Integrated Project on Interaction and Presence in Urban Environments

FP6-2004-IST-4-27571

ipcity.eu

Overall Evaluation Summary Report Year 4

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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 lists the qualitative and quantitative indicators used to measure and monitor the overall success and impact of the project.

1.1 Quantitative Indicators

The document provides a series of quantitative indicators of success of the project, these include: number and type of publications, dissemination, training and exploitation.

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.).

Journal publications

Basile M., Terrin JJ. (2009) Le projet IP City. Une recherche sur la place des technologies de réalité mixte dans les représentations du projet urbain. In : Flux (Oct-Dec 2009)

Ozdirlik B., Vardouli S. (2009) Developing Mixed Reality Technologies for Urban Environments: communication bridges. In: Edinburgh Architecture Research Journal (accepted for publication)

Wagner, I., Broll, W., Jacucci, G., Kuutti, K., McCall, R., Morrison, A., Schmalstieg, D., Terrin, J-J. (2009). On the Role of Presence in Mixed Reality, PRESENCE special issue from RAVE'09, MIT Press. Accepted for Publication.

McCall, R., Wetzel, R., Löschner, R., Braun. A.(2010) Using Presence to Evaluate An Augmented Realitiy Location Aware Game. In Journal of Personal and Ubiquitous Computing. (accepted for publication)

Conference papers

Sareika, M., Schmalsteig, D. (2010). Bimanual Handheld Mixed Reality Interfaces for Urban Planning, AVI 2010 International Working Conference in cooperation with ACM-SIGCHI, ACM-SIGMM, SIGCHI Italy May 25-29, 2010 - Roma, Italy (to appear)

Basile M., Ozdirlik B., Terrin JJ. (2010) IPCity: une recherché sur la place des technologies de réalité mixte dans les représentations du projet urbain. In : the symposium of Les premières journées du Pôle Ville de l'Université Paris-Est.

Broll, W., and Herling, J. Supporting Reusability of VR and AR Interface Elements and Interaction Techniques. (2009). In Proceedings of Virtual and Mixed Reality, Third International Conference, VMR 2009, Held as Part of HCI International 2009 (San Diego, CA, USA, July 19-24, 2009), HCI (13), Lecture Notes in Computer Science, Vol. 5622/2009, Spinger 2009, Pages 145-153.

Weiland, C., Braun, A., and Heiden, W. Colorimetric and Photometric Compensation for optical see-through displays. In Proceedings of Virtual and Mixed Reality, Third International Conference, VMR 2009, Held as Part of HCI International 2009 (San Diego, CA, USA, July 19-24, 2009), HCI (13), Lecture Notes in Computer Science, Vol. 5622/2009, Spinger 2009.

Basile M., Ozdirlik B., Terrin JJ. (2009) Urban Projects and Multi-actor collaboration processes using mixed reality technologies. In: International Symposium on revitalising built environments: requalifying old places for new uses.

Boerner A., Maquil V. (2009) Enhancing Synergies Between Computer Science and Urban Disciplines: Semi-automated Applications for Tangible User Interfaces, A Case Study. In: CAAD futures 2009.

Halttunen, Virtu; Juustila, Antti; Nuojua, Johanna (2009). "Technologies to Support Communication Between Citizens and Designers in Participatory Urban Planning Process".

Proceedings of the colloquium ‘Communicating (by) Design’ at Sint-Lucas Brussels, Belgium, April 15 - 17, 2009. 559 - 568.

Jacucci, G., Spagnolli, A., Chalambalakis, A., Morrison, A., Liikkanen, L., Roveda S., Bertoncini, M., (2009) *Bodily Explorations in Space: Social Experience of a Multimodal Art Installation*. In: T. Gross et al. (Eds.): INTERACT 2009, LNCS 5727, pp. 62Ð75, Uppsala Sweden, Springer.

Jacucci, G., Morrison, A., Richardson, G., Kleimola, J., Laitinen, T. and Peltonen, P. Worlds of Information: Supporting Multiplicity at a Public Multitouch Display. (in press) ACM CHI 2010.

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

Morrison, A., Oulasvirta, A., Peltonen, P., Lemmela, S., Jacucci, G., Reitmayr, G., Nasanen, J., and Juustila, A. (2009). Like Bees Around the Hive: a Comparative Study of a Mobile Augmented Reality Map. In Proceedings of the 27th international Conference on Human Factors in Computing Systems (CHI ‘09) pp. 1889-1898.

