IPCity

Integrated Project on Interaction and Presence
in Urban Environments

FP6-2004-IST-4-27571

ipcity.eu

Evaluation Summary Report Year 3
Deliverable D1.11

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Table of Content

Abstract

This document serves several purposes. First, it provides an overview on how the project performed against the success indicators defined by the consortium. This allows measuring the project's success for project members, its individual boards, the EC, and the project reviewers. Second, it provides a good overview of the results and their quality, which may be interesting for other (similar) projects or projects doing research in related areas.

This report is structured as follows: The first section introduces the overall quantitative and qualitative indicators for measuring progress and impact of work. The second section provides more specific measurement criteria for the individual research and showcase work packages. Finally, section three deals with management assessment.
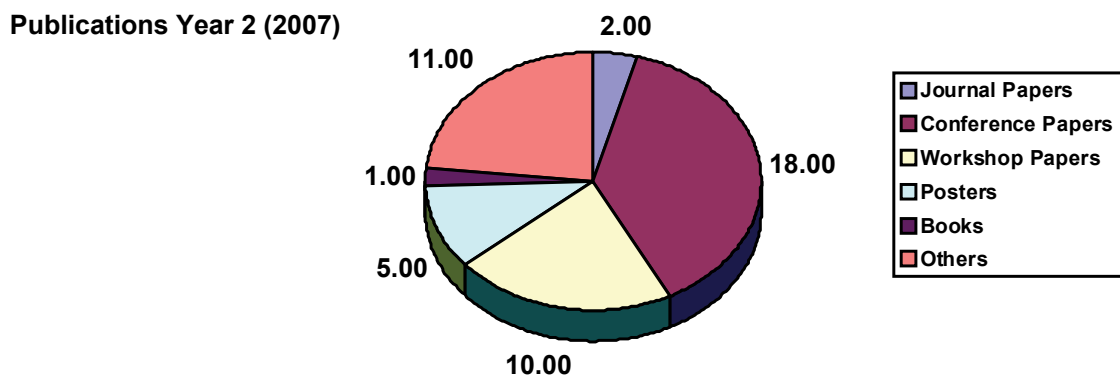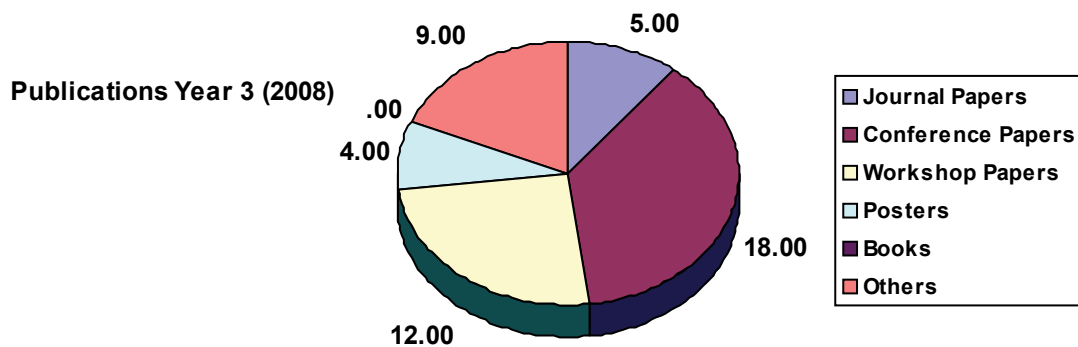
1.   General Progress and Success Indicators

This section will list the qualitative and quantitative indicators used to measure and monitor the overall success and impact of the project.

1.1   Quantitative Indicators

The following quantitative indicators will be used for reporting on progress with the implementation of its research plan by the consortium:

1.1.1 Publications and presentations

The section lists the individual and joint publications directly related to the work undertaken within the contract (conferences, journals, magazines, etc.)

Publications Year 3 (2008)

5.00
9.00
18.00
.00
4.00
12.00

- Journal Papers
- Conference Papers
- Workshop Papers
- Posters
- Books
- Others

Publications Year 2 (2007)

2.00
11.00
18.00
1.00
5.00
10.00

- Journal Papers
- Conference Papers
- Workshop Papers
- Posters
- Books
- Others

Journal publications

Gerhard Schall , Erick Mendez , Ernst Kruijff , Eduardo Veas , Sebastian Junghanns , Bernhard Reitinger, Dieter Schmalstieg, Handheld Augmented Reality for Underground Infrastructure Visualization, ACM Personal and Ubiquitous Computing Journal, 2008

Broll, W., Lindt, I., Herbst, I., Ohlenburg, J., Braun, A., and Wetzel, R. 2008. Toward Next-Gen Mobile AR Games. IEEE Comput. Graph. Appl. 28, 4 (Jul. 2008), 40-48. DOI= http://dx.doi.org/10.1109/MCG.2008.85

Basile, Maria., Terrin, Jean-Jacques. 2008. "Négociation du projet urbain et représentations virtuelles. La place des technologies de réalité mixte", to be published in *Flux International Scientific Quarterly on Networks and Territories*, Avril-Juin, 2009.

McCall, R., and Braun A. Experiences of Evaluating Presence in Augmented Realities. Psychology Journal. Pp157-172. ISSN 1720-7525. www.psychnology.org

McCall, R., Jacucci, G., and Broll W (eds). Editorial Preface. Psychology Journal. Pp113-116. ISSN 1720-7525. www.psychnology.org

Conference papers

A fast sign localization system using discriminative color invariant segmentation. Nguyen, Phuong Giang , Andersen, Hans Jørgen. 2008. International Conference on Pattern Recognition and Computer Vision, Bangkok, Thailand, December, 2008.

Uniqueness filtering for local feature descriptors in urban building recognition. Nguyen, Phuong Giang ; Andersen, Hans Jørgen. Proceeding of the International Conference on Image and Signal Processing, ICISP, July 1-3, 2008, pages. 85-93, Springer, Lecture Notes

Maquil, Valérie, Psik, Thomas, Wagner, Ina (2008) "The ColorTable – A Design Story". ACM Tangible and Embedded Interaction 2008, Bonn, February 18 and 21, 2008.

Broll, W., Herling, J., and Blum, L.: „Interactive Bits: Prototyping of Mixed Reality Applications and Interaction Techniques through Visual Programming", in Proc. of the 3rd IEEE International Symposium on 3D User Interfaces 2008 (IEEE 3DUI 2008), Reno, Nev., USA, March 8-9, 2008, IEEE Computer Society, Piscataway, NJ, USA, 109-115. DOI=http://dx.doi.org/10.1109/3DUI.2008.4476600

Peltonen, P., Kurvinen, E., Salovaara, A., Jacucci, G.,, Ilmonen, T., Evans, J, Salovaara, A, Oulasvirta, A. '"It's Mine, Don't Touch!": Interactions at a Large Multi-Touch Display in a City Center' to appear in proc. of ACM Computer Human Interaction 2008 (CHI 2008) (Florence, Italy, April 5 – 11, 2008), ACM press.

McCall, R., Wagner, I., Kuutti, K., Jacucci, G., and Broll, W. 2008. Urban mixed realities: technologies, theories and frontiers. In CHI '08 Extended Abstracts on Human Factors in Computing Systems (Florence, Italy, April 05 - 10, 2008). CHI '08. ACM, New York, NY, 3973-3976. DOI= http://doi.acm.org/10.1145/1358628.1358970

Daniel Wagner, Gerhard Reitmayr, Alessandro Mulloni, Tom Drummond, Dieter Schmalstieg. Pose Tracking from Natural Features on Mobile Phones. Proc. 7th IEEE/ACM International Symposium on Mixed and Augmented Reality, (ISMAR'08), pp. 125-134, Cambridge, UK, Sep. 2008.

Wagner, Daniel; Langlotz, Tobias; Schmalstieg, Dieter, "Robust and unobtrusive marker tracking on mobile phones," Mixed and Augmented Reality, 2008. ISMAR 2008. 7th IEEE/ACM International Symposium on , vol., no., pp.121-124, 15-18 Sept. 2008

Morrison, Ann, Peta Mitchell, and Stephen Viller. "Evoking Gesture in Interactive Art." Proceedings of the 2008 ACM International Conference on Multimedia. New York: ACM Press, 2008. 11–18.

Morrison, A., Oulasvirta, A., Peltonen, P., Jacucci, G., Lemella, S., Reitmayr, G., Näsänen, J., & Juustila, A. Like Bees Around the Hive: A Comparative Study of a Mobile Augmented Reality Map. CHI 2009. Accepted. Nominated For Best Paper Award.

Maquil V, Sareika M, Schmalstieg D., Wagner I. (2009) MR Tent: A Place for Co-Constructing Mixed Realities in Urban Planning. GI 2009 (paper submitted).

Wagner I., Basile M., Ehrenstrasser L., Maquil V., Terrin J., Wagner M. (2009) Supporting the Formation of Communities of Practice: Urban Planning in the MR-Tent. In: C&T 2009 (paper submitted).

Boerner A., Maquil V. (2009) Enhancing synergies between computer science and urban disciplines. In: CAAD futures (abstract accepted).

Herbst Iris, Braun Anne-Kathrin, McCall Rod, Broll Wolfgang, TimeWarp: Interactive Time Travel with a Mobile Mixed Reality Game. Proceedings of the 10th international Conference on Human Computer interaction with Mobile Devices and Services (Amsterdam, The Netherlands, September 02 - 05, 2008). MobileHCI '08. ACM, New York, NY, 235-244

Wetzel Richard, McCall Rod, Braun Anne-Kathrin, Broll Wolfgang: Guidelines for Designing Augmented Reality Games. In Proceedings of the 2008 Conference on Future Play (Toronto, Canada, November 3-5, 2008). Future Play '08. ACM, New York, NY.

Wetzel, R., Lindt, I., Waern, A., and Johnson, S. 2008. The magic lens box: simplifying the development of mixed reality games. In Proceedings of the 3rd international Conference on Digital interactive Media in Entertainment and Arts (Athens, Greece, September 10 - 12, 2008). DIMEA '08, vol. 349. ACM, New York, NY, 479-486. DOI= http://doi.acm.org/10.1145/1413634.1413719.

Nuojua, J., Juustila, A., Räisänen, T., Kuutti, K. and Soudunsaari, L. (2008). "Exploring Web-based Participation Methods for Urban Planning". PDC 2008. 10th Participatory Design Conference: Experiences and Challenges, Bloomington, Indiana, USA, 30 September - 4 October, 2008.

Nuojua, J., (2008). Communication Based Web Mapping: A New Approach for Acquisition of Local Knowledge. October 7-9, 2008, Tampere, Finland.

Workshop papers

Urban building recognition during significant temporal variations. Nguyen, Phuong Giang and Andersen, Hans Jørgen. Proceedings of the IEEE Workshop on Applications of Computer Vision 2008. Electrical Engineering/Electronics, Computer, Communications and Information Technology Association, 2008. s. 1-6

McCall, R., Herbst, I., Braun, A., and Wetzel R. (2008). "The "Where" of Mixed Reality: Some Guidelines for Design". ACM Computer Human Interaction 2008 (CHI 2008) Workshop on Urban Mixed Realities - Technologies, Theories and Frontiers (Florence, Italy, April 5 – 11, 2008).

Jan Ohlenburg, Wolfgang Broll, Irma Lindt (2008). „Orchestration and Direction of Mobile MR Games", accepted for. ACM Computer Human Interaction 2008 (CHI 2008) Workshop on Urban Mixed Realities - Technologies, Theories and Frontiers (Florence, Italy, April 5 – 11, 2008).

Sareika, Markus, Schmalstieg, Dieter (2008). "Urban Sketcher: Mixing Realities in the Urban Planning and Design Process". ACM Computer Human Interaction 2008 (CHI 2008) Workshop on Urban Mixed Realities - Technologies, Theories and Frontiers (Florence, Italy, April 5 – 11, 2008).

Morrison, Ann, Jacucci, Giulio, Peltonen. Peter. CityWall: Limitations of a Multi-Touch Environment. AVI 2008: Public and Private Displays workshop (PPD 08)

Morrison, A. The Long Way Home. British HCI workshop: Critical Issues in Interaction Design, Liverpool, September 1-5, 2008.

Morrison, A., Jacucci, G, Peltonen, P., Juustila, A., & Reitmayr, G. Using locative games to evaluate hybrid technology. British HCI workshop: Using locative games to evaluate hybrid technology, Liverpool, September 1-5, 2008. Accepted as workshop paper and presented.

Morrison, A and Salovaara, A. Sustaining Engagement at Public Shared Interfaces. ShareIT -Shareable Interfaces for Learning Workshop 2008, 11-12 September, Sussex 2008

Morrison, A and Salovaara, A. Situated Engagement at a Public Urban Display. Situated Large Displays Workshop, Dec 5-12, Australian CHI, OZCHI 2008, Cairns 2008.

Braun Anne-Kathrin, Löschner Johannes, McCall Rod. Iterative design of a mobile Mixed Reality game. Proceedings of the Workshop on "Mobiles Spielen" at GI Informatik 2008, (München, 2008)

McCall Rod, Braun Anne-Kathrin, Wetzel Richard. Towards Evaluating Place in Location Aware Games. HCI 2008 Workshop: Evaluating Player Experiences in Location Aware Games, Liverpool, 2008

Ohlenburg, J., Broll, W., and Braun, A.-K., "Morgan: A Framework for Realizing Interactive Realtime AR and VR Applications", Latoschik, M. E. et al (eds.), Proceedings of the Workshop on Software Engineering and Architectures for Realtime Interactive Systems

(SEARIS) at IEEE Virtual Reality 2008 (VR 2008), (Reno, NV, USA, March 9, 2008), Shaker Verlag, Aachen, Germany. ISBN: 978-3-8322-7029-2, ISSN: 0945-0807, 27 – 30.

Posters

Herbst, I., Braun, A.-K., McCall, R., and Broll, W.: Multi-dimensional Interactive City Exploration through MR, IEEE VR 2008, in Proc. of IEEE Virtual Reality 2008 (IEEE VR 2008, March 8-12, 2008). IEEE Computer Society, Piscataway, NJ, USA, 259-260. DOI=http://dx.doi.org/10.1109/VR.2008.4480790

Garbe, K., and Herbst, I: Extending X3D with Perceptual Auditory Properties, IEEE VR 2008, in Proc. of IEEE Virtual Reality 2008 (IEEE VR 2008, March 8-12, 2008). IEEE Computer Society, Piscataway, NJ, USA, 253-254. DOI=http://dx.doi.org/10.1109/VR.2008.4480787

Sabiha Ghellal, Rod McCall, Jan Ohlenburg, Steffen Harrer (2008). "12 Mixed Reality Principles of Animation – Based on Disney's Principles of Animation". ACM Computer Human Interaction 2008 (CHI 2008) Workshop on Urban Mixed Realities - Technologies, Theories and Frontiers (Florence, Italy, April 5 – 11, 2008).

Weiland Christian, Braun Anne-Kathrin, Heiden Wolfgang. Colorimetric and Photometric Compensation for see-through displays Siggraph'08, Los Angeles, CA, USA, 2008

Books
None.

Others

Peter Peltonen Doctorial Symposium run by Margot Brereton, Paul Dourish and Wally Smith, OZCHI 2008.

Ann Morrison. Doctorial Symposium run by Margot Brereton, Paul Dourish and Wally Smith, OZCHI 2008.

Basile, Maria. 2008. "IP City Research Project", in *Allez Savoir, University of Cergy-Pontoise internal newsletter*.

Basile, Maria. presentation of IP City Project to the *Ateliers* urban planning association, 13.05.2008

Terrin, Jean-Jacques. 2008. Presentation of IP City and European City of Science in the professional review *Le Moniteur* (to be published in 2009)

Terrin, Jean-Jacques. Conference & workshop on mixed reality technologies, urban projects and IPCity at Université de Montreal, School of architecture and institute of environment, 30-31.01.2008

Terrin, Jean-Jacques. presentation of IPCity project at a CNRS research prospective meeting, 03.06.2008

Terrin, Jean-Jacques. conference on mixed reality technologies, urban projects and IPCity at Ecole Nationale des Ponts et Chaussées (Master Amur), 25.11.2008

Boerner, Andrea: presentation of IP City Project at Academy of fine Arts, Vienna, 01.12.2008

Citation index

Within the previous working period the following results regarding the number of citations to project-based publications (conferences, journals, magazines, etc.) were recognized. Based on the Google Scholar and CiteSeer services one of the project related publications published in 2006 have been cited nine times. Ten papers in 2007 publications were cited 38 times in total. Four publications from year 2008 have been cited nine times.

