Does understanding social presence allow us to improve the overall end-user experience? (4) Does the end-user feel socially present with other people who appear as part of the story, for example in a club with other clubbers or musicians? (5) If it is relevant how do we apply such knowledge to improve the design of the City Tales show cases?

In contrast with the traditional view of presence in a virtual reality context, where the user is typically seen as only the person experiencing the finished environment some of the systems in City Tales rely on user generated content in order to create a sense of presence.

Therefore it is important to consider presence issues during the content creation phase and where possible to “scaffold” authors in a way which will improve the sense of presence of the end-users. For Street Beat this is comparatively simple as only one author is involved and through a cycle of evaluation and improvement it should be possible to provide a rich experience for end users, in which they can enjoy a sense of presence. However for the systems based on user generated content (Bärlin) there may be a need to provide a “scaffold” for the content developers which will enhance the sense of presence end-users experience when trying out the stories.

4.2 Elements of Presence

In addition to the definitions and types of presence it is also important to review the elements of presence which are relevant to the design of mixed reality systems. Although there is much debate on what constitutes presence a cursory examination of the literature would suggest it is related to aspects such as: engagement, immersion and affordances. Engagement is when someone is focused on a particular activity within an environment. Immersion is the feeling of being completely inside an experience and affordances, where the environment affords certain actions. It is important to note however that immersion is not presence, for example it is entirely possible to be immersed in a virtual environment and not be feel physically present in the experience. Likewise in mixed reality it is perhaps true that people are always immersed in the chosen location, but are not present in the overall mixed reality experience. Affordances are related to what the user can carry out in the environment, for example picking up objects and interacting with them, it is also related to more classic HCI issues such as the naturalness of the interactions. Providing the users with a sense of immersion in the City Tales stories is one of the key requirements. Laura Ermi and Frans Mäyrä [4] the following analysis on player immersion within games which provides a set of issues which, when combined with higher level presence issues should be considered when developing the city tales applications.

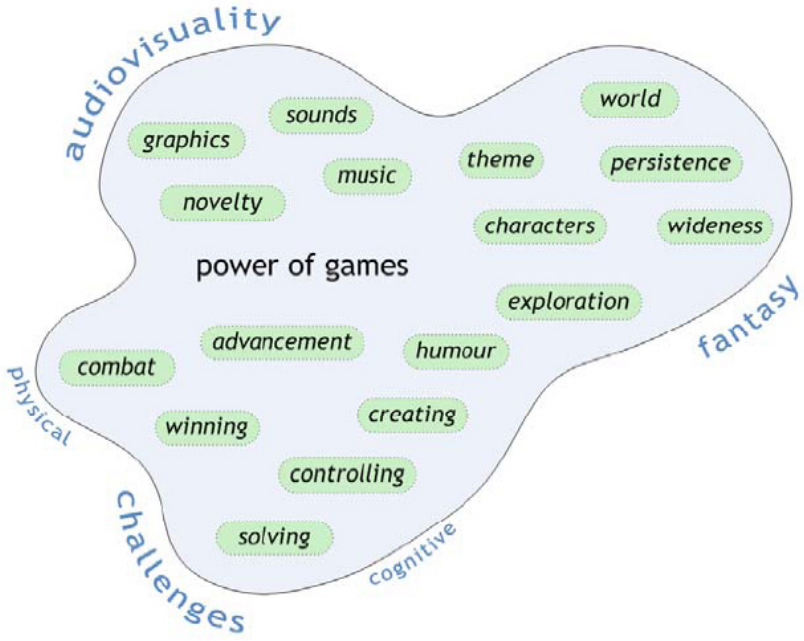


Figure 4: Player Immersion from "Fundamental Components of the Gameplay Experience: Analysing Immersion"

4.2.1 Place

While classic presence research seeks to make people feel present somewhere, the work within City Tales seeks to make people feel presence in a particular place, or more specifically a view of a place which the user is sharing with the content creator. This means it is important also to explore the notion of place with respect to presence. Relph describes place as:

"…the static physical setting, the activities and the meanings – constitute the three basic elements of the identity of places. A moment's reflection suggests that this division, although obvious, is a fundamental one. For example, it is possible to visualise a town as consisting of buildings and physical objects, as is represented in air photographs. A strictly objective observer of the activities of people within this physical context would observe their movements much as an entomologist observes ants, some moving in regular patterns, some consuming objects and so on. But a person experiencing these buildings and activities sees them as far more than this – they are beautiful or ugly, useful or hindrances, home, factory, enjoyable, alienating; in short, they are meaningful."