Nguyen, G.P.; Andersen, H.J. (2009) “Context-Based Adaptive Filtering of Interest Points in Image Retrieval,” Intelligent Systems Design and Applications, 2009. ISDA ‘09. Ninth International Conference on , vol., no., pp.529-534, Nov. 30 2009-Dec. 2 2009.

G.P Nguyen and H.J. Andersen, A. (2010) New Approach for Detecting Local Features. International Conference on Computer Vision Theory and Applications (VISAPP), May 2010, France.

Ozdirlik B., Vardouli S. (2009) Developing Mixed Reality Technologies for Urban Environments: Communication Bridges. In: Transilient Boundaries In/Of Architecture_Conference

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.

Ylirisku, Salu; Halttunen, Virtu; Nuojua, Johanna; Juustila, Antti (2009). ”Framing Design in the Third Paradigm.” Proceeding of the 27th CHI conference on Human Factors in Computing Systems, Boston, Massachusetts, USA, April 4 - 9, 2009. 1131 - 1140. - 2 viittausta

Wagner, D., Reitmayr, G., Mulloni, A. Drummond, T., Schmalstieg, D. (2008), „Pose Tracking from Natural Features on Mobile Phones.“ Proceeding of the 7th IEEE/ACM International Symposium on Mixed and Augmented Reality, Cambridge, UK, September 2008, pp. 125--134

Others

IPCity project presentation at the Lab’Urba research laboratory meeting, UMLV, 26.03.2009

Work session with Thales and Terramagna project partners at Communauté d'agglomération de Cergy-Pontoise to cross experiences about VR, MR and AR applications to urban environments, UMLV, 20.05.2009

IPCity project presentation at the workshop organized by the PIRVE / CNRS « Environnement et co-production de projets : échanges franco-italiens » research program in Université de Paris Ouest Nanterre La Défense/Agorà (F), UMLV, IPCity project presentation, 22.10.2009

Conference on Mixed Reality Technologies, Urban Projects and IPCity at Ecole Nationale des Ponts et Chaussées (Master Amur), UMLV, 25.11.2009 .

A Braun and R McCall edited a special issue of the Journal of Personal and Ubiquitous Computing which is scheduled to appear in 2010. (eds. Grueter, McCall, R., Baille, L,. Braun A).

McCall, R. (2010) Vienna and the Elves. Interfaces Magazine. British Computer Society, HCI Special Interest Group.

McCall,, R. (2009) Interacting in Urban Environments. Perada Magazine. (www.perada-magazine.eu)

Book chapters

Jacucci, G., Peltonen, P., Morrison, A., Salovaara, A.,Kurvinen, E., & Oulasvirta, A. (in press). Ubiquitous media for collocated interaction. In Willis, K. (Ed.), Shared Encounters. Springer Series on CSCW.

McCall, R., Augmented Technologies. (2009) In Presence for Everyone. Benyon, D., Smyth, M., and Helgason, I.(eds). Napier University. ISBN. 978-8-956169-9-8. p 53-56.

Citation index

The following citation index data was gathered for the list of publications in the ipcity.eu web site on 22nd of February, 2010 using Google Scholar. For those IPCity publications not listed here, the service found no citations. Table is sorted by Year, then by Type of publication.