Organization of workshop and events

During the previous 12 months, the IPCity consortium organized the following workshop and events as well as presentations to external specialist at workshops and conferences.

Organisation of a workshop at CHI 2008: McCall, R, Kuutti, K., Wagner, I. & Jacucci, G. (2008) Urban Mixed Realities - Technologies, Theories and Frontiers. ACM Computer Human Interaction 2008 (CHI 2008)

Special issue of Psychnology Journal based upon the outcomes of the CHI 2008 workshop.

Press coverage

The list of appearances in public press and television in 2008.

WP6 :

Stadtplanung am Roulettetisch: http://www.tuwien.ac.at/aktuelles/news_detail/article/4685/

City of science: from satellites to scales http://www.euronews.net/en/article/20/11/2008/city-of-science-from-satellites-to-scales/

WP7 :

Besides appearing in the Finnish and French written media, CityWall has been quite visible in the Internet. Here is a list of selected sites and blogs and a viral marketing site (see Figure 3) reporting on CityWall:

http://www.youtube.com/watch?v=IldDrCcZkZY--over This YouTube video received ¼ million hits in the first two weeks from opening at downtown Helsinki October 8th, 2008 with a new 3D interface that caught the attention of the global multitouch and IT community, The video was advertised as a highlight on for several days on the front page of YouTube most popular sites.

The WAVE Report on Digital Media 3D, Media Creation, Shared Space, Published by 4th Wave, Inc., Issue #0814 11/4/08 http://www.wave-report.com/

http://museiteknik.blogsome.com/2008/10/27/citywall-tryckkanslig-lcd/http://www.wave-report.com/conference_reports/2008/CityWall.htm

http://www.cultureevenement.com/2008/07/les-surfaces-multi-touch-desormais-disponibles-pourevenementiel/http://www.gizmodo.com.au/2008/10/citywall_interactive_multitouch_display_now_has_a_glorious_3d_interface-2.html

http://www.tietokone.fi/uutta/uutinen.asp?news_id=35243&tyyppi=1

http://www.tietokone.fi/uutta/uutinen.asp?news_id=35243

http://www.unidademultipla.com/2008/10/citywall-display-multi-toach.asp

 http://www.slashgear.com/citywall-multitouch-interactive-display-1018961/

http://heightz.blogspot.com/2008/10/city-wall-multi-touch-display.html

http://elanso.com/ArticleModule/HGTgNiSsSiHlQcSESYRRJ2Ii.html

http://officesearchtoronto.com/2008/10/09/citywall-interactive-multitouch-display-now-has-a-glorious-3d-interface/

http://www.helsinkitravelguide.com/latest-blog-posts/city-wall-multitouch-display-now-has-3d-interface.html

http://news.cnet.com/crave/?keyword=%22CityWall%22

http://www.mediauser.de/

http://charliemartinez.wordpress.com/

http://touchscreenyear.blogspot.com/

http://oh-so-fresh.blogspot.com/

http://www.nelson-wong.com/blog/

http://selected-few.blogspot.com/

http://rockstarsociety.blogspot.com/

http://ima80sbaby.blogspot.com/

http://thejournalofawesome.blogspot.com/

http://allthingsmusik.blogspot.com/

http://ashleytan.wordpress.com/

http://solidspace2.blogspot.com/

http://www.gadgetzone.ro/

http://www.aboutprojectors.com/news/

http://freedesign-artedisegnovideomusica.blogspot.com/

http://ravlik.com/

http://www.elhuequito.com/

http://foodshub.com/

http://onzetoekomst.blogspot.com/

http://lifebook98.blogspot.com/

http://playgroundtop.blogspot.com/

http://news.cnet.com/crave/

http://www.google.com/reader/view/

http://tech.slashdot.org/article.pl?sid=07/05/31/1928251&from=rss

http://www.tietokone.fi/uutta/uutinen.asp?news_id=35243&tyyppi=1

http://news.cnet.com/crave/

http://cooler-online.com/

http://www.impactlab.com/2008/10/11/city-wall-multitouch-display-now-has-3d-interface/

Figure 1 **http://www.viralvideochart.com/youtube/citywall_hki?id=IldDrCcZkZY**

http://www.stern.de/computer-technik/technik/:Pervasive-Games-Die-Realit%E4t-
Spielbrett/636171.html (21.09.2008, www.stern.de)

1.1.2 Dissemination

Website

The dissemination website at www.ipcity.eu has had 7 034 visits, 19 933 page views and
5 406 absolute unique visitors during 2008. The tracking and statistics system has been in
use since March 2007. The chart does not include the visitors where date data was not
available or visitor number was less than 2% of the total. Chart below shows the
geographical area of the visitors.
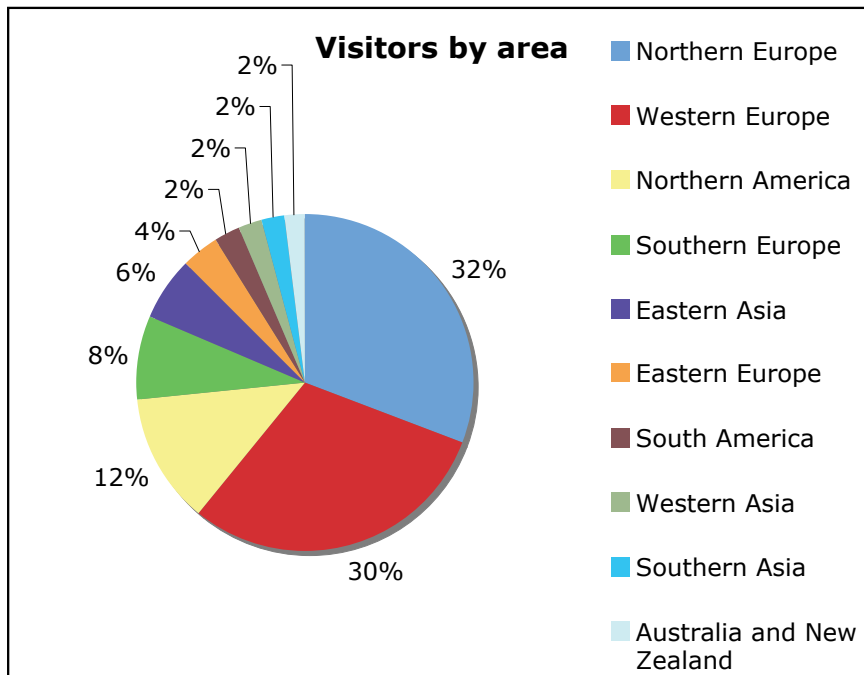
Most of the visitors came to the site through Google (3 209 visits) or directly (1 247). The rest came trough partner sites and CHI conference site, for example. The chart below shows the country of origin of the visitors.
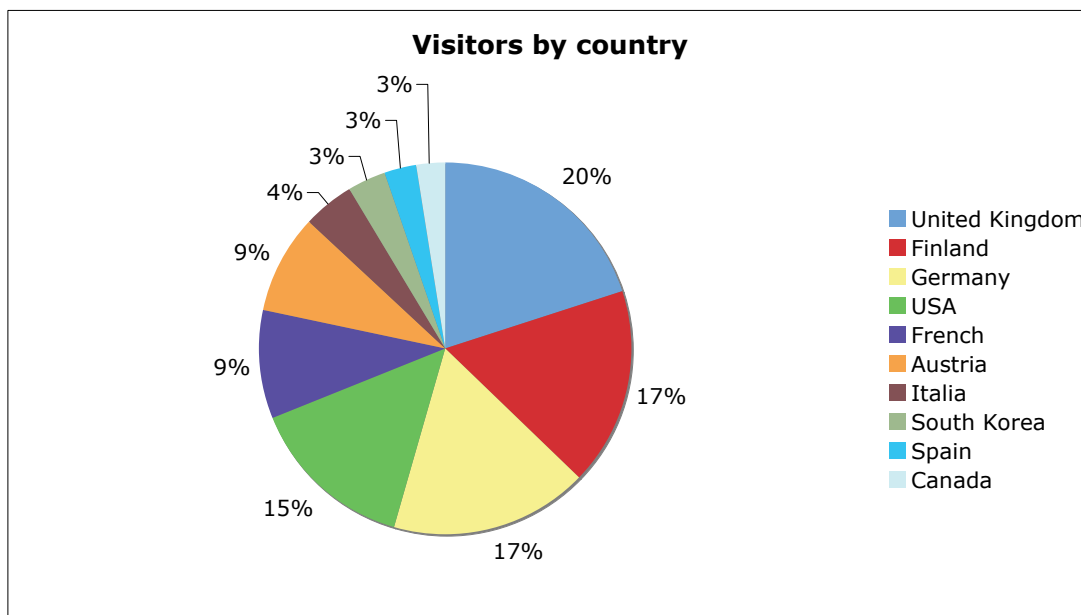
Newsletter

The main channel of delivery of the IPCity news is the News section (http://www.ipcity.eu/?page_id=15) of the external dissemination website at www.ipcity.eu. The news items are also downloadable by using RSS feeds. The section has had 324 page views (of which 129 during 2008). Additionally, the news items are delivered to a limited number of subscribers by email, but this number is not significant due to the primary news delivery method being the web site.

Contacts with user groups

The number of contacts with relevant users groups whether academic or industrial/commercial

TUG: 9
- Imagination
- Hit Lab
- VRVIS
- ATR Intelligent Robotics and Communication Laboratories, Ibaraki, Japan
- Microsoft Research
- TUM Ubitrack
- UCBS Tobias Hölllerer
- University Otago
- HydroSys

OULU: 5
- Department of Architecture, University of Oulu
- University of Art and Design, Helsinki
- Mushashi Institute of Technology, Laboratory of Socio-informational System Design, Yokohama, Japan (prof. Ueno)
- University of Lappland, Dept. Industrial Design, Rovaniemi, Finland (prof. Uotila)
- City of Vaasa, Finland (Mr. Lonka, director of technology)

FIT: 8
- MediaDesign Hochschule Düsseldorf
- GamesAK NRW
- Games Gathering Cologne
- City of Cologne
- Cologne Competence Cluster Virtual Reality
- Ford AG, Cologne
- Deutz AG, Cologne
- freitheit.com, Hamburg

TKK : 7
- Helsinki City Cultural Office
- Ministry for the Environment, Finland (SYKE)
- Nokia Research Center (Helsinki, Finland and Palo Alto, California)
- European City of Sciences, Paris
- Scouts Organisation, Espoo, Finland
- World Wild Life Foundation, Helsinki
- Helsinki Festival Office
- Forces of Light Festival, Helsinki, Finland
- Natural History Museum, Helsinki, Finland
- Nokia Siemens Networks
- National Consumer Research Centre

- All the everyday users of CityWall at Helsinki

UMLV: 16

- Gaspard-Monge Institut, UMLV, France

- Université de Montreal, School of architecture and institute of environment, Canada

- Paris Municipality (Direction du Patrimoine et de l'Architecture), France

- Cergy-Pontoise Metropolitain Authority, France

- APUR, Atelier Parisien d'Urbanisme, France

- IGN, Institut Geographique National, France

- LTMU/Université de Paris 8, France

- CNRS-UMR, France

- Energie Pièton, France

- the Chamber of Commerce and Industry, Cergy-Pontoise, France

- MRTE/Université de Cergy-Pontoise, France

- the Ateliers urban planning association, France

- University of Cergy-Pontoise, France

- RATP research unite, France

- the city of Pontoise, France

- Ecole des Ponts et Chaussées : Master AMUR, France

TUW : 4

- The same as UMVL during Cergy_Pontoise workshop and City of Science Exhibition

- Stadterneuerungsfonds Wien

- UniAK Urban Strategies course 3 and 4

- Several architacts and sound specialists in Vienna

UCAM DENG: 1

- The Boing Company

Imagination: 4

- Verdandi Ausstellungs- und Museumsplanungs GmbH

- Orbster GmbH

- Vienna University of Economics and Business Administration

- Vienna University of Technology

UniAK: 2

- Urban Strategies course 3 and 4.

- Academy of fine Arts Vienna

Field trials

The number of field trials in each showcase application in 2008 and the total number of end-users involved

WP3 Presence and Interaction in Mixed Reality

All showcase field trials were relevant for WP3 and included in the analysis of presence issues.

WP6 Urban Renewal

WP6 conducted two participatory workshops which included a restricted number of participants from local authorities and urban planning and other communities. On the second workshop, we organised two demonstration sessions that were open for the public. Due to the participatory nature of these workshops the number of participants was restricted:

- Workshop on time, distance and reachability, Vienna, June 19th 2008: one participatory session with 15 participants

- Cergy-Pontoise, France, September 10th-14th: two participatory sessions, two demonstration sessions with 48 participants in total

- European City of science, Grand Palais, Paris: hundreds of active users, several thousand visitors.

WP7 Environmental Awareness

WP7 conducted several field trials with CityWall and MapLens demonstrators. CityWall has continued running as a permanent installation at Lasipalatsi, in the city centre of Helsinki. From Helsinki's Cultural Office's request the installation was moved from the street side of Lasipalatsi to the inner courtyard side of Lasipalatsi, which is not as busy spot with passing by pedestrians like the old place. Although the new location is not as visible as the old one, it still has cafes and people spending time there. The new 3D version was opened there 8th October, with press and outputting a YouTube video that grabbed more than ¼ million visits within its first two weeks. http://www.youtube.com/watch?v=IldDrCcZkZY. We estimate the users at the wall is somewhere between 150- 500 per week. The biggest event for CityWall was not in Helsinki, but in Paris: CityWall was exhibited with WP6 Mixed Reality Tent in the European City of Sciences exhibition at Grand Palais. The event was very popular among Parisians, attracting over 50 000 visitors in a few days. Thousands of users tried out the installation, and were video-ed and observed using, as well many answered presence questionnaires about the experience. MapLens prototypes were tested with users in outdoor field trials three times during 2008 with total of 41 users. We conducted our first trial in March, 2008 and then a series of three trials over three weekends in August, 2008.

WP8 TimeWarp

The TimeWarp game of WP8 was tested in August. During the field trials in summer, we conducted 10 test runs with 24 participants, whereas 8 were non IT-professionals. The participants were mainly students, IT-professionals and other people interested in gaming and digital entertainment.

WP9 City Tales

As the WP9 was restarted with the beginning of the actual reporting period, theoretical work and demonstrator implementations covered most of the work during the project phase. The 3 application demonstrators for mixed reality content retrieval, content authoring and location based content perception were tested in informal studies on small user groups. A total of about 10 users tested the systems in internal studies, documented studies with questionnaires and observation is to be conducted during the coming period.

The urban strategies workshop conducted in cooperation with the UniAK at the target region of "Naschmarkt" yielded a high level of interaction with the local people at the market place, who were questioned and involved in the collection of the base-line information.

Scientific cooperation with other projects or organizations

Scientific cooperation with other projects and organizations and their relevance to presence and Mixed Reality

- UOulu: Cooperation with University of Arts and Design, Helsinki, and with Department of Architecture, University of Oulu, in the Academy of Finland-funded Studio'n'site project in the are of mixed reality support for participatory urban design

- Uoulu: cooperation with City of Oulu in the Shanghai 2010-project (application of a City of Oulu demonstration booth in the Shanghai 2010 World Fair) on using mixed reality in urban space

- UOulu: Collaboration with City of Oulu and VTT Electronics in the SmartTouch-project on mixed-reality interaction experiments in urban space using near-field RFT technology

- FIT: Close cooperation with other researchers via the INTUITION NoE

- FIT: Close cooperation with PEACH Presence CA

- FIT: Collaboration with ExploAR project regarding MR learning environments

- FIT: Membership in EuroVR association

- FIT: Participation in Games Gathering Cologne cluster

- FIT: Membership in Cologne Competence Cluster VR

- FIT: Membership in VRCA (VR cluster Aachen)

- TUG: cooperation with PRESENCCIA e.g. on ubiquitous tracking

- TUG: cooperation with HydroSys

- TUG: cooperation with Vidente

- TKK: cooperation with Finland's environmental administration (SYKE) to provide content for CityWall related to environmental awareness

- TKK: MapLens user trials had in-kind sponsorship and collaboration with Nokia Research Center, and Natural History Museum, Helsinki, Finland.

- UCAM: cooperation with EPFL on natural feature tracking on mobile devices.