In short Relph [5] defines a sense of place as:

- Physical properties: e.g. buildings, people, and furniture.
- Activities: e.g. walking, reading and sitting.
- Meanings: e.g. fun, boring, sad.

Therefore place can be seen as an important element in order to enhance the sense of presence as it seeks to elevate the experience of the user from beyond the physical experience of the environment to one where they have a higher-level experience.

4.2.2 Industry Trends

User Generated Content (UGC) is a term that has been used to defined web publishing and new media content production circles. The content is produced by users and no longer only by traditional media producers such as broadcasters and production companies. It reflects a new form of media production through novel technologies that are accessible and affordable. These include digital video, blogging, podcasting, mobile phone photography and, of course, wikis. Prominent examples of websites based on User-Generated Content include e.g. YouTube, Flickr, and Wikipedia. Web producers have shifted towards creating facilities and framework for non-media professionals to publish their content on the WWW.

User-Generated Content has changed the internet, it opened new trends in urban lifestyle, it created new business opportunities and it created new users groups in a word it democratized the web. City Tales will use this trend to make Mixed Reality more visible and accessible to the average web user. It's main goal is to create easy to use and attractive user interfaces that will created missed reality content.

5 Year 1 Demonstrator

During phase one we created the following two demonstrators. Bärlin, a content creation tool and Street Beat, a content browsing tool. Figure 5 shows the two demonstrators developed during year one in relation to the planed infrastructure.

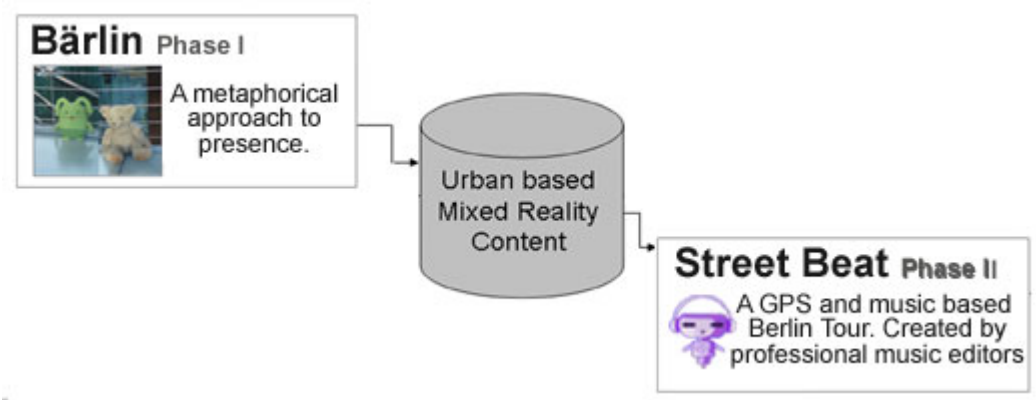


Figure 5: Year one Demonstrators

5.1 Bärlin

Bärlin is metaphorical approach to presence it tangible user interface that allows content creation for everyone. All the user has to do is interact with a Teddy. Hidden technology and a simple button enables the user to film themselves or the things around them by simply handling the doll. The Bärlin prototype will transform a children's toy into a tangible mixed reality user interface which will enable children (aged 3-10) to create mixed reality content in a playful way using hidden technology. Our aim is to test novel forms of user interfaces and human/machine interactions. The video content produced by "Bärlin" will be compared with traditionally generated videos in order to evaluate the benefits of producing content via tangible user interfaces. Figures 6,7 and 8 provide impression of the dolls used and the aesthetics of the videos produced with the dolls.