Year	Authors	Publication	Type	Cited by
2006	Broll Wolfgang, Ohlenburg Jan, Lindt Irma, Herbst Iris, and Braun Anne-Kathrin.	Meeting Technology Challenges of Pervasive Augmented Reality Games	Workshop	18
2006	Novotny Tom, Lindt Irma, and Broll Wolfgang.	A multi modal table-top 3D modeling tool in augmented environments	Symposium	1
2007	Peltonen P., Salovaara A., Jacucci G., Ilmonen T., Ardito C., Saarikko P., Batra V.	Extending Large-Scale Event Participation with User-Created Mobile Media on a Public Display	Conference	15
2007	Jacucci G., Oulasvirta A., Ilmonen T., Salovaara A., Evans J.	CoMedia: Mobile Group Media for Active Spectatorship	Conference	17
2007	Jacucci Guillio, Wagner, Ina	Performative Roles of Materiality for Collective Creativity	Journal	14
2007	Reitinger Bernhard, Zach Christopher, Schmalstieg Dieter	Augmented Reality Scouting for Interactive 3D Reconstruction"	Conference	7
2007	Wagner I., Schmalstieg D.	Muddleware for Prototyping Mixed Reality Multiuser Games	Conference	7
2007	Newman J., Bornik A., Pustka D., Echtler F., Huber M., Schmalstieg D.	Tracking for Distributed Mixed Reality Environments	Workshop	3
2007	Pirchheim, Schmalstieg, Bornik	Visual Programming for Hybrid User Interfaces	Workshop	3
2007	Sareika M., Schmalstieg D.	Urban Sketcher: Mixed Reality on Site for Urban Planning and Architecture	Conference	2
2007	Herbst I., Ghellal S., Braun A-K.	TimeWarp: An Explorative Outdoor Mixed Reality Game	Poster	2
2007	Wittkämper M., Ohlenburg J., Lindt I., Herling J., Broll W., and Ghellal S.	Exploring Augmented Live Video Streams for Remote Participation	Conference	1
2008	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	Conference	46
2008	Wagner D., Reitmayr G., Mulloni A., Drummond T., Schmalstieg D.	Pose Tracking from Natural Features on Mobile Phones	Conference	46
2008	Herbst I., Braun A-K., McCall R., Broll W.	TimeWarp: Interactive Time Travel with a Mobile Mixed Reality Game	Conference	14

2008	Wagner D., Langlotz T., Schmalstieg D.	Robust and unobtrusive marker tracking on mobile phones	Conference	14
2008	Schall G., Mendez E., Kruijff E., Veas E., Junghanns S., Reitinger B., Schmalstieg D.	Handheld Augmented Reality for Underground Infrastructure Visualization	Journal	10
2008	Herbst I., Braun A.-K., McCall R., and Broll W.	Multi-dimensional Interactive City Exploration through MR	Poster	5
2008	Maquil V., Psik T., Wagner I.	The ColorTable – A Design Story.	Conference	4
2008	Broll W., Lindt I., Herbst I., Ohlenburg J., Braun A., and Wetzel R.	Toward Next-Gen Mobile AR Games	Journal	4
2008	Sareika M., Schmalstieg D.	Urban Sketcher: Mixing Realities in the Urban Planning and Design Process	Workshop	4
2008	Broll W., Herling J., and Blum L.	Interactive Bits: Prototyping of Mixed Reality Applications and Interaction Techniques through Visual Programming	Conference	3
2008	Morrison A., Jacucci G., and Peltonen P.	CityWall: Limitations of a multi-touch environment	Workshop	3
2008	Morrison A., Mitchell P. and Viller S.	Evoking Gesture in Interactive Art	Conference	2
2008	Wetzel R., Lindt I., Waern A., and Johnson S.	The magic lens box: simplifying the development of mixed reality games	Conference	2
2008	McCall R., Herbst I., Braun A., and Wetzel R.	The “Where” of Mixed Reality: Some Guidelines for Design	Poster	2
2008	McCall R., Herbst I., Braun A., and Wetzel R.	“The “Where” of Mixed Reality: Some Guidelines for Design	Workshop	2
2008	Nguyen P.G., Andersen H. J.	Uniqueness filtering for local feature descriptors in urban building recognition	Conference	1
2008	McCall R., Wagner I., Kuutti K., Jacucci G., and Broll W.	Urban mixed realities: technologies, theories and frontiers	Extended abstract	1
2008	Morrison A., Jacucci G., Peltonen P., Juustila A., & Reitmayr G.	Using locative games to evaluate hybrid technology	Workshop	1
2008	Nguyen G.P., Andersen H.J. and Christensen M.F.	Urban building recognition during significant temporal variations	Workshop	1
2008	Ohlenburg J., Broll W., and Braun A.-K	Morgan: A Framework for Realizing Interactive Realtime AR and VR Applications	Workshop	1
2008	Nuojua, Johanna; Kuutti, Kari	Communication Based Web Mapping: A New Approach for Acquisition of Local Knowledge for Urban Planning	Conference	1
2009	Morrison A., Oulasvirta A., Peltonen P., Lemmela S., Jacucci G., Reitmayr G., Nasanen J., and Juustila A.	Like bees around the hive: a comparative study of a mobile augmented reality map	Conference	5
2009	Molin-Juustila, Tonja; Nuojua, Johanna; Kuutti, Kari	Urban planning and ubicomp design - do we need to extend legally enforced participation?	Conference	2
2009	Ylirisku, Salu; Halttunen, Virtu; Nuojua, Johanna; Juustila, Antti	Framing Design in the Third Paradigm	Conference	2
2009	Basile M., Terrin J.J.	Le projet IP City. Une recherche sur la place des technologies de réalité mixte dans les représentations du projet urbain	Journal	1