1.1.3 Training

Thesis

In this sub-section we list the individual B.Sc./M.Sc./PhD thesis finished within the scope of the project or closely related to the work of the project and supervised by members of the consortium

Candidate: Jan Herling
Supervisor: Wolfgang Broll

Type: Diploma (Master equiv.)

Title: Realization of an adaptive tracking system for ubiquitous Mixed Reality Environments

Date: 31.08.2008

Short Abstract:

In Mixed Reality (MR) environments the user's reality is augmented by virtual objects using computer based technologies. To allow for a precise geometric registration between real and virtual objects the exact user's viewpoint and viewing direction are necessary. This pose can be determined by different tracking approaches. In ubiquitous environments, tracking so far requires either the use of markers or 3D CAD models. However, the exact placement of the markers as well as the creation of the CAD models is very time-consuming and has to be done in advance. In this thesis, a feature based tracker suitable for indoor and outdoor scenarios was realized, extracting SURF-features from camera images of the environment. After an initialization step the tracker autonomously detects new features from its direct environment, determining their 3D positions and using them afterwards for pose estimation. Thus, this SLAM-like approach even allows for tracking in unknown environments. Therefore,

the usage of previously created 3D CAD models of the environment is not necessary as the tracker adapts to its current surrounding. Additionally, the system integrates existing sensors and tracking technologies, applying a situated weighting of their tracking data to achieve a more stable pose. The system achieves twice the update rate compared to existing approaches, operating in real time on mobile computers. Thus, the approach provides the basis for novel mobile applications in ubiquitous mixed reality environments.

Candidate: Katherina Garbe
Supervisor: Iris Herbst

Type: Masterthesis

Title: Spatial acoustics for mobile Mixed Reality applications

Date: 15.01.2008

Short Abstract:

In the context of this thesis, the MORGAN Framework developed at Fraunhofer FIT was extended by the possibility to render three-dimensional sound through using the open source library OpenAL. The internal scene graph of the framework was thereby supplemented with additional nodes that permit to map an external scene graph – like for example X3D – on these nodes. However, the internal nodes can be used directly, too. For the adequate rendering of 3D-Sound by means of HRTFs (Head-related transfer functions) an appropriate sound card was used. Two user tests with different Augmented Reality scenarios finally served for the examination of the implementation. The results derived from these tests were in the following already implemented partially in an additional effects extension that contains reverberation, echoes, filters, distortions etc.

Candidate: Johannes Löschner
Supervisor: Anne-Kathrin Braun

Type: Batchelorthesis

Title: Pattern-based Game Re-Design

Date: 15.10.2008

Short Abstract:

TimeWarp is a game played in urban environments and thus utilizes innovative mobile AR-technology. Evaluation of TimeWarp's first prototype drew attention to some insufficiencies in the game design. This bachelor thesis aims for redesigning Mixed Reality outdoor games to cover those issues. Due to the special features of TimeWarp, several approaches are investigated that would allow the game's redesign to be done theoretically and in a structured way. Based on the game design patterns approach by Björk and Holopainen, the game redesign is conducted and documented.

Candidate: Christian Weiland
Supervisor: Anne-Kathrin Braun

Type: Masterthesis

Title: Colorimetric and Photometric Compensation for See-Through Displays

Date: 01.02.2008

Short Abstract:

Optical see-through displays are widely-used in augmented reality. Though they exist for a number of years their appliance still has not achieved the maturity found with video projectors or other devices. One topic is the absence of including eye adaptation in the virtual image which results in inconsistent perception of the real and virtual part. The techniques to counter this effect are called colorimetric compensation algorithms. Another topic is the overlapping of radiance from reality and the radiance emitted from the projector of the see-

through display which causes the reality to interfere with the virtual image, leading to unpleasant disruptions. The techniques to reduce this effect are called photometric compensation algorithms. For colorimetric compensation many different approaches can be applied, most developed from tone reproduction, where the task is to create an image alike the adapted eye impression of a scene. They include different responses in rod and cone system, contrast sensitivity, neural adaptation, pigment bleaching and pigment regeneration. Only recent research [IFM05] covers the adaptation behavior in image streams. For photometric compensation there are algorithms which are capable to remove the background wall color from projected images using a projector-camera pair. Nevertheless they can hardly be transferred as with see-through displays the projected light does not interact with the reality. In this thesis a camera will be used to capture an environment image on which colorimetric and photometric compensation for the virtual part will be based. The algorithms from both domains need a considerable amount of computation time. As real-time is one of the demands with see-through displays, the algorithms in this thesis will approximate the effects where necessary.

Candidate: Stefan Mooslechner
Supervisor: Dieter Schmalstieg

Type: B.Sc.

Title: Stylus Calibration and Prop. Registration

Date: 2008

Short Abstract:

Virtual reality or augmented reality environments are not imaginable without tracked objects. These objects are the interface between the real and the virtual world. They are the heart of this application because they bring interaction to the scene. Normally, we deal with two forms of objects: On the one hand, we have a stylus, the VR equivalent of a pen. A stylus is a very generic way to interact with the environment. It is, therefore, most often used, just like a mouse on a desktop. But a stylus is only useful when it is well calibrated, i.e., when the top of the stylus is de_ned as exactly as possible. In the _rst part of this work, we implemented a simple and universal method calibrating a stylus. The built solution is an Opentracker module, so we provide a really exible opportunity for calibrating. On the other hand, we have props, tracked physical things with a virtual counterpart. Here, it is also necessary to register these props exactly. Bad registration of props will produce inexact and unsatisfactory incoming results. A good working prop registration is the topic of the second part of this work. This solution is also an Opentracker module in combination with an OpenInventor program. So, it is possible to register physical props in an easy and smart way.

Participants trained in field trials

This part lists the individual field trials and the corresponding number of participants, which actually received training on mixed reality related technology as part of these field trials.

- 63 active participants in participatory workshops, learning how to use the Urban renewal prototype

- Around 60 people attended the presentation on presence research within the IPCity project which was presented during the PEACH summer school.

- A total of 16 participants in the second TimeWarp prototype user trials were trained on fundamental aspects of using and interacting through Mixed Reality technology using hand-held MR devices.

- A total of 41 people were trained to use the mobile mixed reality application MapLens during the field trials.

- Hundreds of people were shown how to work with CityWall multi-touch display, color table and urban sketcher applications during European City of Sciences exhibition

- Around 25 people were shown how to work with color table and urban sketcher applications during the dissemination events organized in parallel to the Cergy-Pontoise workshop.

- Around 13 people were trained on how to work with color table and urban sketcher applications during the Cergy-Pontoise workshop.

Visits to foreign research labs

Markus Sareika (TUG)
Visited lab: Hit Lab NZ

Date: Sept. 18th, 2008 – Okt. 24 th, 2008

Contribution to project: UI development Urban Sketcher

Iris Herbst (FIT)
Visited lab: Hit Lab NZ

Date: January 15th, 2008 – March 31st,2008

Contribution to project: UI for mobile gaming

Hagen Buchholz (FIT)
Visited lab: Hit Lab NZ

Date: November 1st,2008 – December 1st,2008

Contribution to project: User generated content tools

Wolfgang Broll (FIT)
Visited lab: Hit Lab NZ and University of Otago

Date: November 24th,2008 – December 1st,2008

Contribution to project: Interaction tools, urban planning

Giulio Jacucci, , Peter Peltonen, Ann Morrison, Rodolfo Samperio (TKK)
Visited lab: UC Berkeley School of Information, California

Date: 15th April, 2008

Contribution to project: Dissemination

Giulio Jacucci, , Peter Peltonen, Ann Morrison, Rodolfo Samperio (TKK)
Visited lab: Berkeley Institute of Design (BID), California

Date: 17th April, 2008

Contribution to project: Dissemination

Giulio Jacucci, , Peter Peltonen, Ann Morrison, Rodolfo Samperio (TKK)
Visited lab: Communication between Humans and Interactive Media (CHIMe) Lab of Stanford University, California

Date: 18th April, 2008

Contribution to project: Dissemination

Giulio Jacucci, , Peter Peltonen, Ann Morrison, Rodolfo Samperio (TKK)
Visited lab: Nokia Research Center (NRC), Palo Alto, California

Date: 21th April, 2008

Contribution to project: Dissemination and cooperation planning

Jean-Jacques Terrin (UMLV)
Visited lab: Gaspard-Monge Institut, France

Dates: 16th January 2008 and 7th may 2008

Contribution to project: Dissemination

Exchange of specialists among consortium teams

This part lists the exchange of specialists among the individual consortium teams for training purposes (i.e. either specialists sent to another partner to train people there, or researchers sent to another partner to be trained on a particular issue in order to become a specialist).

Visits of senior researchers

The following senior researchers from outside the consortium visited project events or project partners:

Raimund Dachselt
Partner: FIT

Affiliation: Junior Professor and research team leader, Magdeburg University

Date: June, 16th, 2008

Jaakko Lehikoinen
Partner: TKK

Affiliation: Research Team Leader, Human Practices and Design, Nokia Research Centre

Date: 26th March 2008

David Frohlich
Partner: TKK

Affiliation: Director of Digital World Research Centre at the University of Surrey and Professor of Interaction Design

Date: 20th August 2008

Roderick Murray-Smith
Partner: TKK

Affiliation: Professor in the Department of Computing Science, University of Glasgow

Date: 19th September 2008

Mark Davis
Partner: TKK

Affiliation: Chief Scientist of Yahoo! Connected Life and VP of ESP

Date: 7th November 2008

Robert Jeansoulin and Venceslas Biri
Partner: UMLV

Affiliation: Research Team Leaders, Gaspard-Monge Institut, France

Date: 12th February 2008

Bruno Latour
Partner: UMLV

Affiliation: co-director of SciencesPo

Date: 14th November 2008

Erwann Minvielle
Partner: UMLV

Affiliation: economist at the Ministry of Public works and professor at the University of Cergy-Pontoise

Date: 15th November 2008

Khaldoun Zreik
Partner: UMLV

Affiliation: researcher in information and communication technologies, Paris8 University

Date: 15th November 2008

1.1.4 Exploitation

Patents

There were no patent applications from the consortium partners in 2008.

Standards

Within the previous working period no direct contributions to international, European, or national standards were made.

The project's Scientific Board takes note that concerning multimedia content, there could be a potential contribution towards standards. The technical implementation of the modules developed in the projects uses standards or de facto standards where appropriate, for example the use of X3D for graphics in Morgan in WP8 or SMS for the entrance tool in WP7. An independent contribution towards standards seems difficult because of the exploratory, iterative nature of the development, which defeats the objective of stable feature sets defined in advance. However, we are actively considering the re-use of code and data for standard problems across all showcases.

Industrial and other non-scientific collaborations
- FIT: Talks to gaming industry regarding standards for pervasive games

Components used by other projects or 3rd parties

This sub-section describes number of components developed in the project used by other projects or third parties (open source, licensed, etc.)

- Component: Distributed media entrance and management
  - Project name: Studio'n'Site
- Component: DEVAL device abstraction
  - Project names: IPerG, CoSpaces, ExploAR
- Component: Interaction Prototyping
  - Project names: Exploar
  - Gandhara exhibition Bonn and Berlin
- Component: 3D Reconstruction
  - Project name: WikiVienna
- Component: AR Scouting
  - Project name: Smart Vidente, Hydrosys
- Component: OpenTracker
  - Project names: Presenccia, Ariser, Vidente, Doctoral College "Confluence of vision and graphics", Pomar3D, Hydrosys
- Component: Colored objects tracking (AAU)
  - WP6: The ColorTable (TuW)
- Component: Vision based localization (AAU)

    o   WP5: Integrating with the Model-based Outdoor Tracking (UCAM)

Project Name: multitouch.fi. Dr Tommi Ilmonen, Esa Nuuro and John Evans.The start-up company multitouch.fi created to commercialize the technology still has three of the researchers that worked in WP7 in the company. The company successfully obtained local Finnish funding (TEKES), has successfully negotiated IPR with the University and has sold 10 small multi-touch cells, 10 large multi-touch cells, and two projector versions. They are expanding to employ more people to deal with the extensive orders for 2009. TKK works alongside multitouch.fi

1.2   Qualitative Indicators

In addition to the quantitative indicators used, the following qualitative measurement indicators will be used. This will include the following information and data:

1.2.1 Ethical and gender issues

Ethical issues

This sub-section provides an overview of the ethical issues that were raised by the showcases and how they were handled.

WP7 continued to address issues of privacy concerning a) content contributed by the users to the CityWall installation, which may be offending or otherwise inappropriate, and b) identity - people can get offended by the fact that their pictures are shown in a public place in a central location of a city. We instigated a moderation tool for ECS exhibition in Paris, which we will continue to develop.

WP6 reflected on the potential of the representational techniques (both images and sound) used in MR tools for manipulating users.

The work of WP6 and WP7 continued to address issues of empowerment, literacy, and participation, in particular the need for simplicity and transparency of the tools and afforded interactions. Major improvements concerning the simplicity of interactions with the ColorTable were made. WP6 also reports on user participation requiring intense preparation and sufficient time for understanding and engaging with the MR tools in order to be able to contribute in an informed way. WP7 increased the complexity of required interactions with its 3D interface in order to enable more sustained engagement from its participants.

WP8 noted that there is potential for people to ignore reality, thus causing potential safety problems to arise. This also results in a situation where interaction with real people is minimal thus leading to potential issues with social isolation when using the mobile AR systems..While none of these problems resulted in harm to the users they are issues which are being further explored.

Much like other shared multi-user systems City Tales has to cope with the issue of personal vs. public information, anonymous vs. personalized representation of the user's contribution and the representation of the person at runtime. Being a research system at the moment all users are "friendly" users. To bring the system to real world applications however we think this issue can be crucial. We will pay special attention to this problem during our evaluation and testing with the "friendly" users in order to gain experience with privacy issues in this environment as there is little or no previous experience in this field.

Recommendations

The Scientific Board could not observe problems with ethical issues. It practice in our experiments involving real users that all test subjects give informed consent to their participation throughout the trials. In the limited, supervised trials sensitive issues were typically not touched. When conducting larger, unsupervised trials or trials with unknown users (such as in freely accessible public installations), no sensitive data was recorded without consent.. In all cases, supervision occurs when recording is performed for scientific purposes.

Gender issues

Some changes in personnel have taken place in Year III of the project and according to the gender plan women have leading project positions:

- TKK: Ann Morrison lead WP7 from Jan 2008.

- FIT: Anne-Kathrin Braun lead WP8 from Jan 2008

- TUW: Valérie Maquil lead WP6 from March 2008

Further, project teams heavily rely on woman as junior researchers:

- FIT: Lisa Blum will join the IPCity team from Jan 2009
- UMLV: Sevasti Vardouli has joined the IPCity team from November 2007
- Lisa Ehrenstrasser has joined the IPCity team from October 2007

In the MapLens trials WP7 in August, 2008, we looked to address gender issues in multiple ways. The first two trials were comprised of largely professionals working in related fields, early-adopters, and researchers working with environmental issues. The third trial was comprised of scouts and their friends and families. The scouts teams were younger, predominantly male, less aware of environmental issues, with less expertise with technology, and understandably less tertiary qualifications. Over the three trials, we enlisted 37 people with ages ranging from 7 years to 50 years, 20 females and 17 males. 21 had owned five or more mobile phones, with 22 owning or using regularly Nokia brand, and one unfamiliar with a mobile phone. All phone owners used their phones for at least SMS and phone calls.

In the third trial the scout groups were randomly allocated between the augmented (MapLens) and the digital (DigiMap) systems. We had actively sought a higher proportion of female users for the earlier trials in an effort to ensure gender differences in using technology were anticipated in the early design and deployment stages (Liff & Shepherd, 2004). As well we looked to avoid problems with uneven distribution with an assumed younger and more male distribution in the scout user group anticipating corresponding difference in patterns of use between same sex pairings, and participation styles (Prinsen et al., 2007) and bearing in mind research on linguistic and lexico-grammatical differences in male and female language use (Poynton, 1989). Recent studies find a more collaborative approach in female pairings, differences in turn-taking and more or less aggressive styles between the genders in technology enhanced collaborative learning environments (Benford et al., 2000, Maurin et al., 2006, Prinsen et al., 2007). The profiles of early adopters of technology support our self-reported demographic findings that show these users have more formal education and exposure to mass media channels of communication (Rogers, 1976).

Across all the trials, 19 users of MapLens were female with a higher education level, as well as more knowledge of ICT, navigation, local and environmental awareness and technology use, whereas DigiMap users were predominantly younger males (10) with less expertise in these areas.