Figure 6: Bärlin

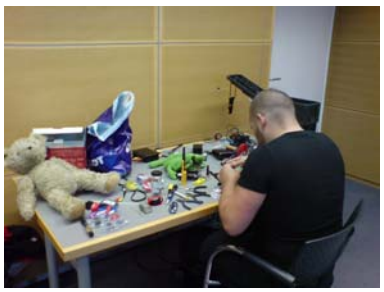


Figure 7: Assembling the Toy

Figure 8: View of a Bärlin Video

5.2 Orchestration

One of the main interfaces provided by the City Tales project is a simple user interface called the "Bärlin Catcher" which allows any user with limited PC knowledge to create a game. The PC user interface utilizes the VLC player (in the background) to record the video based stories that are told to the doll. The UI, see screenshots below allows the creator to start, stop and restart the recording mode and the video are automatically stored to a certain folder on the PC and names the video file automatically. Figure 9 and 10 show the simple PC based recording tool and figure 11 shows the standardised filing system that is automatically generated.

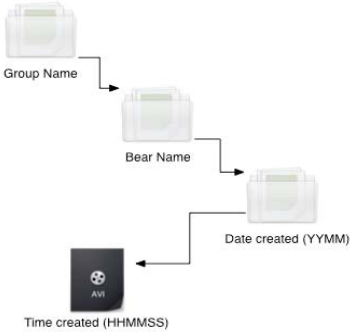
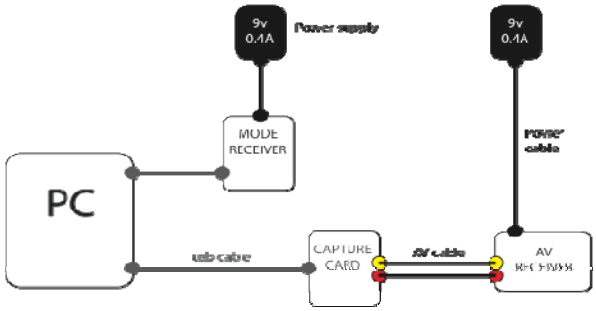
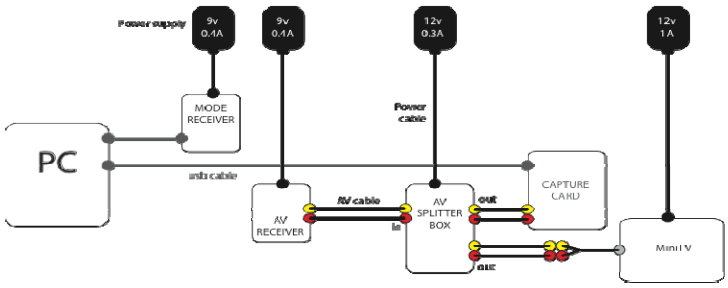


Figure 9: Bear Catcher_off *Figure 10: Bear Catcher_on* *Figure 11. File System*

5.3 Specification

Hardware and OS	Bärlin entails a hardware infrastructure that allows recording of video material produced by a customized VLC player (see software description) on a connected standard PC. Figure 12 describes the supporting HW components hidden within the toy and the interfaces between the PC and the supporting components  *Figure 12. Components Diagram not including TV Monitor* Figure 13. Describes the configuration of supporting components for PC recording from a teddy with the addition of a real time TV monitoring.  *Figure 13. Components Diagram including TV Monitor*
Software	<u>AV Input</u> The AV input is provided by a Dazzle DVC 90 connected via a USB port. The software will accept input from any Direct X

compliant capture card.

Video Capture

Video Capture is performed using Macromedia Director (a multimedia authoring environment) in combination with the CxtraVdieoCapture extension for Director. The video is captured from the card using standard Windows APIs, and passed through a video codec to be compressed, the resulting file is stored as a Windows AVI.

Video Codecs

The system can employ any standard windows video codecs. In testing the 3vix and xvid codecs have been used, however other intermediate codecs would be a better choice for video editing. More information about video codecs can be found on wikipedia.

Storage

The videos are stored as windows AVI in a hierarchical directory structure as shown in Figure 8. Both the 'group name' and the 'bear name' are settable in the software UI. The date created folder is automatically created on the fly when the video capture process starts. The files are stored with a filename based upon the moment the capture began.

Software Setup

Three things must be installed in order to use the bear catcher; the bear catcher software, drivers for the capture card, and video codecs. To set up the software all that is required is to copy the 'Sony Bear Catcher' folder to the machine to be used for capture. Installation of the video capture card should be done as indicated in the software manual for the device. Installation of video codecs should be done as per their instructions.