2009	Halttunen, Virtu; Juustila, Antti; Nuojua, Johanna	Technologies to support communication between citizens and designers in participatory urban planning process	Conference	1
2010	Basile M., Ozdirlik B., Terrin JJ. (2010).	IPCity: une recherché sur la place des technologies de réalité mixte dans les représentations du projet urbain	Conference	1

Organization of workshop and events

During the previous 15 months, the IPCity consortium organized the following workshop and events as well as presentations to external specialist at workshops and conferences.

FET'09 - European Future Technologies Conference and Exhibition – Prague

IPCity participated in the FET09 event (http://ec.europa.eu/information_society/events/fet/2009/index_en.htm) in Prague. Visitors were especially interested in the tracking technologies, machine vision, image processing, mobile technologies and in general the IPCity project and research done there. FIT, IMAG and TKK were present in the event while other partners supported the organizing of the event. Demonstrations included a WP8 demo and a talk during sessions, WP9 demo and a WP7 demo with MapLens. FET even was useful in the sense that we were able to promote IPCity to a reasonably large group of interested people from fellow researchers to the press. The event itself had around 700 participants, and was more a case of quality of booth visitor rather than quantity. IPCity was successful in getting the IPCity project across to a diverse audience.

Figure 1: IPCity booth at the FET09 in Prague.

IPCity Summer School 2009 – Vienna

The project organized the IPCity Summer School (http://www.ipcity.eu/summerschool) in Vienna 22-25. September 2009. The summer school provided an opportunity to 29 students to work alongside experts in the field of urban mixed realities. The summer school brought together students from a range of backgrounds including architecture, urban planning,

computer games design and information technology. School included four presentations from the IPCity researchers and six workshops on IPCity, Urban Issues, Urban Renewal, Environmental Awareness, Explorative Edutainment and Story-Telling.

Figure 2: Participants of the IPCity Summer School in Vienna.

IPCity Final Event

Organised by UniAK

March 22-March 25th Vienna

At the time of writing the final preparations are being made for the IPCity final event which will take place in Vienna. The event will be open to the public and will consist of demonstrations of the various showcase technologies, panels and an exhibition. The event will be opened by Dr Gerald Bast the Rector of UNIAk and a number of specially invited experts will not only attend but also take part and a panel session. The panel discussion is on Mixed Reality – Strategies of Representation and Communication techniques within the field of architecture and urban planning and urban design, theory and practice.

Other events

Two discussion panels on urban issues and the use of mixed reality technologies with urban professionals and researchers from public and private institutions, UMLV, 13.02.2009 and 11.12.2009

A presentation of MapLens study results was given at Tampere, Finland for Nokia NRC, 27.03.2009 among a workshop on Mobility and Future Directions.

Three seminar series on evaluation with Andreas Duenser at HitLabNZ and Ann Morrison, TKK

Workshop on MR/AR examples and evaluation styles with Holger Regenbrecht (Uotago), Saija Lemmela (Nokia), Andreas Duenser (HitLabNZ), Gabriela Richard (NYU), Mikael

Wahlström (HIIT) was held at TKK 06.08.2009: http://www.hiit.fi/~morrison/workshop6August.html

Workshop on interactional techniques in mobile virtual and augmented reality applications with Alessandro Mulloni (TUGraz), Antti Nurminen (HIIT), Ville Lehtinen (HIIT) at TKK. 02.09.2010

CityWall presented in a workshop at Mobile Life Center, Stockholm. 18.10.2009.