References:

Benford, S., Bederson, B., Åkesson, K., Bayon, V., Druin, A., Hansson, P., Hourcade, J.P., Ingram, R., Neale, H., O'Malley, C., Simsarian, K.T., Stanton, D., Sundblad, Y. and Taxén, G. (1999). Designing storytel-ling technologies to encourage collaboration between young children. In Proc CHI'2000 ACM Press, 556-563.

Liff, S., Shepherd, A. An evolving gender digital di-vide? Oxford Internet Institute, Internet Issue 2, 2004.

Maurin, H., Sonnenwald, D. H., Cairns, B., Manning, J. E., Freid, E. B., and Fuchs, H. 2006. Exploring gender differences in perceptions of 3D telepresence collabora-tion technology: an example from emergency medical care. In Proc. NordiCHI (2006) pp. 381-384.

Poynton, C. (1989). Language and gender: Making the difference. New York: Oxford University Press

Prinsen FR., Volmann MLL., Terwel J, 2007, Gender-related differences in computer-mediated communica-tion and computer-supported collaborative learning JCAL, Wiley (2007), 393-409.

Rogers, Everett M. New Product Adoption and Diffu-sion. JCR, 2 (1976), 290 -301.

1.2.2 Overall project objectives

Please note that the progress towards the overall project objectives is not reported within this deliverable, but in Deliverable D1.10 – Annual Progress Report.

Adequacy of showcase structure

The project's Scientific Board evaluates the overall showcase structure regarding their representation and covering of the project's objectives. It then provides recommendations for modifications of the overall structure as well as for the further development of individual showcases. Those recommendations will be reflected in the detailed implementation plan for the next period.

The Scientific Board finds that the showcases overall are well suited to cover the objectives of the project. At the core, all showcases involve the interaction of real, non-technical users in outdoor environments with and through Mixed Reality technologies. Where necessary, adjustments have been done during Year 3.

After the exit of Sony at the beginning of year 3, the Showcase WP9 City Tales was re-defined with the help of the new partner IMAG. During regular checks with the overall project objectives it was noted that some plans regarding WP9 were too much based on technologies developed outside of IPCity rather than applying technologies developed in the research work packages in practical user tests (actually the primary purpose of showcases). Thus, some corrective measures were applied, but will require further attention by the Scientific Board.

The success of the research of Large-Scale Event in WP7 led to an adjustment. Several publications in the best publication forums including two best paper awards were achieved in 2007. Other achievements include the inclusion in official programs of events, participation in all most important Helsinki Events, public Installation with tens of thousands users and the founding of a start-up company as the most successful exploitation.

Rather than focusing on more incremental publishing after the initial success, WP7 was re-aligned to start with a new and fresh brief to keep the creativity level high. The new topic, Environmental Awareness, is of growing importance in European cities. Moreover, the new topic will allows overcoming the problem that events last only few days and therefore are not ideal for trials that require longitudinal studies. The environmental awareness brief continues to be addressed in WP7.

Relevance to presence and mixed reality

The Scientific Board further evaluates each activity regarding their relevance to presence and Mixed Reality (under particular consideration of the overall urban context of the project).

The Scientific Board finds the activities conducted in Year 3 generally relevant to the study of Presence in Mixed Reality environments.

- WP6 is primarily focusing on urban renewal projects and interventions. In their analysis of the presence and interaction aspects they emphasize the relevance of dynamic representations (flow, movement, sketching on a scene); characteristics of the content (fuzziness, stimulating combinations of realistic and abstract, narrative and expressive content); agency (participants' co-constructing, performing, dynamically enacting MR scenes); sense of place and culture; materiality (the engaging capacity of objects); spatial aspects (spatial alignment of tools and views, scale/depth/volume, orientation, and so forth).

- WP7 continues to research mixed reality with its tangible interface that is available to the general public in an urban environment. The architecture allows for physical intervention and contributes by extending available interventions of presence and mixed reality in the urban environment. MapLens continues this work and extends place-making and collaboration with its digital-physical technology, where players

are present to the game and the technology more than was found with a comparison digital-only group.

- WP8 has specifically explored the relationship between MR content and presence across the spectrum of experience from real to purely virtual. It has explored this from the perspective of social, temporal and physical presence as well as with specific respect to aspects such as place and elements in the WP3 concept map. The result is a more thorough exploration of the effect of mixed realities on "where" people feel and with "whom". In particular how connected or otherwise such experiences need to be in reality in order to create unified (continuous) experiences or to highlight boundaries between different mixed-reality locations.

- WP9 has been restarted in Year 3 after the replacement of partner Sony with partner Imagination. A new scenario was developed, which focuses on the joint contribution of artists who express their relation to the urban environment, and the active and passive participation of ordinary citizens. The target location Naschmarkt in Vienna is a lively environment which lends itself to fueling the theme of the showcase. This approach much better resonates with the theme of "City Tales" and its foundation in urban presence.

1.2.3 Involvement of user groups

Overview of kinds of user groups involved

WP6: Showcase 1: Urban Renewal

For the participatory workshop Caserne Bossut in Cergy Pontoise, WP6 involved several user groups:

- **Urban experts:** two members of the scientific board of the summer school "Les Ateliers"

- **Local Authorities :** an urban planning director at the metropolitan authority (CACP); a general director of the services of the City of Pontoise; an urban planner of "Département Aménagement et Maîtrise d'ouvrage, CACP" ; a Design Assistant at the cartography service, CACP; a person in charge of communication between the university and the CACP

- Cergy-Pontoise University Professors: 3 professors

- **Users & associations:** a policeman working on the site; researchers working at the building next to the site; two members of the association "Energies piétons cyclistes"; a representative of "Theatre Apostrophe"- national scene of Cergy Pontoise and Val d'Oise; a Director of UVOL Theater Company; a Director of City Management unity (Chamber of Commerce); a representative of Pontoise City Manager

For the workshop in Vienna, WP6 cooperated with a class of 15 students of UniAK's postgraduate program `Urban Strategies´.

Several architects and sound specialists participated in smaller hands-on workshops with the ColorTable in Vienna.

The largest audience was at European City of Sciences exhibition at the Grand Palais. In Paris. Visitors were some professionals (architects, urbanists), school groups, and a general public population, including many children.

WP7: Showcase 2: Environmental Awareness

In WP7 the CityWall installation continues as a permanent installation setup in the city centre of Helsinki since the beginning of May 2007. It has been available for general public all the time and has had an estimated average of a 150-500 users per week, depending on activity in the area. From Helsinki's Cultural Office's request the installation was moved from the

street side of Lasipalatsi to the inner courtyard side of Lasipalatsi, and we took footage of use of CityWall by a passing public to judge the comparative use in its new location. The new 3D version was opened there 8th October, with press and outputting a YouTube video that grabbed more than ¼ million visits within its first two weeks. http://www.youtube.com/watch?v=IldDrCcZkZY. Most of the visitors were either part of the large international multitouch community, new technology users or e.g school groups.

The largest audience was Paris at European City of Sciences exhibition at Grand Palais. Visitors were professionals working with, and individuals and groups interested in new sciences and technology, as well as visiting school groups, and a general public population.

For MapLens the user groups were comprised of largely professionals working in related fields, early-adopters, and researchers working with environmental issues, as well as teams of scouts and their friends and families. The scout teams were younger, predominantly male, less aware of environmental issues, with less expertise with technology, and understandably less tertiary qualifications. The predominant users of MapLens though, were female with a higher education level, as well as more knowledge of ICT, navigation, local and environmental awareness and technology use.

WP8: Showcase 3: TimeWarp

In the TimeWarp field trials several kinds of user groups were involved. The great part of the participants consists of students in computer science or in communication studies. Furthermore IT professionals, who were partly familiar with AR technology, took part in some test runs. Non-IT participants such as journalists were also involved.

WP9: Showcase 4: City Tales

Participants of our first informal studies were IT professionals and students of Informatics. Both user groups were familiar with IT technology, 3D visualization and partially with Augmented Reality technology.

Additional user groups to be addressed

The project's Scientific Board reviews the user groups involved and tries to identify additional user groups missing, providing recommendations which of them should be addressed by existing and future showcases.

WP6 will organize another event close to Paris and engage in the preparation of citizens and for an in-depth participatory workshop events. TUW also plans a participatory workshop in cooperation with the University of Oslo, in which new user groups will be involved.

In WP7, the new topic Environmental Awareness will include citizens concerned with ecology of cities, alongside citizens unaware of and introduced to these issues, as well as the general passing public.

The new scenario investigated in WP9 by Imagination is planning to involve a more diverse user group, such as general public at the selected target region of Naschmarkt market place and artists or students of art who express themselves through mixed reality technology.

1.2.4 Publications and presentations

Assessment of type and quality of publications

The Scientific Board finds that there is a good level of publication success in Year 3. Particularly noteworthy is the success of WP7 in the well-respected ACM CHI conference again, with again a nomination for best paper award (two years in a row), this time with the second application MapLens. As well WP7 has a publication the well-respected ACM MM conference. A publication from WP8 on TimeWarp received a best paper award at the ACM MobileHCI. Also several publications are accepted at well respected venues, such as IEEE Virtual Reality, IEEE ISMAR or GROUP. Another noteworthy publication activity is the workshop on "Workshop on Urban Mixed Realities - Technologies, Theories and Frontiers", organized by IPCity researchers at the CHI 2008 conference in Florence, and the future Multitouch and Surface Computing Workshop at CHI 2009. The Scientific Board suggests

that in Year 4, it may be time to consider an increased number of journal publications summarizing the results of work achieved so far. A submission of the IPCity conceptual work to a well-established journal was recently made towards that aim.

Citation index

For the publications of 2008, the following were cited:

Gerhard Schall , Erick Mendez , Ernst Kruijff , Eduardo Veas , Sebastian Junghanns , Bernhard Reitinger, Dieter Schmalstieg, Handheld Augmented Reality for Underground Infrastructure Visualization, ACM Personal and Ubiquitous Computing Journal, 2008 (Citation index 4)

Peltonen, P., Kurvinen, E., Salovaara, A., Jacucci, G.,, Ilmonen, T., Evans, J, Salovaara, A, Oulasvirta, A. '"It's Mine, Don't Touch!": Interactions at a Large Multi-Touch Display in a City Center' to appear in proc. of ACM Computer Human Interaction 2008 (CHI 2008) (Florence, Italy, April 5 – 11, 2008), ACM press. (Citation index 2)

McCall, R., Wagner, I., Kuutti, K., Jacucci, G., and Broll, W. 2008. Urban mixed realities: technologies, theories and frontiers. In CHI '08 Extended Abstracts on Human Factors in Computing Systems (Florence, Italy, April 05 - 10, 2008). CHI '08. ACM, New York, NY, 3973-3976. DOI= http://doi.acm.org/10.1145/1358628.1358970 (Citation index 1)

Herbst Iris, Braun Anne-Kathrin, McCall Rod, Broll Wolfgang, TimeWarp: Interactive Time Travel with a Mobile Mixed Reality Game. Proceedings of the 10th international Conference on Human Computer interaction with Mobile Devices and Services (Amsterdam, The Netherlands, September 02 - 05, 2008). MobileHCI '08. ACM, New York, NY, 235-244 (Citation index 2)

For the publications of 2007, the following journal articles and conference papers were cited:

Jacucci,, G., Wagner, I., (2007). Performative Roles of Materiality for Collective Creativity, Leonardo Journal, Special Issue. (Citation index 7)

Reitinger, Bernhard, Zach, Christopher, Schmalstieg, Dieter (2007). „Augmented Reality Scouting for Interactive 3D Reconstruction". In Proc. of IEEE Virtual Reality 2007 Conference (VR 2007), March 10-14, 2007 (Charlotte, NC, USA), IEEE, Piscataway, NJ, USA, 2007, 219-222. (Citation index 4)

Wagner, Schmalstieg (2007). "Muddleware for Prototyping Mixed Reality Multiuser Games". In Proc. of IEEE Virtual Reality 2007 Conference (VR 2007), March 10-14, 2007 (Charlotte, NC, USA), IEEE, Piscataway, NJ, USA, 2007, 235-238. (Citation index 7)

Maquil, Valérie, Psik, Thomas, Wagner, Ina, Mira Wagner (2007) "Expressive Interactions Supporting Collaboration in Urban Design". In: Proceedings of GROUP 2007, Nov 4 - 7, Sanibel Island, Florida, USA (Citation index 2).

Jacucci, G., Oulasvirta, A., Ilmonen, T., Salovaara A., Evans, J., "CoMedia: Mobile Group Media for Active Spectatorship". In Proceedings of the SIGCHI conference on Human factors in computing systems, ACM, 2007, pp. 1273 – 1282. (Citation index 7)

McCall, R, Kuutti, K., Wagner, I. & Jacucci, G. (2008) "Urban Mixed Realities - Technologies, Theories and Frontiers". ACM Computer Human Interaction 2008 (CHI 2008) Extended abstracts proceedings. (Citation index 1)

The following workshop papers published in 2007 were cited:

Pirchheim, Schmalstieg, Bornik (2007). "Visual Programming for Hybrid User Interfaces". Proceedings of the Second International Workshop on Mixed Reality User

Interfaces 2007 (MRUI'07) at IEEE Virtual Reality 2007 (VR 2007), (Charlotte, NC, USA, March 10, 2007), Shaker Verlag, Aachen, 25-32. (Citation index 1)

Schall, Gerhard, Mendez, Erick, Reitinger, Bernhard, Junghanns, Sebastian, Schmalstieg, Dieter (2007). „Mobile Geospatial Augmented Reality using Urban 3D Models". Workshop on Mobile Spatial Interaction (in conjunction with ACM CHI '07), 2007. (Citation index 7)

Rod McCall, Sabiha Ghellal, Joachim Rothauer (2007). "Mobile Phones, Sub-Culture and Presence". ACM Computer Human Interaction 2007 (CHI 2007) Workshop on Urban Mobile Spatial Interaction (San Jose, USA, April 28th – May 3rd, 2007). (Citation index 1)

G.P. Nguyen, H.J. Andersen, and M.F.Christensen (2008). "Urban building recognition during significant temporal variations". IEEE 2008 Winter Vision Meetings, Workshop on Application of Computer Vision (Citation index 1)

And finally, the following publication from 2006 was cited:

Broll, Wolfgang, Ohlenburg, Jan, Lindt, Irma, Herbst, Iris, and Braun, Anne-Kathrin. "Meeting Technology Challenges of Pervasive Augmented Reality Games". In Proc. of ACM Netgames 2006 (Singapore, Oct. 30-31, 2006) (Citation index 9)

Invitations to journals and presentations

Invitations to publish in journals and invitations to talks, presentations, and demonstrations at conferences

- The members of the CHI 2008 workshop were responsible for publishing a special issue of the Psychology journal.

- UMLV has been invited to present IPCity project in an issue of *Flux International Scientific Quarterly on Networks and Territories* devoted to the use of numeric communication and urban change.

- UMLV has been invited to present IPCity project in an issue of the internal newsletter of the University of Cergy-Pontoise, *Allez Savoir*,

- UMLV has been invited to present IPCity project and European City of Science in the professional review *Le Moniteur*

- UMLV has been invited to present IPCity project at a CNRS research prospective meeting

- UMLV has been invited to present IPCity project Ecole Nationale des Ponts et Chaussées (Master Amur).

- Imagination has been invited to participate at an Innovation Workshop on LBS Technology in 2009

- FIT has been invited to publish its article on TimeWarp (Best paper award at ACM MobileHCI conference) in the MobileHCI journal. The submission is planned for early 2009.

- TUW was invited to present the IPCity project at the University of Oslo.

Assessment of invitations

Dissemination through invitations has been somewhat increased. Several principal investigators were able to present IPCity work as part of their regular networking activities. In particular, the SB would like to mention the success of establishing a collaboration with outstanding researchers in New Zealand (HITLabNZ and U. Otago) through an exchange grant, IRSES. This will foster much stronger future joint activities.

Joint publications

In 2008 there were at least 8 joint publications by the project consortium:

McCall, R., Jacucci, G., and Broll W (eds). Editorial Preface. Psychology Journal. Pp113-116. ISSN 1720-7525. www.psychology.org

McCall, R., Wagner, I., Kuutti, K., Jacucci, G., and Broll, W. 2008. Urban mixed realities: technologies, theories and frontiers. In CHI '08 Extended Abstracts on Human Factors in Computing Systems (Florence, Italy, April 05 - 10, 2008). CHI '08. ACM, New York, NY, 3973-3976. DOI= http://doi.acm.org/10.1145/1358628.1358970

Maquil V, Sareika M, Schmalstieg D., Wagner I. (2009) MR Tent: A Place for Co-Constructing Mixed Realities in Urban Planning. GI 2009 (paper submitted).