Running the software

In order to run the software first connect all external hardware such as the capture card and other devices outlined through out this document. Once all the hardware is setup, open the bearcatcher.ini file and edit the settings for the 'group name' and 'bear name', these settings related to the directory structure outlined in Figure 8. Once this is done running Bearcatcher.exe will present the operator with a recap of the settings from the ini file as well as three buttons numbered in the order that they should be adjusted.

The first button relates to the capture source; set it to the capture card being used (in this case the Dazzle DVC90). The second button relates to the video format; depending on the capture card used, the user is able to set the physical size of the video frame and other miscellaneous settings. the operator should familiarise themselves with these settings and adjust as needed. Typically, the physical size of the video frame will be the only parameter adjusted, with 640 x 480 being an optimal choice. The third button relates to the video codec to be used. Here there operator selects the

	video codec they wish to use and adjusts the various settings according to their requirements. Subsequent uses of the first two dialogues are not normally required as the settings are remembered between uses of the software. however the codecs dialogue is required to be set upon each launch of the application, but the user does not need to select the correct codec as the settings are remembered across uses.
Core Features	Capture videos from the viewpoint of a toy in order to create mixed reality content from a metaphoric point of view.
Status	Trough away early technology probes Stable Hardware prototype Stable Software prototype
Intended users	The main user group will be children (4-10 years) However the prototype can be altered to meet an older audience (hide the toy factor)
Research Workpackages	WP3 A Metaphoric approach to presence by simplifying mixed reality and the associated presence implications to in order to address as large an audience as possible. WP 4 & 5 interface to AuthOr planned for the next phase in order to postion content at predefined GPS locations.

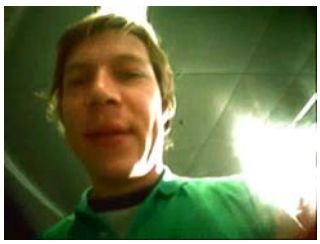
5.4 Testing / Evaluation

Bärlin provides an opportunity to explore the relevancy of presence research within the field of content authoring, rather than evaluating it from the perspective of a user in an electronic environment. With Bärlin the objective is to make the content creator feel like they are carrying round a character which represents the city of Berlin, with which they can then share their own experiences. These experiences are then shared with end-users via the City Whisper application. Therefore we would hope that the user feels comfortable in sharing their stories, finds it easy to use and that the personality of Berlin is in some way represented in the Bärlin character. As a result social presence also becomes a key issue as we are asking the content creator to communicate with and accept the Bärlin character. Related to this is how acceptance of Bärlin varies with its design and the impact this has on the behaviour of the content creator and the stories they tell. In particular how Bärlin can help to create a sense of presence and place for the storyteller in their own story, through to issues related to how it helps them focus on this task and the affordances Bärlin offers. Early studies using video analysis have been conducted and are currently being analysed, we are also exploring the use of other methods.

Early Technology Tests: We conducted 3 early technology tests in order to explore the technical functionality of the application. One test was conducted during a IPCity Plenary where we asked IPCity researchers to tell a story about their Berlin experiences. During this test we found a number of bugs that where fixed in preparation for the first field trial. A 2nd and 3rd technology test was conducted within an office space where distant colleagues were asked to stress test the application by moving rapidly, try out different distances and play rough with the dolls.

One of the major results of the initial evaluation to test the technology was that all individuals communicated with the doll as if it was a character. They seamed to accept that the doll had a character and they would refer to it and communicate with it directly. Below Figures 14 -19

who screenshots of the text and next to it some of the comments made by the users, please note they are translated from German to English.



"Are you turned on? Well I am not I need a coffee before I can get going! "

Figure 14: Evaluation

"Shall I drop you?. *ironically*… Oh now I dropped you, are you OK?"

Figure 15: Evaluation

"Good Morning How are you today?"