Workshop on Multitouch: Design Issues and Knowledges: Limitiations and Affordances with Hyowon Lee (UDublin), Tatu Harviainen (VTT), Mika Nieminen (TKK), Tommi Ilmonen (Multitouch Ltd), Celine Coutrix, Ivan Avdouvevski and Toni Laitinen from HIIT at TKK, 27.11.2009. http://www.hiit.fi/~morrison/workshop27November.html

Multitouch and Surface Computing Workshop at CHI2009. Co-organised with Steven C Seow, Microsoft Corporation, Dennis Wixon, Microsoft Corporation, Giulio Jacucci, HIIT, Ann Morrison, HIIT, Scott MacKenzie, York University

A presentation of the IPCity project, MapLens and TimeWarp in particular to a workshop meeting urban computing held at the University of Queensland Australia, with researchers from National ICT Australia (NICTA) University of Queensland (UQ) and Queensland University of Technology (QUT), community, plus other IPCity and MARCUS partners in Brisbane, Australia.

A presentation of the IPCity project to the MARCUS workshop held during February 2010 at the University of Otago, New Zealand.

To Come: Natural User Interfaces Workshop at CHI2010. Co-organisers of workshop Giulio Jacucci, HIIT, Ann Morrison, HIIT, Steve Seow, Microsoft Surface, Dennis Wixon, Microsoft Surface.

Press coverage

Project Wide

- Two articles pending in the EC ICT results magazine on IPCity and more specifically Urban Renewal.
- A press release and other materials are pending for the final event.

WP6 :

- Newspaper article on the WP6 Pontoise workshop, “Dessine-moi une ville” in the Cergy-Pontoise agglomeration newspaper “Douze comme une”, July 2009, http://issuu.com/cergypontoise/docs/mag151

WP7 :

- WP7 prototyes have had a good coverage in the Internet and in the news. MapLens interview was presented in local University of Helsinki newspaper http://www.helsinki.fi/news/archive/3-2009/3-14-12-51
- The popularity of the CityWall video has been noted in the news of University of Helsinki http://www.helsinki.fi/ajankohtaista/uutisarkisto/10-2008/20-15-04-37) and naturally also in the HIIT news (http://www.hiit.fi/node/735).
- The video of MapLens on Youtube http://www.youtube.com/watch?v=00hiRuCTBOQ) has so far received 825 views.
- The MapLens HiitTV video on YouTube http://www.youtube.com/user/HIITTV) has received 286 views.

- We also published a call for MapLens game applicants in our web pages http://www.hiit.fi/~morrison/maplens.html). Our environmental awareness theme was also presented in our web pages (see http://www.hiit.fi/node/507).
- CityWall has been advertised in the Internet http://www.citywall.org), where it has received also a lot of attention: the CityWall Hki YouTube video http://www.youtube.com/watch?v=IldDrCcZkZY) has had 286 925 viewers and the very first CityWall video (see http://www.youtube.com/watch?v=WkNq3cYGTPE) has had 35,882 viewers.

WP8

- TimeWarp press release December 2009.
- „Virtuelle Zeitreise durch Köln“, auf **DRadio Wissen** – Medien, 9 min (Radio)
- „Heinzelmännchen zurück in Köln“, **Rheinzeitung** Nr. 19, 23.1.2010, p.36 (Newspaper)
- Report, „neues“, **3sat**, 4 min (TV)
- „Eine Zeitreise mit TimeWarp“, **Computer Club Zwei**, Folge 205, 15 Min (TV)
- „Tages Thema: Im Papier steckt mehr drin“, **Rheinzeitung** Nr. 26, 1.2.2010, p. 4 (Newspaper)
- Webpage for „Tages Thema: Im Papier steckt mehr drin“, www.rheinzeitung.de/ar (paper augmentation with video report)
- „Ufos überm Rhein“, in : „**Focus**“ Nr. 09/10, p.78-79 (Magazine)
- **Playboy** Deutschland, April 2010 (to appear, Magazine)
- TV-style report, student work, final year project “Technikjournalismus”, Hochschule Bonn-Rhein-Sieg (www.h-brs.de) (Uni/TV)
- “Forschung aktuell: Computer und Kommunikation”, auf **Deutschlandfunk** (to appear), 4 min (Radio)