Wagner I., Basile M., Ehrenstrasser L., Maquil V., Terrin J., Wagner M. (2009) Supporting the Formation of Communities of Practice: Urban Planning in the MR-Tent. In: C&T 2009 (paper submitted).

Boerner A., Maquil V. (2009) Enhancing synergies between computer science and urban disciplines. In: CAAD futures (abstract accepted).

Morrison, A., Jacucci, G, Peltonen, P., Juustila, A., & Reitmayr, G. Using locative games to evaluate hybrid technology. British HCI workshop: Using locative games to evaluate hybrid technology, Liverpool, September 1-5, 2008. Accepted as workshop paper and presented.

Sabiha Ghellal, Rod McCall, Jan Ohlenburg, Steffen Harrer (2008). "12 Mixed Reality Principles of Animation – Based on Disney's Principles of Animation". ACM Computer Human Interaction 2008 (CHI 2008) Workshop on Urban Mixed Realities - Technologies, Theories and Frontiers (Florence, Italy, April 5 – 11, 2008).

FIT, TKK, TUG, TUW, UMVL, and UOulu cooperated in writing a paper 'On presence in mixed reality' submitted to RAVE 2009 and the special issue of the PRESENCE journal.

Assessment of joint publications

The Scientific Board finds that the number of joint publications acceptable. Multiple papers from IPCity participants have been presented or are being prepared. The SB is happy that a publication on the conceptual level, related to WP3, has now been submitted.

1.2.5 Cooperation within project consortium

Contributions of project partners to the IPCity newsletter

The base for contributions to the IPCity newsletter broadened considerably from previous year, when it was largely produced by the editor of the newsletter, Uoulu. This year other partners than Uoulu contributed already about 30% of the newsletter content.

Contributions of the work packages to the IPCity web page

Each research work package has provided the content to the corresponding section to the IPCity website. The content, comprising of text, images, illustrations and links is then placed to the website either by the workpackage responsible person, or as usual, by WP2 webmaster. After the initial setup of the website, there have been two update rounds to the work package sections in the website.

Contributions to joint deliverables

WP1

All project partners represented in the Executive Board contributed to D1.10 – Annual Progress Report for Year 3.

Deliverable D1.11 – Evaluation Summary Report for Year 3 received contributions from all partners represented in the Executive Board, most members represented in the Management Board and the Scientific Board.

Deliverable D1.12 – Detailed work plan for months 37 – 51 is based on contributions from the Executive Board members and minor input from the other project partners.

WP1

UCam DENG 5% · IMAG 5% · UMLV 0% · TKK 0% · AAU 4% · UniAK 5% · UOulu 6% · TUG 8% · TUW 12% · FIT 54%
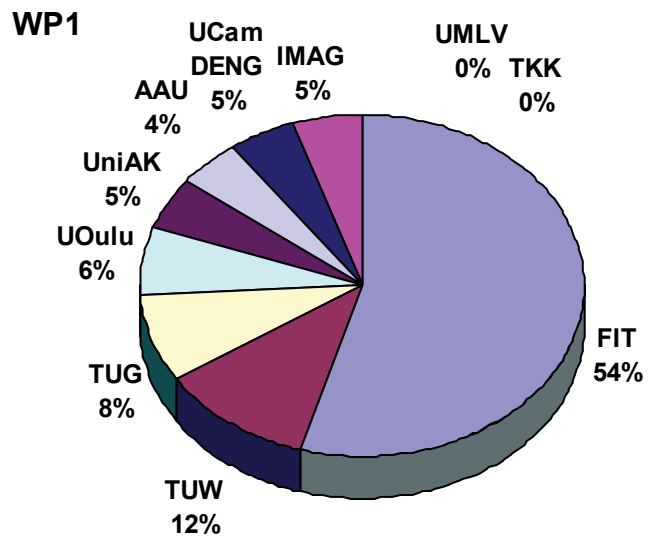
WP2

While dissemination was done by almost project partners, the deliverable D2.4 was mainly assembled by UOulu with minor input from other project partners.

WP2

Ucam DENG 10% · IMAG 0% · UMLV 0% · FIT 29% · TKK 0% · TUW 5% · TUG 13% · UOulu 29% · UniAK 9% · AAU 6%
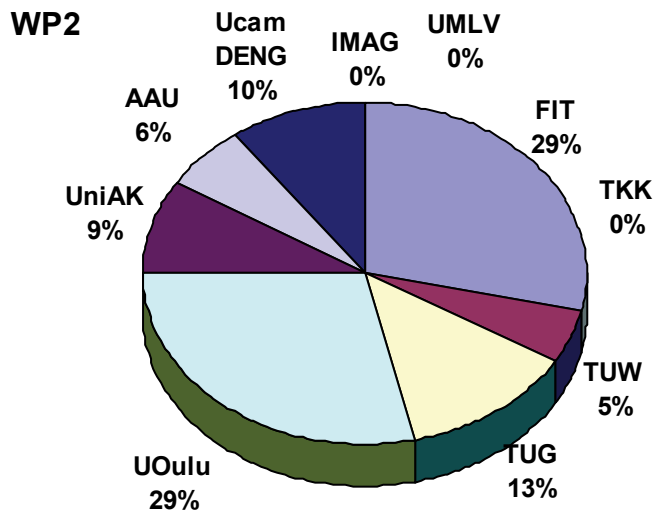
WP3

The preparation of D3.4 benefitted from the intense engagement of FIT, HIIT, UMVL, UniAK, Uoulu, and TUW in the form of field trials and their analysis and contributions of texts. TUW, UMVL and FIT cooperate closely in sound research.

FIT, TKK, TUG, TUW, UMVL, and UOulu cooperated in writing a paper 'On presence in mixed reality' submitted to RAVE 2009 and the special issue of the PRESENCE journal.

WP3

IMAG 0% · FIT 13% · UMLV 0% · AAU 0% · UCam DENG 0% · TUW 49% · TUG 0% · UOulu 12% · UniAK 1% · TKK 25%
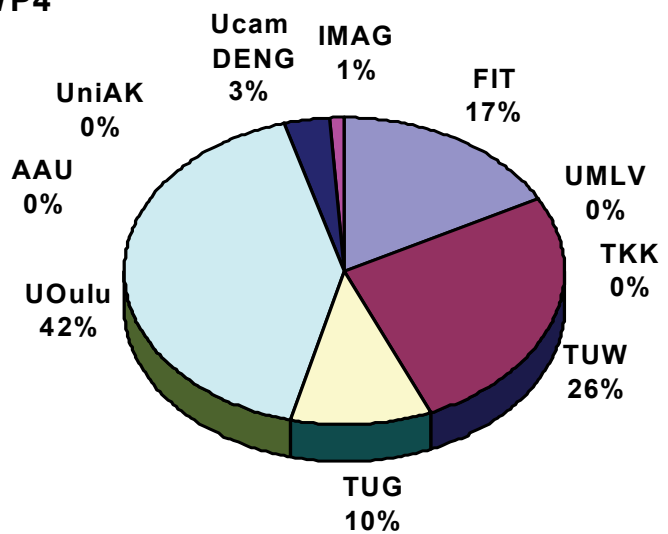
27
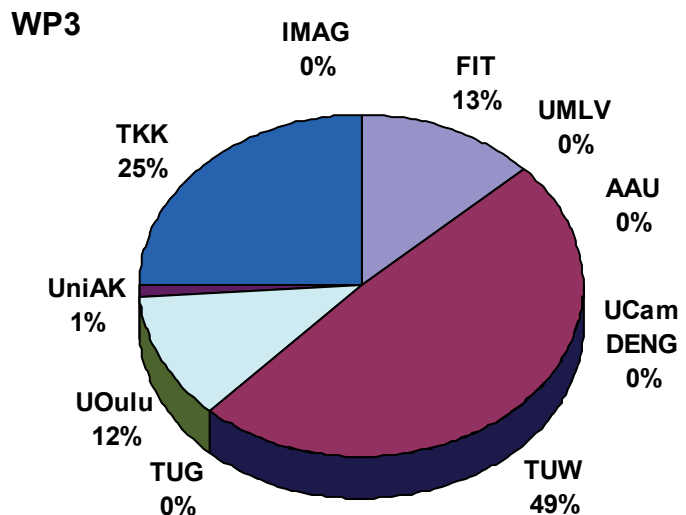
WP4

All partners involved in the research work contributed to the deliverable D4.2 and described the components and tools they worked on. FIT and TUG jointly wrote the section on the shared vision of the research work packages WP 4 and WP 5. FIT finalized the document.

Each partner contributed to at least two of the building block (aligned with D4.3), while some building blocks contain different technologies from single partners, the activities within the building blocks was coordinated and discussed by the involved partners. The following diagram shows partner contribution to each of the building blocks.

WP4 building blocks (aligned with D4.3) and contributing partners:

- Authoring:
  - FIT, TUW, UOulu, UCam

- Data and Event Distribution:
  - FIT, TUG, UOulu

- Interaction:
  - FIT, TUW, UOulu, TKK, UCam

- Ambient Displays:
  - TKK, UCam

WP4

UOulu 42%
UniAK 0%
AAU 0%
Ucam DENG 3%
IMAG 1%
FIT 17%
UMLV 0%
TKK 0%
TUW 26%
TUG 10%

WP5:

All partners engaged in the infrastructure research work contributed to the deliverable D5.3 and described the components and tools they worked on.

Each partner contributed to the development within the building blocks which contain different technologies from single partners, the activities inside the building blocks were coordinated and discussed by the involved partners.

Building blocks of WP5 (aligned with D5.3) and contributing partners:

- Tracking:
  - UOulu, UCAM, TKK, AAU

- Storage / Content:

WP5

UCam DENG 17%
IMAG 1%
FIT 4%
TUW 8%
TKK 0%
UMLV 0%
TUG 32%
UOulu 21%
UniAK 2%
AAU 15%

28
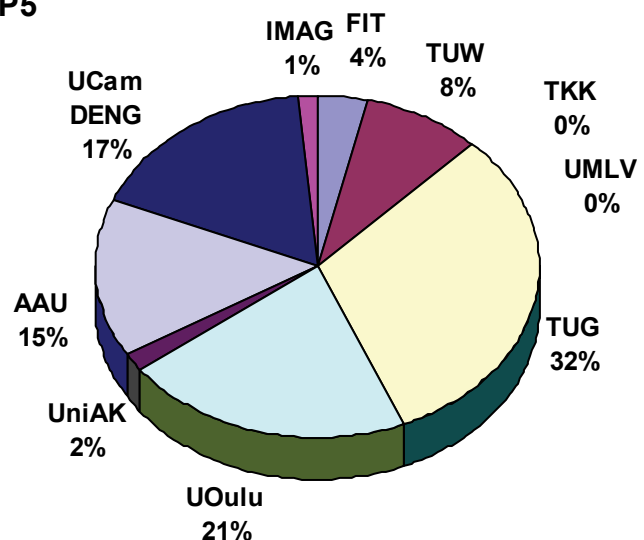
- o UOulu, TUW

- Computation:

 - o FIT, TUG

- Mobile AR/MR

  - o TUW, TUG, FIT, UniAk

WP6

In WP6 UniAK, UMVL, and TUG joined TUW in preparing and carrying out field trials, analyzing the results, and contributing texts to D6.3. TUW and TUG as well as TUW and UMVL wrote 2 full papers submitted to conferences together.

WP6

IMAG 1% FIT 1% UCam DENG 0% TKK 0%
UMLV 0%
AAU 11%
UniAK 16%
UOulu 5%
TUG 14%
TUW 53%
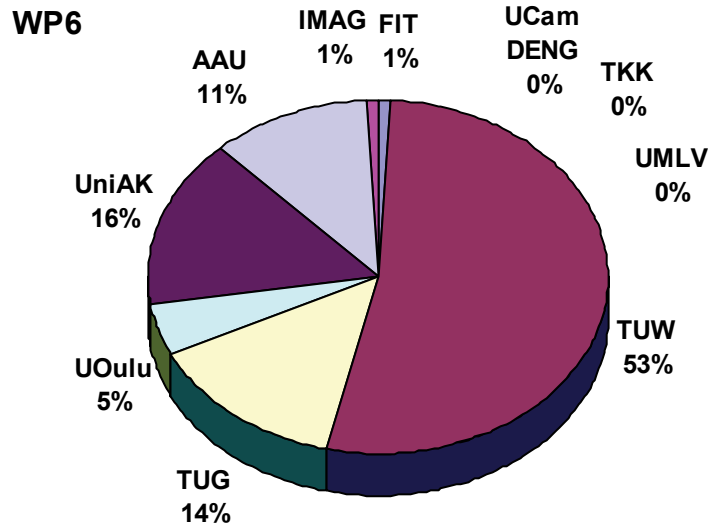
WP7

In WP7 field trials were prepared, implemented and analyzed by TKK researchers with the cooperation of UOulu, UCam and TUG, as well as in-kind sponsorship by Natural History Museum, Helsinki, Finland, and some in-kind sponsorship and collaboration with Nokia Research, Helsinki, Finland and Ministry for the environment, Helsinki, Finland.

WP7

UCam DENG 1% FIT 1% TUW 1% TUG 9%
TKK 79%
UOulu 9%
UniAK 0%
AAU 0%
IMAG 0%
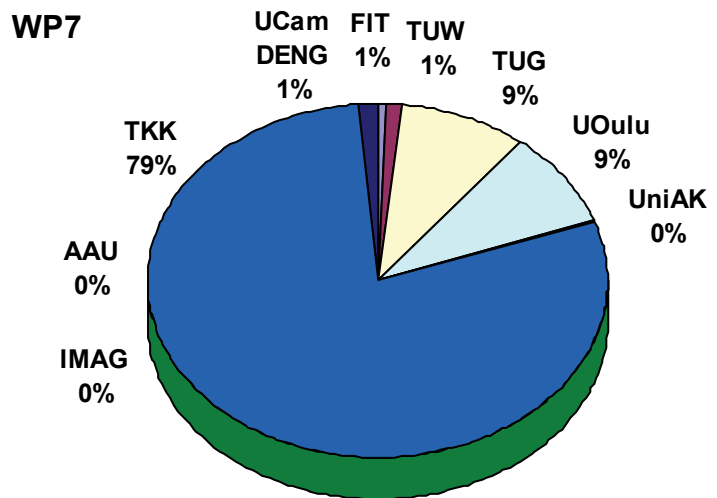
WP8

In WP8 FIT was supported by IMAG, TUW in designing the game for the second prototype and in 3D modeling of the virtual objects. Furthermore, FIT collaborated with TUG and UCAM to integrate tracking functionalities in the TimeWarp application.