Figure 16: Evaluation

"Oh look at you, you are dirty, what did that mean boys do to you? "

Figure 17: Evaluation

"Hello, are you my friend? "

Figure 18: Evaluation

"Yes, you are, mmmmhhhhh! "

Figure 19: Evaluation

Initial Field Trial: The initial field trial was conduced with one child and its mother, we explained the Bärlin user interface and gave the doll to a child and explained briefly what she needed to do in order to "switch the doll on".

The trial produced the following results:

As a pet: she placed it in a doll push chair and pushed it around the flat see figure 23.

As a camera: she sang an English song to it and posed in front of it and was very keen to see the film as soon as she was finished see figure 24.

As a dance partner she made a couple of really wild dances that entailed a lot of jumping and turning in circles and seemed no longer conscious of the camera and no longer cared about making a movie see figures 20 and 21.

Figure 20: Evaluation Dancing

Figure 21: Evaluation Dancing

Figure 23: Evaluation_Pet

Figure 24: Evaluation_ Performing

When we came to pick up the doll and the equipment the girl said to the doll. "Come and visit me again". This was not only a clear indication that she had fun it also showed that she accepted the doll as a toy and tool that she could use and play with and with which she managed to create a certain rapport in a very short time frame.

5.4.1 Early Evaluation

Evaluating if very young children feel a sense of social presence with Bärlin is a difficult task. For example traditional methods like interviews and questionnaires are not suitable. Therefore the study had to rely on evaluating the movies the children produced while playing

with Bärlin. A further study is planned where the dolls will be left with a kindergarten, however this requires adequate supervision by the staff and legal clearance.

5.4.2 Other Results

Other issues were identified which were related to usability and technical issues:

- Some disturbances appear when accessing certain rooms, we will have to find out what causes the disturbances and take appropriate action.
- The filmed material is quite dark we sill have to ensure that the application is used outdoors or in a well lit room(see images 17- 20)
- Very young children over use the switch located at the palm of the doll. The seem to simply enjoy pressing buttons and did not realize that they switched the video function on and off
- When the toy is manhandled, or used in a very rough manner by the children the recording quality deteriorates.

5.5 StreetBeat

StreetBeat (Pervasive Service Prototype): Street Beat is a location aware mobile, music based City tour. While exploring Berlin the visitor listens to urban music and stories about sub-culture of the Streets of Berlin. The GPS trail, the music and snapshots will be made available as a travel journal using a Web 2.0 similar interface. The intention is to immerse the "story-browsers" into a sub-cultural story told by a professional music editor about hip areas in Berlin. The user is lead through the city based on the musical relevance of certain urban locations, with the music and cultural narrative being altered depending on the location. Our main aim is to explore how browsers experience location based stories and how immersed they feel in the audio content provided at the predefined locations. Figure 25 and 26 show the initial user interface design and figure 27 shows two screenshots for the application.

Figure 25: Mobile Application

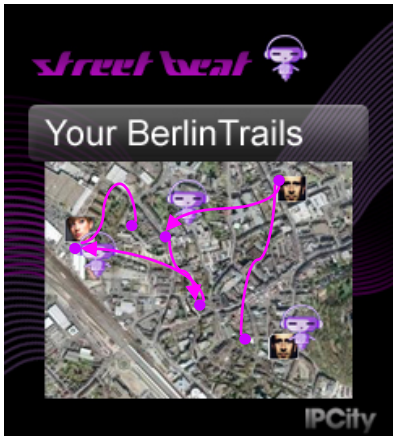


Figure 26: Planned Web Interface

Figure 27: Screenshots

5.5.1 The StreetBeat Tour

The streetbeat tour leads to 7 sub-cultural spots at Berlin Mitte and provides an alternative music culture based impression of Berlin. Figure 28 entails photos of the covered locations and an introduction of the featured spot