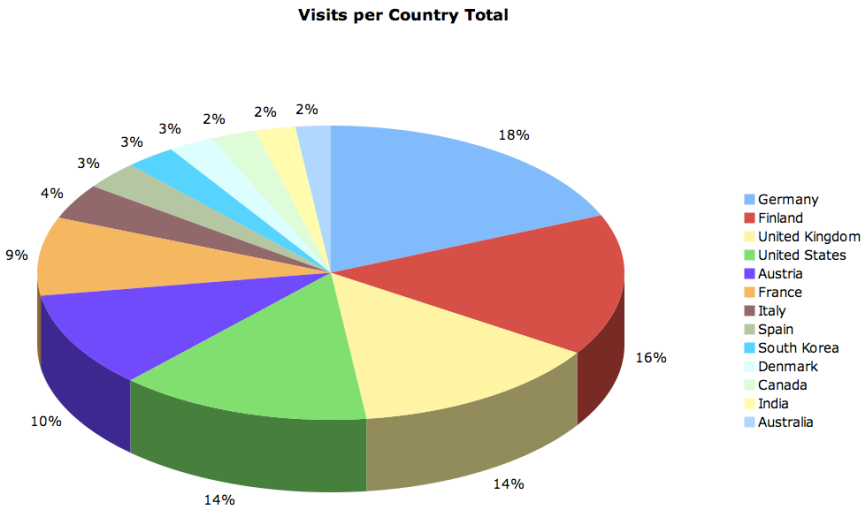
WP9:

- IMAG created the IPCity Summer School web-pages http://www.ipcity.eu/summerschool/ that received a great visibility, check following chapter Dissemination for details.
- IMAG web site receiving over 75.000 visitors a year hosted information on the City Tales work package as well as on the IPCity project.

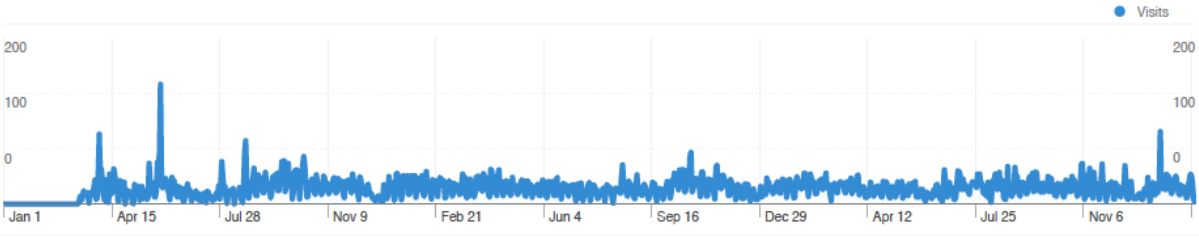
1.1.2 Dissemination

Website

The following chart displays the visitor countries with more than 300 visits to the www.ipcity.eu during the **whole duration** of the project. There were a total of 21 177 visits from 142 countries to the site during the project.



The traffic was quite even during the **duration** of the project, with some low peaks (figure below). Most of the traffic came through Google, followed by the dissemination of user trials and technologies (e.g. CityWall).



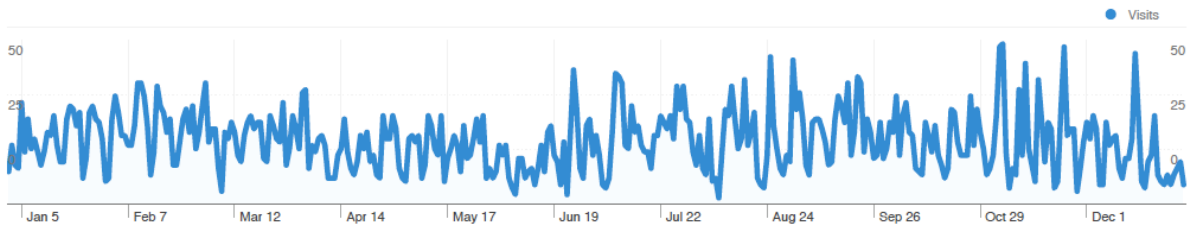
Also the Pervasive games topic and conference seems to have generated hits through Google search.

Top Traffic Sources

Sources	Visits	% visits
google (organic)	8,275	39.08%
(direct) ((none))	4,220	19.93%
citywall.org (referral)	1,274	6.02%
hiit.fi (referral)	910	4.30%
fit.fraunhofer.de (referral)	681	3.22%

Keywords	Visits	% visits
ipcity	1,614	18.62%
ip city	118	1.36%
pergames	90	1.04%
ip-city	78	0.90%
ipcity project	69	0.80%

During the **year 2009**, 7095 visits were done to the site, countries being from the same group of countries already illustrated in the totals pie diagram above.