WP8

IMAG 14% TKK 0% UMLV 0%
UniAK 1%
TUG 3%
TUW 6%
AAU 0%
UOulu 0%
UCam DENG 0%
FIT 77%
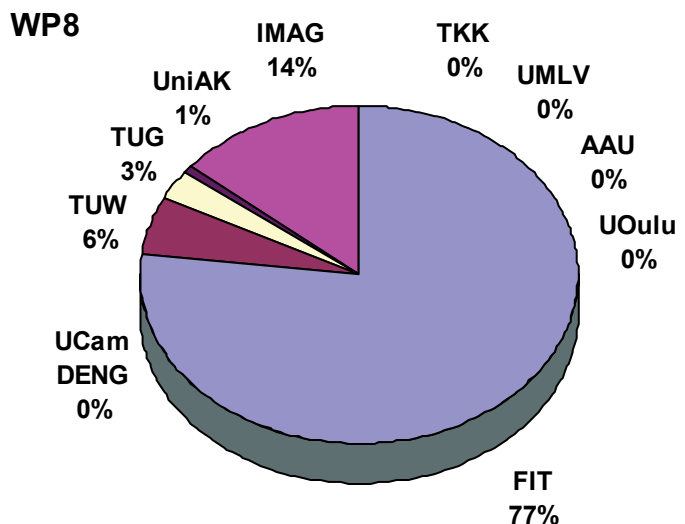
WP9

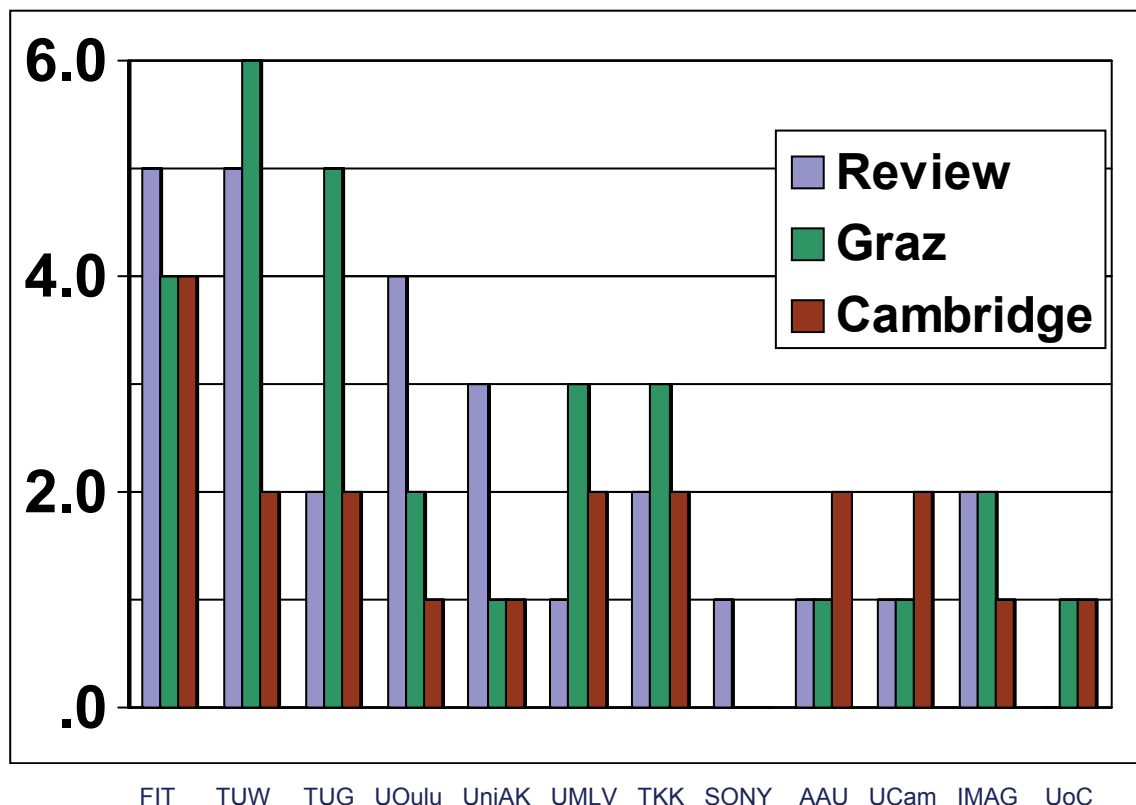In WP9 IMAG collaborated tightly with UniAK in the target area selection and workshop preparation to asses the Naschmarkt from a wide number of perspectives. FIT and IMAG work together on content creation and the integration of Morgan data into the Second City database. Application demonstrators developed by IMAG integrate technologies developed partially be TUG. FIT supported IMAG on understanding and handling of the Concept Map.

WP9

- FIT 9%
- TUW 2%
- TUG 2%
- UOulu 1%
- UniAK 2%
- TKK 0%
- AAU 0%
- IMAG 84%
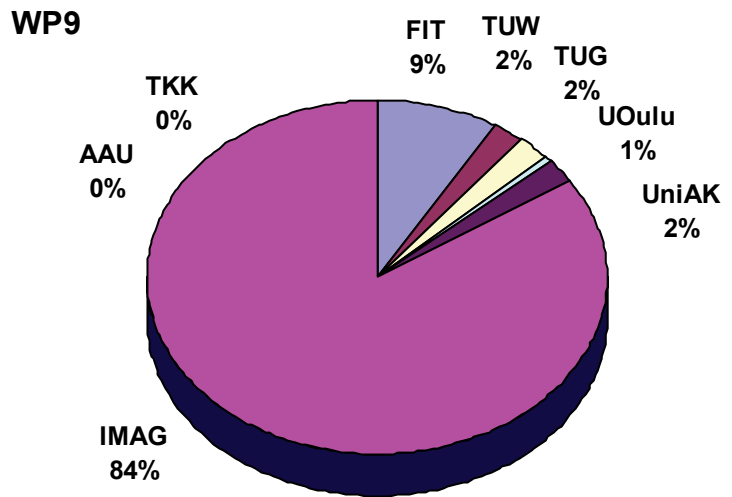
Participation in general meetings

All project partners participated in regular project meetings, i.e. the review meeting in Barcelona, the general project meeting at TUG in Graz, and the general meeting at UCAM DENG in Cambridge. The overall number of participants from each partner to those meetings is shown in the diagram. Further, most project members participated in the European City of Science exhibition in Paris.

Legend: Review, Graz, Cambridge — partners: FIT, TUW, TUG, UOulu, UniAK, UMLV, TKK, SONY, AAU, UCam, IMAG, UoC

Interaction among disciplines beyond current work plan

According to the overall and the detailed implementation plan there is a significant amount of interaction among disciplines within the consortium on three different levels:

- o By different partners within individual research work packages in order to benefit from the individual expertise, cooperated on new topics, and combine different yet separate technologies.

- o By different partners within individual showcases in order to create integrated Mixed Reality applications, to carry out the corresponding field trials, and evaluate their results.

- o Between different partners from research work packages and showcases in order to apply research results to the showcases and receive feedback regarding future research.

Beside those, this sub-section lists additional interaction among disciplines and partners, not originally foreseen in the work plan, which evolved from individual needs or emerging perspectives.

- TUW, UMVL, and FIT further cooperated in sound research. This topic has emerged from the showcases 1 and 3 (WP6 and WP9). After initial interaction on this topic sound research was added as objective to WP3 (from a conceptual point of view) and to WP5 (from a technical point of view) to provide research results to all showcases. As research is split between WP3 and WP5, the close cooperation on this topic will glue together WP3, WP5, WP6, and WP8.

- Oulu, TKK, UCam and TUG cooperated in the development of MapLens technology

- Oulu and TKK cooperated in the development of CityWall technology

- AAU and TUW collaborated to test, improve and extend the color tracking for the ColorTable.

- Oulu and TUW collaborated in the joined development of the HMDB.

- TUG and TUW collaborate in developing the MR technologies, a joined effort in combining the Color Table and Urban Sketcher.

- TUG and Oulu and TKK worked on the Dotted Map Tracking

- TUG and UCAM collaborated in various tracking developments

- UCAM and AAU are collaborating on the integration of image-based localisation and model-based tracking.

- UMLV and TUW collaborated on building up a cultural probes session to better participant contribution

- UMLV, TUW, UniAk and TUG collaborated on workshop scenario development

- UMLV, TUW and UniAk collaborated on the preparation of visual and sound content

- IMAG and UniAK collaborated in the target area investigation

- IMAG and FIT started collaboration on the content integration of WP8 into Second City database

- UniAk and TUW collaborated on workshop scenario development and ColorTable redesign (rules and interaction)

2.   Work Package Specific Indicators

This section contains the results based on individual indicators to measure the success and impact of the individual research and showcase work packages. These indicators were defined in the revised deliverable D1.2 and were based on the success criteria for the individual work packages as specified in the description of work. No additional success criteria for WP2 were specified in this section, as those criteria are already completely covered by the overall quantitative and qualitative success criteria (see previous section).

1.3   WP3 Research Activity: Cross Reality Presence and Experience

For this ‚theory and methods' work package there are four main criteria of success:

- Conceptual map actually used and further developed in the four showcases

- Submission of at least one journal paper and two conference papers

- Common evaluation approach accepted by all showcases

- Joint analysis of presence and mixed reality across showcases

Use of concept map

The consolidated concept map was sucessfully used in the preparation and anaylsis of field trials in all showcases. No further modifications of the concept map were made.

Joint analysis

Research in the showcases focused on the particuoar concepts and issues that had been identified in D3.4:

Stages and resources for performative interaction: How mixed reality and related technology can be made to pervade the physical, providing more opportunities for action and in particular for expressive and embodied interactions?

Place and presence: How to support a sense of place and culture ('ambience') to emerge in users' interactions with a mixed reality application, by using sound as well as expressive visual content; working with fuzziness and abstraction; making use of material resources in the environment, emphasizing hidden (invisible) and imaginary aspects?

Unified experience versus 'opportunistic switches': How to more explicitly address the design issue - when operating at the AR end of the spectrum, presence might not be a key issue neither to design for nor to be observed; when designing for mixed reality interactions, attention has to be given to how to support users' mapping actions and events from both, PE and VE.

In this light, a first set of 'design guidelines' on five topics was developed: making interaction tangible; an experience point of view on different MR set-ups; working with 2D abstractions of 3D environments and objects; MR on mobile devices; enabling the user experience.

Publications

A workshop on Multitouch and Surface Computing for CHI 2009 is in preparation between Microsoft Research and TKK. Organisers: Seow, S, Jacucci, G., MacKenzie, S., Wilson, D., Morrison, A., Wilson, A.

Morrison, Ann, Peta Mitchell, and Stephen Viller. "Evoking Gesture in Interactive Art." Proceedings of the 2008 ACM International Conference on Multimedia. New York: ACM Press, 2008. 11–18.

Morrison, A., Jacucci, G, Peltonen, P., Juustila, A., & Reitmayr, G. Using locative games to evaluate hybrid technology. British HCI workshop: Using locative games to evaluate hybrid technology, Liverpool, September 1-5, 2008. Accepted as workshop paper and presented.

Morrison, A and Salovaara, A. Sustaining Engagement at Public Shared Interfaces. ShareIT -Shareable Interfaces for Learning Workshop 2008, 11-12 September, Sussex 2008

Morrison, A and Salovaara, A. Situated Engagement at a Public Urban Display. Situated Large Displays Workshop, Dec 5-12, Australian CHI, OZCHI 2008, Cairns 2008.

Morrison, A., Oulasvirta, A., Peltonen, P., Jacucci, G., Lemella, S., Reitmayr, G., Näsänen, J., & Juustila, A. Like Bees Around the Hive: A Comparative Study of a Mobile Augmented Reality Map. CHI 2009. Accepted. Nominated For Best Paper Award.

Common evaluation approach

The agreed upon evaluation framework was followed in all four showcases. It was felt that WP3 should accentuate the different approaches in each showcase – from interventions in an urban environment to more playful forms of engagement – since our experience is that this enriches our perspectives on presence and interaction.

Joint analysis of presence and mixed reality across showcases

Joint analysis helped all showcases to rethink and better focus their research questions. The focal point common to all is to understand users' interweaving and connecting of the real world and events in it with the constructed ,virtual' world, be it a game experience, interactions on a multi-touch screen, or the imagining and experiencing of changes to a real place.

1.4   WP4 Research Activity: Cross Reality Interaction Tools

The general objectives of this research workpackage are to provide tools which allow for easy creation and support of sophisticated multi-modal user interfaces and mobile mixed reality environments.

Thus final indicators for the success and impact of the tools and services developed are:

- The number of tools and services developed within the current working period/since project start/based on existing technology.

- Significant progress in the development of technologies of each major building block

- Each technology requested by at least two showcases and actually used by at least one showcase

- Each technology developed is contributing to the overall project objectives

- Submission of at least six conference and/or journal papers (at least one for each of the five major building blocks

- Identify new technologies developed within the project not available elsewhere

Tools and services developed within previous working period

The number of tools and services developed within the previous working period/since project start/based on existing technology.

Tools and services developed or extended within the previous working period		
since project start	**current working period**	**based on existing technology**
- Interaction Prototyping Tool - AuthOr - ColorTable - OpenVideo - Multi-Touch Display - Mobile Media Collector - Location Based Media Browsing on Paper Maps - Augmented Map Table - MRIML - OpenTracker - DEVAL	- Visual Programming Editor - ColorTable - Multi-Touch Display - Mobile Media Collector - Location Based Media Browsing on Paper Maps - Augmented Map Table	- Visual Programming Editor - Mobile Media Collector Location Based Media Browsing on Paper Maps

Significance of progress in the development of technologies
See Deliverable D4.3 for a detailed description.

Use of technologies by showcases
Each technology developed must be requested by at least two showcases and must actually used by at least one showcase. The following table shows for each technology, which showcases are interested in this technology (foresee to use it in future prototypes) and those already using it.

Tool or service	Interested showcases (bold actually using it)
Interaction Prototyping Tool	WP 6, WP 8, WP 9
AuthOr	WP 6, WP 7, WP 8, WP 9
ColorTable	WP 6
Mobile Media Collector	WP 6, WP 9
Location Based Media Browsing on Paper Maps	WP 7
Multi-Touch Display	WP 7
Augmented Map Table	WP 6, WP 7, WP 8

Contribution of individual technologies developed to overall project objectives
The following table shows the contribution of the individual tools to the overall project objectives regarding Mixed Reality technologies and applications (as listed in the project's description of work).

Overall objective	Contributing tools
Mixed Reality interaction prototyping	Interaction Prototyping Tool, MRIML, ColorTable
Device abstraction and independency	Interaction Prototyping Tool, MRIML, OpenTracker, DEVAL, OpenVideo
Cross-reality content authoring	Interaction Prototyping Tool, MRIML, ColorTable, MMC
Configurable infrastructures	OpenTracker, DEVAL
Semi-stationary outdoor Mixed Reality	-

Submission of at least six papers to conferences and/or journals (at least one for each of the five major building blocks

Building block	Publications
Device abstraction	Ohlenburg et al 2008
Data and event distribution	Broll et al 2008
Interaction Prototyping and Authoring	Wagner et all 2008 Ohlenburg et al 2008 Broll et al 2008 Wagner et al 2009
Ambient Displays	Morrison et al 2008 Maquil et al 2009
Audio and Videostreaming	Weiland et al 2008

New technologies developed not available elsewhere

- Multi-Touch Display
- ColorTable
- Mobile Media Collector
- Augmented Map Table

1.5   WP5 Research Activity: Mixed Reality Infrastructure

The general objectives of this research work package is to provide mixed reality infrastructure components, which allow for easy set-up and use of sophisticated mobile and stationary mixed reality environments.

Thus final indicators for the success and impact of the tools and services developed are:

- The number of components/technologies developed within the current working period/since project start/based on existing technology.
- Significant progress in the development of technologies of each major building block
- Each technology requested by at least two showcases and actually used by at least one showcase
- Each technology developed is contributing to the overall project objectives
- Submission of at least six conference and/or journal papers (at least one for each of the five major building blocks
- Identify new technologies developed within the project not available elsewhere

Tools and services developed within previous working period

19 different technologies have been developed which are already used by the different showcases.

Tools and services developed within the previous working period		
before current working period	**current working period**	**based on existing technology**
• Bluetooth Media Dispatcher • Color Table Tracking • Vision based localization • Distributed media entrance and management system • HMDB interfacing • Audio/Video Streaming • MR tent • AR-Scouting • Morgan Light • Illuminate Technology • Studierstube ES • Muddleware	• Spatial Sound Table • Mobile Map Tracking from natural features • Dotted Map Tracking • Model-based Outdoor Tracking • Content Manager • Urban Sketcher and Expression Integration	• Augmented Map Table

Significance of progress in the development of technologies

A description of the progress of each major building block is given in deliverable D5.3.

Use of technologies by showcases

Each technology developed must be requested by at least two showcases and must actually used by at least one showcase. The following table shows for each technology, which showcases are interested in this technology (foresee to use it in future prototypes) and those already using it.

The following table shows which IPCity showcases already use infrastructure components developed or extended within work package 5, or intend to use this in the future.

Tool or service	Showcases
Augmented Map Table	WP 6
AR scouting	WP 6
Distributed media entrance and management system	WP 6, WP 7, WP 9
MR tent infrastructure	WP 6
Spatial audio	WP 6, WP 8
Vision based localization	WP 6, WP 9
HMDB Interfacing	WP 6, WP 9
Mobile presence scanner	WP 7
Illuminate	WP 7
Morgan Light framework	WP 8, WP 9
Cal3D XSG	WP 8
Color Table Tracking	WP 6
Dottet Map Tracking	WP 7
Content Manager	WP 7
Urban Sketcher and Expression	WP 6

Contribution of individual technologies developed to overall project objectives

The following table shows the contribution of the individual tools to the overall project objectives regarding Mixed Reality technologies and applications (as listed in the project's description of work).