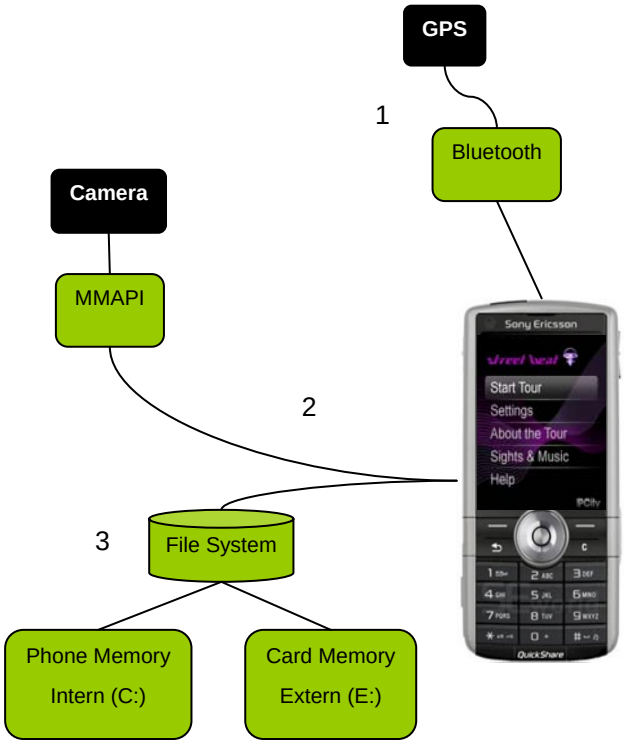
Stop One: Tacheles	 Influential Culture centre and squat formed directly after the reunification. Tacheles holds ateliers, record labels, cafes and an alternative cinema. Featured Artists: Guy Called Gerald, Peaches
Stop Two: WMF & 103	   Contemporary Clubs. Berlin Club culture in general. Between the two clubs you see Bode museum.
Stop Three: BPitch Control	 Example of the Berlin techno-and electro label city space. Lead by the fashion and music trend setter Ellen Allien. The tour leads past fashion labels etc.)
Stop Four: Haus Schwarzenberg	 Next to Hackeschen Höfen you will find the Haus Schwarzenberg the “it” quarter of the 20`s Berlin alternative culture and today a place full of history, art and entertainment.
Stop Five: Volksbühne	 As a centre for concerts, parties and progressive theater in Berlin (Castroft, Schlingensief and Pollesch) it featured events like: Insane, pudelnacht Kongresse, Post Porn Politics etc. Volksbühne also this history heavy building hosted 1890 the as “Freie Volksbühne Berlin” theatre for the masses.

Stop Six: **Kaffee Burger**		A café, club and disco with great importance to the sub-cultural literature scene. The Russian Jewish writer "Vladimir Kaminer" wrote a number of short stories about this cafe and also organizes and event called "Russian Disco" every 2 weeks.
Stop Seven: **White Trash**		A bar with odd furniture, food and visitors. Changing DJ's and gigs, it attracts a very bizarre and hip crowed – Mick Jagger and Pink have been seen in this bar as well as famous tramps and artists from the area.

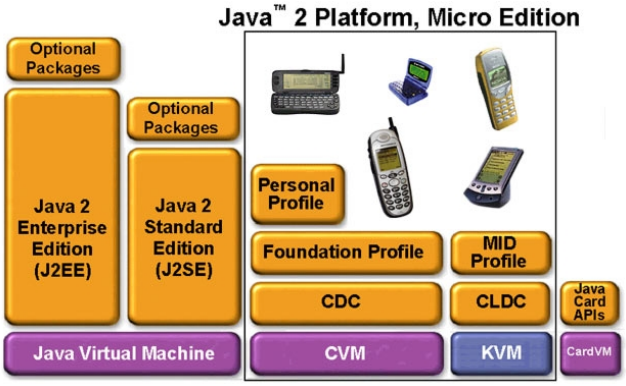
Figures 28: The StreetBeat locations

5.6 Specification

Hardware and OS	Application featuring the Sony Ericsson K800i and the Holux GPSlim236 connected via Bluetooth. Below the high level system architecture as figure 29:



Figures 29: StreetBeat High Level System Requirement

	Figure 29 illustrates the high level system architecture below you find the interface descriptions marked on the illustration. 1. Connecting the GPS-Device over Bluetooth (JSR-82) 2. Accessing and controlling the internal Camera (JSR-135 & JSR-234) 3. Connecting the File System of the Mobile Phone (FileConnection JSR-75)
Software	Java Client featuring connected limited device configuration based on KVM in version JP7 Java platform preinstalled on the K800i. See figure 30:  Figures 30: Java Platform Used API's: • MMAPI1 (JSR-135) [7] • MMAPI (AMMS JSR-234) • FileConnection JSR-75 • Bluetooth (JSR-82) • Customized location API similar to Nokia location API (JSR-179)
Core Features	Urban story told by a professional music edition Positioning using GPS Position based Audio Streaming Integrated Music player Integrated Snap shot application

	Integrated Story overview
Status	Stable prototype
Intended users	Visitors of Berlin that would like to experience the subculture of Berlin. Particularly the mid 30this of both sexes that are interested in pop-culture and contemporary art.
Research Workpackages	WP3 Sense of Place, This prototype has been developed to test sense of place in order to establish if and how city based tales can be told in an urban environment using sound and text. It also explores the sense of immersion and presence which can be created through the use of location based music and stories. Most importantly it has been design to provide the browser with an experience that will only be possible through such a tour. The subculture of an urban space can best be demonstrated and experienced through the art movement and its urban spots and the associated music. WP4 & WP5: The integration of a AuthOr, GPS tracking, integrated music browsing and integrated snap shot functionality within an mobile client is planed for the next phase.

5.7 Testing / Evaluation

Participatory design: featuring a music editor of an independent music magazine and label called SPEX, one artist, one UI specialist, one graphic designer and one technical developer.

User Interface Design Tests: Several on site tests were conducted where we explored aspects such as: navigation tools, solutions and technical feasibility

Presence: In this initial phase we established that a phased approach to mixed reality city tales would be advisable. We decided to focus on researching the sense of place (Relph, 1976 [5]) before we add the next layer of complexity for presence evaluation.

5.7.1 Preliminary Evaluation

An early exploratory study was conducted in which the two users of Street Beat were asked to complete the tour. An objective of the study was to find out which locations were in need of improvement in terms of content and presence. Other objectives included exploring the usability of the system and trying out some informal measurement techniques.

During the study notes were taken about the actions of the participants and any comments they made. The participants were also video recorded. On completion of the tour they were asked several questions relating to their experience based on observations during the trial. An outline of the questions is presented below. The entire session was video recorded and the transcripts will be analysed at a later date.

Following on from the basic questions the participants were then asked to rank the different locations in the tour based on the following criteria:

- Their level of interest in each location
- Appropriateness of the music at each location
- Appropriateness of the picture(s) at each location
- Appropriateness of the narrative at each location
- Their sense of presence, or being in the “cultural experience”

On completion of this stage they were then asked some more questions based on their responses then asked to provide 12 words or terms. Having been asked to provide the twelve words they were then asked to order them using semantic differentials [8]. This is where the participants pick two words they perceive as opposites then place all others in between, the objective being to uncover the relationships between different responses.

5.7.2 Pictures of Street Beat in Use

Following as figure 31 a set of pictures taken by a user at the field trial to provide an initial impression:

Figure 31: Screenshots by user

Overall impressions of the application was that it fulfilled its main goal of providing a sense of subculture and the users felt presence in certain areas of the city but some improvements need to be made to increase the feeling of narration, content has to be improved to increase the level of "irony" that was missed by some users and we will need to extend the tour to provide an inside view of the featured buildings, clubs and scenes. In general the interface received very favourable feedback with the major issues focussing on the presentation of navigational information to the end user.

5.7.3 Results from Rankings – Presence and Associated Measures

Interest		**Music**		**Picture**		**Narrative**		**Presence**		
1	4	7	*7*	1	4	7	5		*1*	*1*
7	5	1	*2*	7	1	5	4		*4*	*4*
2	1	4	1	5	5	4	7		*5*	*5*
4	2	3	5	2	6	6	2		*6*	7
5	7	5	6	4	7	2	6		*7*	6
3	3	2	4	6	2	3	7		*3*	2
6	6	6		3	3	1	3		*2*	3

Locations: 1= Tacheles, 2 = WMF, 3= B-Pitch Control, 4 = Haus Schwartzenerg. 5= Volksbühne, 6=Kaffee Burger. 7= White Trash

Data from the table points to some interesting trends developing, although it should be pointed out that the participants indicated the rankings were often very close for each location. The premise here is that the content for those locations with the lowest ranking should be enhanced first. It should be noted that the second participant provided a score out of 10 rather than a ranking of presence, however to allow for easier comparison their responses have been ranked in the above table. Finally the sample size is very small so should only be considered as providing possible suggestions for improvement.