Overall objective	Contributing technologies
Mixed Reality interaction prototyping	Muddleware
Device abstraction and independency	Muddleware
Cross-reality content authoring	HMDB & interfaces, Bluetooth Media Dispatcher, Cal3DXSG, AR-Scouting, Content Manager
Configurable infrastructures	Muddleware, Illuminate, Map Table, Vision Based Localization, Spatial Sound, Morgan Light, Urban Sketcher and Expression
Semi-stationary outdoor Mixed Reality	MR-Tent, Mobile Presence Scanner, Mobile AR System

Paper submissions for individual building blocks

Submission of at least six conference and/or journal papers (at least one for each of the four major building blocks)

There are 16 accepted publications and 2 pending submission and 0 rejected submission about mixed reality infrastructure components.

Conference/journal, date or timeframe	Title or topic	Authors	Status
Tacking			
International Conference on Image and Signal Processing	Uniqueness filtering for local feature descriptors in urban building recognition	G.P. Nguyen and H.J. Andersen	Accepted
IEEE 2008 Winter Vision Meetings, Workshop on Application of Computer Vision	Urban building recognition during significant temporal variations	G.P. Nguyen, H.J. Andersen, and M.F.Christensen	Accepted
ISMAR 2008	Robust and unobtrusive marker tracking on mobile phones	Wagner, Daniel; Langlotz, Tobias; Schmalstieg, Dieter	Accepted
British HCI workshop	Using locative games to evaluate hybrid technology	Morrison, A., Jacucci, G, Peltonen, P., Juustila, A., & Reitmayr, G	Accepted
CHI 2009	Interaction In the Wild with a Mobile AR Map	Morrison, A, Oulasvirta, A, Peltonen, P, Jacucci, G, Lemella, S, Juustila, A., & Reitmayr, G.	Submitted
ISMAR 2008	Pose Tracking from Natural Features on Mobile Phones	Daniel Wagner, Gerhard Reitmayr, Alessandro Mulloni, Tom Drummond, Dieter Schmalstieg	Accepted
Storage/Content			
CHI 2007	Bringing Urban Design Site to Studio by using a Remote Surveillance Camera	Juustila, Antti; Kangas, Tanja; Räisänen, Toni; Kuutti, Kari; Soudunsaari, Leena	Accepted
Proceedings of 30th Information Systems Research Seminar in Scandinavia	Atelier Infrastructure for Ubiquitous Computing.	Juustila, A., Räisänen, T.	Accepted
VR 2007	Muddleware for Prototyping Mixed Reality Multiuser Games	D. Wagner, D. Schmalstieg	Accepted

Mobile AR/MR			
To appear in a special edition "Mobile Spatial Interaction" of ACM Personal and Ubiquitous Computing Journal, 2008	Handheld Augmented Reality for Underground Infrastructure Visualization	Gerhard Schall , Erick Mendez , Ernst Kruijff , Eduardo Veas , Sebastian Junghanns , Bernhard Reitinger, Dieter Schmalstieg	Accepted
Workshop on Mobile Spatial Interaction (in conjunction with ACM CHI '07), 2007	Mobile Geospatial Augmented Reality using Urban 3D Models	Schall, Gerhard, Mendez, Erick, Reitinger, Bernhard, Junghanns, Sebastian, Schmalstieg, Dieter	Accepted
IEEE Virtual Reality '07	Augmented Reality Scouting for Interactive 3D Reconstruction	Reitinger, Bernhard, Zach, Christopher, Schmalstieg, Dieter	Accepted
ISMAR 2007	Urban Sketcher: Mixed Reality on Site for Urban Planning and Architecture	M. Sareika, D. Schmalstieg	Accepted
IEEE Computer Graphics & Applications.	Towards Next-Gen Mobile AR Games	Wolfgang Broll, Irma Lindt, Iris Herbst, Jan Ohlenburg, Anne-Kathrin Braun, Richard Wetzel	Submitted
CHI 2008 - Workshop	Urban Sketcher: Mixing Realities in the Urban Planning and Design Process	M. Sareika, D. Schmalstieg	Accepted
Computation			
IEEE International Conference on Computer Vision	Towards Wiki based density matching	A. Irschara, C. Zach, H. Bischof	Accepted
VR 2008	Extending X3D with Perceptual Auditory Properties	Katharina Garbe, Iris Herbst	Accepted
Proc. of 10th Int.Conf. on Human and Computers 2007 (HC2007), Dec, 13th -15th , 2007, Duesseldorf, Germany	Spatial Augmented Reality	Katharina Garbe, Iris Herbst, Jens Herder	Accepted

New technologies developed not available elsewhere

Illuminate Technology, Bluetooth Media Dispatcher, Vision based localization, Distributed media entrance and management system, Mobile presence scanner, HMDB interfacing, Cal3D XSG, Spatial audio, MR tent, AR-Scouting, Mobile AR System, Morgan Light, Content Manager, Dottet Map Tracking, Color Table Tracking, Model Based Outdoor Tracking, Urban Sketcher and Expression

1.6   Common criteria for all showcases

Conformance with concept map

The prototypes and application concepts developed in showcases have to address more than half of the issues of the Concept Map as provided by WP3.

In the showcases more than half of the issues were addressed. An appropriate analysis is provided in the deliverable D3.4.

Conformance with technologies developed

All application prototypes must primarily be based on technology developed in WP4/5.

If the conformance is not achieved, corrective actions have to be taken. Either the required technology has to be added to one of the research work packages (if at least two showcases require this technology) or the showcase has to be adapted to be in line with the overall

project objectives, or the showcase will have to replace technologies by those developed within the project. This is described in detail in the individual showcase deliverables.

Collection of user group feedback

Feedback has to be collected from at least one independent user group and one independent group of stakeholders. The results are reported in the individual showcase deliverables and verified by WP3.

These criteria have been met in all showcases.

Dissemination

Each showcase will have to submit at least two conference papers each year. The individual submissions are reported in each showcase sub-section and in detail in the individual showcase deliverables.

1.7   WP6 Showcase Activity: Urban Renewal

The main criteria of success for WP6 is to be able to demonstrate how different groups of users in real urban renewal contexts use the technology prototypes for collaboratively envisioning change, how this supports the participation of citizens in planning and improves the quality of the planning process. Other criteria are

- The number of urban renewal situations that can be supported with the developed concepts

- The number of 'non-expert' users (involved and interested citizens) that visit the MR-Tent

- The amount and nature of feedback from different urban planning groups and citizens and the qualitative evaluation of this feedback

- The diversity and relevance of content - created and used during workshops and public demonstrations

- The ability of the Urban Renewal applications to provide continuous support during the event, and to be useful before or after the event.

Scope of urban renewal situations

In project year 2 three field trials in the form of participatory workshops connected a real urban renewal projects were carried out. Two elaborate workshop protocols with different scenarios had been prepared. The scenarios deal with various aspects of a same urban planning project. They concern different scales and the point of view of several stakeholders. They discuss as well local effects, the identity and uses of the site, connections and public transportation and technical constraints. The urban renewal prototypes support these discussions with manipulations on different levels: the definition of connections and flows, the positioning of activities, programs or housing types, the sketching directly onto the scene and the   segmentation   of   the   ground   into   land   use   polygons.

The number of 'non-expert' users (involved and interested citizens) that visit the MR-Tent

One objective of phase III was to involve different stakeholders, including citizens in the participatory workshops. We recruited, prepared and supported therefore 6-8 non-expert users and integrated their ideas and visions into the workshop scenarios. They participated in the workshop and provided us with rich feedback.

During the exhibition in Grand Palais, hundreds of non-expert users visited the MR-Tent and experimented with the tools.

Diversity and relevance of user created content

Content creation is a crucial issue in WP6 and preparing content (in the right format and technical quality) is extremely time consuming. In phase III we cooperated with different stakeholder representatives in the preparatory phase for each workshop to prepare content and panoramas from the perspective of different stakeholders. The importance of these extensive preparations, not only for the lay people but also for the planning experts, was confirmed during the workshop itself. Participants arrived with their knowledge of the site, their own vision of the kind of interventions they would like to explore, and they found the content they needed for entering the debate.

In the second workshop, participants were also supported in creating their own content ‚on the fly' in the form of sketches (for a description see D6.2), which enabled them to express their imaginations and anchor them in the ‚real' urban space.

Amount and nature of feedback

As can be seen from the detailed descriptions in D6.3, we received valuable feedback from users in all three participatory workshops. Data analysis was carried out collaboratively in the team, with attention to the details of participants' interactions (as revealed in selected video clips) and to the intense discussions that took place during the workshop sessions, where participants addressed questions of the project – which interventions to carry out – but also commented on features of the tools and on their potential role in urban planning. In this way we can base our re-design decisions in an analysis of video observations as well as in comments and suggestions of workshop participants. Participants also filled in a small questionnaire with free comments on a range of key research issues.

Common criteria for all showcases

Conformance with concept map

WP6 applications in the MR-Tent relate in several ways to the concept maP.

Users' purposeful activities: The MR tools support collaboration in co-constructing audio-visual scenes; the yynamic enactment of these scenes; and the mapping between ‚real' and ‚virtual' elemens.

Spatial aspects: sound (flow sound, changing the hearing position) provides spatial information; Interaction space supports co-construction and reflection, also provides immediate (graphical) feedback; views allow experiencing the MR configuration (crucial: depth information, zooming, changing viewpoint (panorama, scout)).

Temporal aspects – mobility: users are supported in experimenting with flows of different speed and following a path (roads and flows); the newly developed history function allows freeze a scene, go back to previous configurations, erase elements of scene, thereby enabling users in comparing scenes and understanding the devlopemnt of ideas;

Material aspects: texture and material play a major role in users co-constructing scenes; this includes features, such as the materiality (wood, shape, color) of objects (tokens, content cards), the physicality of table and map and users' haptic orientation on site map.

Ambience: the use of expressive visual content and sound, as well as ambient qualities of the site contribute to a sense of culture and place:

Content: sound extends users' imagination, it reinforces, underlines, or contrasts the visual content with which it is associated; moving objects (flows) animate the scene and introduce an an additional scale; so does sketching on the scene and manipulating objects.

Multimodality: users work with sound, which has strong immersive qualities; the integration of interaction space, visual scene and accoustic space is crucial fort he experience of presence; so are dynamic representations.

Awareness cues: the MR technologies have several awareness cues built in – sound heightens awareness of interventions; changing the hearing position provides additional

feedback about elements of the scene; information displayed on the info screen and the diagrammatic representation of activities (circles, dots, bars, etc.) offers visual feedback.

Mixed reality configuration can be characterized as follows: there is a strong reality element present through the rresence on the site and the co-presence of people; uesers are supported in combining views (top view, panorama, video-augmentation, see-through) and switching viewpoints, zooming; the engage in direct manipulation of elements of the scene with tokens.

Conformance with technologies developed
The prototypes are based primarily on WP4/5 technology

The prototypes and technology probes were developed based on technologies that were produced in WP4 and WP5 - some examples are: MR-Tent, Muddleware, Opentracker, HMDB and the different interaction modules of the ColorTable framework. Also the tracking technology for the ColorTable was developed within WP5.

Collection of user group feedback
Feedback is collected from at least one independent user group and one independent group of stakeholders

We in all two participatory workshops collaborated with independent users (stakeholder representatives), such as architects connected to the urban project itself, representatives from involved local authorities, and 'residents' (e.g. police men, student).

Dissemination
5 conference papers were submitted; 3 have been accepted up to now.

1.8   WP7 Showcase Activity: Environmental Awareness

The main criteria of success for WP7 is to be able to demonstrate mixed reality promoting environmental awareness and involving participants in an urban environment, as well with the objective that the experience is spatially distributed. The success will depend on the ability of IPCity to deliver technology prototypes which support individual and group activities that foster the identification with ongoing activities, group co-presence and the engagement with the applications and events. Additional criteria:

- The number of city events in Helsinki in which the prototypes will be evaluated

    o   Reported in the Showcase deliverables verified by WP2

- The number and variety of users that can try out the showcase prototype. Starting from a minimum of six per event and application.

    o   Reported in the showcase deliverables verified by WP2

- The ability of the prototypes to provide continuous support during the event, and to be useful before or after the event.

    o   Reported in the showcase deliverables verified by WP3

In this third year M25-M36 WP7 had to re-design the demonstrators, create a new version of the demonstrator and carry out a new round of field trials. The re-design has successfully moved forward the demonstrator with more articulated and substantially new mixed reality application in comparison to year 1 and 2. The current demonstrators follow the plan of having a mobile, an installation and a pervasive component. In all components substantial advancement has been made. As well the theme of awareness of the environment has been addressed.

- The mobile component has moved beyond CoMedia which was already field trialed in year 1, progressed to MapLens in year 2 and now re-modeled to address environmental awareness, and evaluated by a location-based game scenario.

MapLens had three extensive field trials in year 3, therefore WP7 has moved forward to investigate the augmented map lens as a new mobile component.

- The installation component has concretized in the CityWall a large multitouch urban display which was the object of extensive field trials with one opening and one large event in year 3.

- Finally some prototype development ensures we integrate pervasive technologies for users to participate by inputting into the content of the above two showcases.

As in years 1 and 2, the demonstrator has three components at different development statuses. The aim is to proceed by field trialing the components when ready and to move ahead to new concepts when a prototype has exhausted its research potential.

The approach of having three components in the demonstrator makes it possible to address many aspects of experience, media and of urban settings. We demonstrate in D7.3 how we are able to address over half of the concept map through mobile, pervasive and installation components, and how presence for our users is supported by these applications (see also D3.4). WP7 has also been successful in using for each component basic technologies from WP4-5. Multitouch displays WP4, pervasive interfaces and middleware WP4/5, Augmented Map Lens WP4 and WP5.

Feedback has been collected from visitors and citizens and is reported in D7.3 along with an appendix on MapLens field trials and an appendix on CityWall bi-directional inputs.

CityWall has continued running as a permanent installation at Lasipalatsi, in the city centre of Helsinki. From Helsinki's Cultural Office's request the installation was moved from the street side of Lasipalatsi to the inner courtyard side of Lasipalatsi, which is not as busy spot with passing by pedestrians like the old place. Although the new location is not as visible as the old one, it still has cafes and people spending time there. The new 3D version was opened there 8th October, with press and outputting a YouTube video that grabbed more than ¼ million visits within its first two weeks. http://www.youtube.com/watch?v=IldDrCcZkZY

The biggest event for CityWall was not in Helsinki, but in Paris: CityWall was exhibited with WP6 Mixed Reality Tent in the European City of Sciences exhibition at Grand Palais. The event was very popular among Parisians, attracting over 50 000 visitors in a few days.

For MapLens, several field trials were conducted. In following table is a summary table of dissemination events and field trials and users regarding both CityWall and MapLens. More details in WP7 D7.3..

Prototype	Period	Event	URL	Users
CityWall	Jan-Dec 2008	City installation in cooperation with Cultural Office	http://citywall.org	Estimate: 500 per week (general public)
MapLens	Mar 2008	Field trial with first prototype	-	5 users
CityWall	May 2008	Dissemination at UC Berkely, Stanford and Nokia NRC Palo Alto	-	Estimate: audience of 100 people
MapLens	Aug 2008	Three field trials with 2nd prototype	-	37 users
CityWalll	Oct 2008	3D version opening at Helsinki City Centre	http://citywall.org	50 invited guests, including press
CityWall	Nov 2008	European City of Sciences	http://www.villeeuropeennedessciences.fr/uk/index.htm	Over 50 000 visitors

Because of a variety of issues we suggested this workpackage was re-defined with a new topic of environmental awareness for year 3. The reasons:

- The exceptional success of the impact of WP7 Large-Scale Event. This workpackage achieved the highest success possible more attuned with the end of the project, hence the need to re-define the WP.
    - Several publications in the best publication forums including best paper awards.
- Inclusion in official programs of events, participation in all most important Helsinki Events
- Public Installation with tens of thousands users
- Start-up company as the most successful exploitation
- The volume of publications already published on the subject in HCI field by the group on Large –scale events
    - The research group already published extensively in the best journals and conferences on Large-Scale Events making it harder in the future to continue on this topic as only incremental publishing will be possible which is hard to get accepted.
- Start with a new and fresh brief to keep the creativity level high
    - After this big success the WP needs a new brief to raise the creativity potential
- The problem of temporality with events
    - The problem that is experienced with events is that they last only few days and therefore are not ideal for trials as they set strong constraints on the timing and the extend of trialing for example NO LONGITUDINAL STUDIES are possible.
    - On the other hand we showed the potential of having a permanent installation.
- The fact that the most important issue for cities today is not addressed in IPCity namely Environmental awareness
    - This is maybe the most important reason. As all the city organistions and the EU shows in the 7th Program the most important topic is now Environment and IPCity should take action by directing one of its showcases to Environmental Awareness.

For this reason WP7 in months 25-36 in the Implementation Plan WP7 was redefined as "Environmental Awareness".

For WP7 in months 25-36 the focus (while integrating environmental awareness) has been on development of its two applications. With MapLens the emphasis was with extensive field trialing while extending the prototype. With CityWall the emphasis was on the development of a new interaction paradigm to allow multiple content and multiple timelines so more users can participate with content at the wall at the same time.

We added an environmental awareness location-based game to the evaluation of MapLens technology and required users to complete a number of tasks that would ensure they learnt more about green issues, environmental issues and their surrounding urban environment. We worked with the Natural History Museum to achieve this. We worked with SYKE, Finnish Ministry for the Environment to implement a media discussion at the wall on nature as nuisance and nature as nice that local participants can easily input into via e.g. SMS, MMS, online etc.

These focii have been successfully implemented, and the future emphasis will now be on executing more field trials to concentrate on the research per se, with less intense concentration on the development side, We spent much of the year publishing in workshops with the aim of entering into as many discussions as possible with other researchers, to be sure we were as well informed as possible on the current research in the areas these two applications cross. As well we successfully targeted three quality

conference (CHI, ACM MM and CHI again) and our aim for months 37-48 is to complete our field trial research and specifically target high quality journals and conferences.

The emphasis for months 37-48 is on research and publication.

Common criteria for all showcases

Conformance with concept map

WP7 applications CityWall and MapLens relate in many ways to the concept map.

Users' purposeful activities

- Collaboration: Current CityWall (CW) solution supports collaboration, we look to increase collaboration. Possibilities with new inputs (SMS, MMS and comments) and multiple timelines and contents. MapLens (ML): when compared to digital only version, ML was found to be an ideal collaboration Tool

- Dynamic enactment: CW has been shown to support performative interaction. ML users performed for each other in order to collaborate

- Mapping: Both systems dynamically upload user input from RE to VE

Spatial aspects

- Scale and depth: The new CW 3D interface allows overlaying of information, scaling and xyz axis. For ML we have measured spatial awareness with MEC-SPQ questionnaire participants scoring mostly above average

- Layers and borders: Both systems support this

- Orientation: ML users had more difficulties orientating than digital users. For CW users trials for this have not yet been analysised.

- Aligning representations and activities: ML aligns user contributed representations with actual location. CW maps activities according to time and theme.

Material aspects

Texture and material

- Physicality of a cardboard map for ML supported place-making, common ground and collaboration

- CW as a display supports touch as an input but does not support texture or haptic feedback

Temporal aspects - mobility

- Especially CW supports memory showing the traces of the past.

- ML shows the trail of its users.

- Both support and display event evolution

Ambience

Sense of culture and place: CW is constantly reproducing its urban and cultural landscape. ML was shown to support place making as its major finding.

Conformance with technologies developed

The prototypes are based primarily on WP4/5 technology

WP7 has been successful in using for each component basic technologies from WP4-5. Multitouch displays (WP4), pervasive interfaces and middleware (WP4/5), Augmented Map Lens (WP4) and (WP5).

Collection of user group feedback

Feedback has been received from many user groups while exhibiting of CityWall (permanent installation at Lasipalatsi, opening of the new version at Lasipalatsi, European City of Sciences exhibition at Grand Palais, Paris) and MapLens user trials.

This also applies to WP6 were feedback was collected during the workshop im Cergy-Pontoise, the European City of Sciences exhibition at Grand Palais, Paris, and a series of smaller workshops with a variety of users.

Dissemination

In addition to the dissemination events reported in the table before, WP7 has submitted three conference papers which have been accepted. As well there were five workshop papers submitted, accepted and presented, and two doctoral consortium papers accepted and presented (see table below):

Conference/journal, date or timeframe	Title or topic	Responsible person and additional authors	Status (published, submitted, under preparation, planned, presented)
CHI 2008	"It's mine, don't touch": Interactions at a large multitouch display in a city Center.	Peter Peltonen, Esko Kurvinen, Antti Salovaara, Giulio Jacucci, Tommi Ilmonen, John Evans, Antti Oulasvirta, Petri Saarikko	Presented as full paper. Nominated for Best Paper Award
AVI 2008: Public and Private Displays workshop (PPD 08)	CityWall: Limitations of a Multi-Touch Environment	Morrison, Ann, Jacucci, Giulio, Peltonen. Peter.	Accepted and presented as workshop paper
ACM Multimedia 2008, HCC Workshop, ACM publication	Evoking Gesture in Interactive Art	Ann Morrison, Peta Mitchell, Stephen Viller	Accepted and presented as full paper
British HCI workshop: Using locative games to evaluate hybrid technology, Liverpool, September 1-5, 2008.	Using locative games to evaluate hybrid technology	Morrison, A., Jacucci, G, Peltonen, P., Juustila, A., & Reitmayr, G.	Accepted and presented as workshop paper
British HCI workshop: Critical Issues in Interaction Design, Liverpool, September 1-5, 2008.	Speaking with many voices: Intertwining within and between inter-disciplines	Morrison, A	Accepted and presented as workshop abstract
ShareIT -Shareable Interfaces for Learning Workshop 2008, 11-12 September, Sussex 2008.	Sustaining Engagement at Public Shared Interfaces,	Morrison, A and Salovaara, A	Accepted and presented as workshop paper
CHI 2009	"Like Bees Around the Hive" A Comparative Study of a Mobile Augmented Reality Map	Morrison, A, Oulasvirta, A, Peltonen, P, Lemella, S, Jacucci, G, Reitmayr, G. Näsänen, J Juustila, A.	Accepted as full paper. Nominated for Best Paper Award

OZCHI 2008	Proposal to Doctorial Symposium run by Margot Brereton, Paul Dourish and Wally Smith	Peter Peltonen Ann Morrison	Accepted and presented as symposium presentations
OZCHI 2008	Situated Engagement at a Public Urban Display	Morrison, A and Salovaara, A	Accepted and presented as workshop paper

Besides appearing in the Finnish and French written media, CityWall has been quite visible in the Internet. See appendix for a list of the large number of selected sites and blogs and a viral marketing site reporting on CityWall:

CityWall attracted a lot of attention also in the web. Our site http://citywall.org received more than 40 000 contacts. A video was posted in youtube, gathering more than ¼ million hits in its first two weeks CityWall was referenced in a variety of important websites including slash.com.

We received requests from all over the world to create similar installations. In 2007 we created a start-up to commercialise the technology www.multitouch.fi, successfully negotiating IPR with the University. Three of the researchers that worked in WP7 founded the company. Mutlitouch.fi is expanding as a company, employing more people, has successfully re-applied for financial support from Finland government (TEKES), and has developed a cell LCD technology with 10 large and 10 small cells being sold (as far a field as Australia) as well as 2 larger projector-based installations. In 2009 the company will expand further, employing more people again, to deal with increasing demand.

1.8.1 WP8 Showcase Activity: Time Warp

The expected result of this showcase is a Mixed Reality application that allows collaborative experience and gaming in the past, presence and future of a city across the boundaries of different media channels and interaction devices. The involvement of the users into the game play will serve as an indicator how successful the TimeWarp game is. Another success criterion is the awareness of travelling through the time. The individual indicators related to the Time Warp show case are:

- The number of (non expert IT) users

- During the field trials in summer, we conducted 10 test runs with 24 participants, whereas 8 were non IT-professionals. The participants were mainly students, IT-professionals and other people interested in gaming and digital entertainment.

- The sense of presence in the game was evaluated using techniques modified from year two which included more aspects relevant to WP3 and the new gaming experience, in particular the co-operative elements. Methods included a questionnaire, video observations, an observer log and a semi-structured interview approach which prompted people for their opinions based on an early examination of their questionnaire responses and a new method using pictures of the experience to trigger a response.

- In the second prototype of the TImeWarp game, we explicitly improved and increased the amount of collaboration by developing a multi-player game. Nevertheless, the players did not collaborate with non-game participants. Furthermore, the participants felt engaged in the experience during the game.

- The amount of work to adapt the application to a different location

- To play TimeWarp in another city doesn't require a lot of work. The challenges have to locate to another situation, but it will be feasable due to the description based on the Morgan Interaction Prototyping. The most effort might be to adjust the content of some challenges to the new city, which means a certain amount of work in modelling the 3D objects.

Common criteria for all showcases

Conformance with concept map

During the third year we extended and built upon the aspects of the IPCity concept map which formed the basis of WP8, these included

- Collaboration: the game and evaluation methods specifically explored collaboration, and how the interaction and discussion is shaped by the collaboration

- Spatial elements: as players have to orientate themselves within the hybrid space the layers borders and switches between them become interesting evaluation and design elements

- Temporal aspects: the game supported multiple time frames and the evaluation methods and results pointed to sense of presence depending upon users prior conceptualisations or experiences.

- Mobility: TimeWarp encourages users to walk round the city, in the new version and following on from year 2 the game space was compressed. This allowed for a less fragmented experience, in year 3 path structures will be explored so that experiences appear more connected and not a collection of end points.

- Ambience was explored from the perspective of design and evaluation as a range of locations were chose which would engender certain feelings in the participants. It was also observed how behaviour would change as users entered certain locations so that they would not interrupt the normal accepted practices of that location.

- Awareness cues were provided to enhance game play and presence and alerted users to character, actions and locations.

- Content was used not only to add game elements but also as a method to constraint the game space

- Multimodality graphical and auditory augmentations were used in combation with a novel device (a UMPC). The UMPC provided a contrasting approach to the year 2 demo by providing a lens into a game world, rather than a more immersive visor approach.

Conformance with technologies developed

In the second prototype we used several techologies developed in WP4/5. Some examples are: Morgan Interaction Prototyping, mobile AR system and AuthOr.

Collection of user group feedback

For the presence research, we developed a questionnaire which also includes the collection of feedback.

City specific feedback was also gained by involvement and collaboration with tourist guides.

Dissemination

- 1 Journal Paper was submitted and accepted.

- 1 outline abstract for a full workshop paper was submitted and accepted

- 2 Workshop Papers was submitted and accepted.

- 1 Conference Paper was submitted and accepted as paper.

- 2 research posters were submitted and accepted

1.9 WP9 Showcase Activity: City Tales

City Tales work package was started over after the joining of the leave of SONY with the new partner IMAG. Due to this fact and the detailed delay in WP9 the conducted user studies were implemented as informal user tests.

- The number of (non IT-affine) users
  - Informal studies were carried out with IT-professionals and IT-students, thus the planned evaluation studies will higly focus to capture a wide range of users outside the IT-field.

- The 'quality of presence' (using method and tools of WP3)
  - Our informal results with first test users indicate that users get an altered impression about the urban environments with an additional information layer. Perceiving location based information on the spot the interaction of the urban surroundings with the digital information creates a mixed reality experience that needs more in-depth investigation and documented user studies and evaluation of these.

- The created content
  - Decision on what is to be considered as valuable or garbage is very hard, especially in a social networking community. As the value of information can be very subjective based on the purpose of the storage, we cannot decide and govern in the prototyping phase on the quality of content. Measures can only be defined in relation to the purposeful activities of the participants to the system. So we must decide on a case-by-case basis to introduce a content quality measure and can evaluate this against our previously laid out assumptions.

- The amount of engagement and collaboration
  - Without large scale studies and a large user group the relation between "contributing creators" and "perceiving only users" is hard to predict as comparable scenarios lack. The natural assumption is that the relation contributors vs. preceptors will not be equal, that more users will be passive participating in the system, while a small group of users will create more elements. Looking at recent results investigating community based content creation platforms - such as WikiPedia - it is hard to predict if this situation does not overturn into more creators. We plan to investigate if there is a characteristic pattern in the type of users who extensively contribute or not. If yes, how can we transfer these users's ability or strive to other participants of the mixed reality experience?

- The amount of work to adapt the application to a different location
  - The system lives from the availability of the basic layer of content and the created stories. The Second City database was specifically designed not to include platform, location, system, client, and content specific limitations. The open architecture permits to enter data from other locations as well – so adaptation is content creation carried out by the community.

Common criteria for all showcases

Conformance with concept map

Based on the IPCity presence concept map we identified the core areas in which WP9 is exploring the temporal, social and ambient aspects of mixed reality enhanced urban environments, we emphasize the relevance of

- Temporal aspects
  - Memories – traces of the past

- o Evolution of an event

- o Transformation of a place in time

- Mobility

  - o Following a path (and the connected story)

- Ambience

  - o Sense of place and culture

- Awareness cues

  - o Social interaction (members, encounters)

  - o Communication (exchanges, viewings)

- Multimodality

  - o Dynamic representations

  - o 3D animation

  - o Sound scenes – soundscapes

Above target investigation dimensions were theoretically explored and formulated questions to be answered in user evaluation studies.

Conformance with technologies developed

The application demonstrators are integrating technologies developed in WP5 and are adding a new component of a public available common database sharing a superset of geolocated information.

Collection of user group feedback

Informal user studies conducted so far, formal user feedback collection, user interaction documentation and evaluation is yet to be conducted.

Dissemination

As the WP9 was re-started with the participation of Imagination the workshops and other dissemination events were too early for a presentation of preliminary results. However Imagination was trying to do it's best to present the ideas and plans of the IPCity project as a whole at different audiences.

3. Management assessment

In reporting on progress with its management the consortium will provide information and data on the following:

Quality of being on time regarding milestones and deliverables

Based on the monthly internal progress reports in combination with the monthly Executive Board phone conferences all delays regarding milestones and deliverables are identified immediately.

In general delays in reaching milestones were pretty small. Some deviation regarding internal deliverables occurred, but was already discussed and resolved in advance.

Regarding the year 3 deliverables all deliverables met the official deadline, while some of them were late by a few weeks (less than one month) due to individual project partners not contributing as fast or as comprehensive as expected.

Contributions to work package tasks by individual partners

Again, this issue is tracked as part of the internal progress reports and the monthly Executive Board phone meetings.

Although there were some minor delays in the previous working period due to late processing and final acceptance of the second amendment and the related cost statement as well as due to some unexpected labor shortages, which are both reported in detail in the annual progress report (deliverable D1.10), all project partners contributed to all work packages according to the work plan.

Contributions of work packages to presence and mixed reality

Please see section 1.2.2 for feedback from Scientific Board regarding this issue.

Appropriate consideration of privacy ethics and gender issues

Please see section 1.2.1 for a discussion and recommendations by the Scientific Board on these issues.

Nature and justification for adjustments

The nature and justification for adjustments to the original research work plan and/or timetable are reported in the annual progress report (deliverable D1.10). Major changes reported there include the changes regarding the members of the consortium:

- IMAG as new partner joining the project

- SONY leaving the project

- Cooperation with HITLAB NZ (UoC) started, becoming a full project member (without funding) foreseen for final project year

- Request of project extension (by three months) to allow for better results in new showcase 4 and for cooperation with HITLAB NZ

Effectiveness of the internal communication

The effectiveness of the internal communication between the coordinator, team leaders, supervisors, down to the individual researchers, including feedback processes is checked frequently and procedures are adapted were necessary. This includes

- the actual use of internal email lists and the shared document repository (BSCW) by individual work package participants

- the promptness and completeness of meeting agendas, minutes, etc.

- the awareness of deadlines and other important milestones

The BSCW shared workspace system is effective and efficient regarding the distribution, storing, and joint editing of any project related material (documents, papers, videos, applications, etc.). It is very well accepted by all project partners and all individuals working

within the project. However, it is not used as effectively as in other projects for communication and exchange of documents with the EC and project reviewers.

In general all meeting agendas are available on time as defined in the project handbook. All meeting minutes of board meetings are usually available within one week from the meeting.

Regarding the awareness of deadlines we could observe that for particular milestones or deadlines the awareness obviously still was not sufficient or that there may be a lack of awareness regarding importance of a specific deadline. This in particular applies to deadlines regarding dissemination (contributions to the newsletter, updates to the website content), but also to internal deliverables and reviews. The Scientific Board will again discuss this issue at its next regular meeting.

Acknowledgements and Further Information