Based on the rankings it is clear that locations 1 (Tacheles) and 4 (Haus Schwarzenberg) provided the highest sense of presence, and was also rated highly for the selection of music,

pictures and narrative as well as overall interest. This may have been due to a number of reasons, not least because the participants actually entered both locations, thus increasing physical presence. Moreover, Tacheles also contained a strong odor. Anecdotal evidence from the rest of the study pointed to the need to encourage people to actually enter some of the locations when possible and also to provide support for this within the Street Beat System.

Locations 5,6,7 also were grouped in roughly the same area in terms of presence ranking. With location 7 (White Trash) enjoying very high scores for selection of music. The participants also commented that they would like to visit there when it opened later in the evening – a claim which was verified by them after the study. Locations 2 (WMF) and 3 (B-Pitch Control) were ranked lowest for presence. Comments made during the study pointed to this being related to the choice of pictures used in Street Beat, for example the first location in WMF consisted only of a small black door which was easily missed and in the case of B-Pitch control the picture was taken prior to the building being covered in a scaffolding. Interestingly B-Pitch control also received low rankings with respect to interest and narrative.

5.7.4 Other Results

At this stage we have not analysed either the video recording of the tour or the evaluation session or the semantic differentials. However in contrast with previous work which used semantic differentials in virtual environments none of the keywords chosen appeared related to the underlying technology. An initial conclusion from this would suggest that the system is sufficiently user friendly that it disappears in to the background during use, and therefore does not impact in any significant way on the users sense of presence. From a content perspective the semantic differentials highlighted themes such as the subculture, club scene through to issues such as food (in particular donor kebabs). The latter was rather amusingly commented upon by users due a song played during the tour and also the fact that a kebab house was located near the point where that particular tune was played.

5.7.5 Preliminary Conclusions

The study was being undertaken at the time of writing this report so as yet it is too early to provide full or detailed results, however a few initial findings are worthy of further investigation. Initial results point to the content being critical in providing users with a sense of presence, for example when the music, narrative, pictures and level of interest in a location are high it is not unsurprising that people should not experience a higher degree of presence. Also sense of presence is further enhanced when there is support for entering a building or location. These results therefore agree to some extent with earlier presence research which indicates that presence is related to sense of immersion (within a location), engagement (with the content e.g. they are focused pictures, and narrative) and the range of affordances/activities on offer (i.e. being able to walk around a location).

From a measurements perspective presence and the various related aspects are worthy of consideration and at this basic level can be “measured”. However we acknowledge that for larger trials a more formal and rigorous approach is required and we will seek to adopt standard methods which can be used in combination to corroborate results, for example video analysis, questionnaires and interviews.

References

[1] Witmer B.G, & Singer M.J. (1998) Measuring Presence in Virtual Environments: A Presence Questionnaire. Presence: Tele-operators and Virtual Environments. Vol. 7 (3). Pp225-240.

[2] Lombard, M. & Ditton, T. (1997). At the Heart of it All: The Concept of Presence. Journal of Computer-Mediated Communication. Vol. 3(2)

[3] [1] Ijsselsteijn, W.A. & Riva, G. (2003). Being There: The Experience of Presence In Mediated Environments. In: Riva, G., Davide, G., & Ijsselsteijn, W.A., (eds). Being There: concepts, Effects and Measurements of Presence in Synthetic Environments, Amsterdam: IOS Press. Pp3-16.

[4] Laura Ermi and Frans Mäyrä "Fundamental Components of the Gameplay Experience:1 Analysing Immersion" (DiGRA 2005 Conference: Changing Views – Worlds in Play, 2005)

[5] Relph, 1976:47

[6] Freeman, D. (2003). Creating Emotion in Games: The Craft and Art of Emotioneering. Indianapolis (Ind.): New Riders

[7] MMAPI – Mobile Media API (JSR-135), URL: http://java.sun.com/products/mmapi/, last visited 2006-09-28

[8] Osgood, E.C., Suci, G.J. & Tannenbaum, P.H. (1957). The Measurement of Meaning. Urbana, University of Illinois Press.

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ipcity.eu