During 2009 (see next page), Google was also the top source for traffic. Also blogs seem to generate interest. For example, the neo-nomad blog entry referred over 200 clicks, and that blog originally posted the blog entry because of another blog writing about the IPCity project.

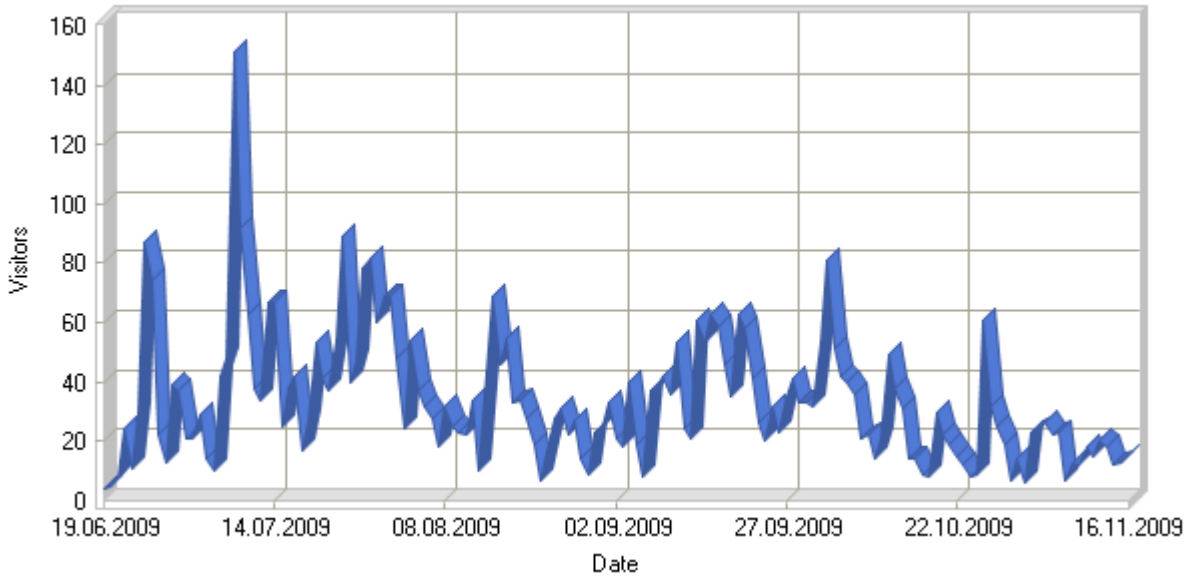
Top Traffic Sources

Sources	Visits	% visits
google (organic)	3,034	42.76%
(direct) ((none))	1,383	19.49%
blog.neo-nomad.net (referral)	244	3.44%
hiit.fi (referral)	212	2.99%
media.tuwien.ac.at (referral)	206	2.90%

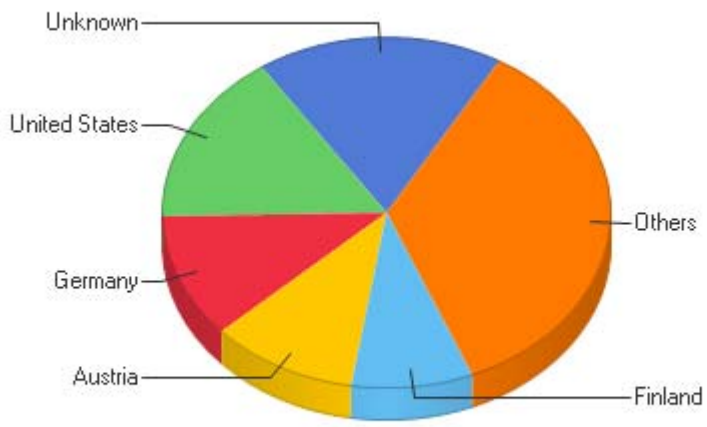
Keywords	Visits	% visits
ipcity	643	20.25%
pergames	57	1.79%
ip city	37	1.16%
hypermedia database	29	0.91%
project deliverables	29	0.91%

Summer School Website

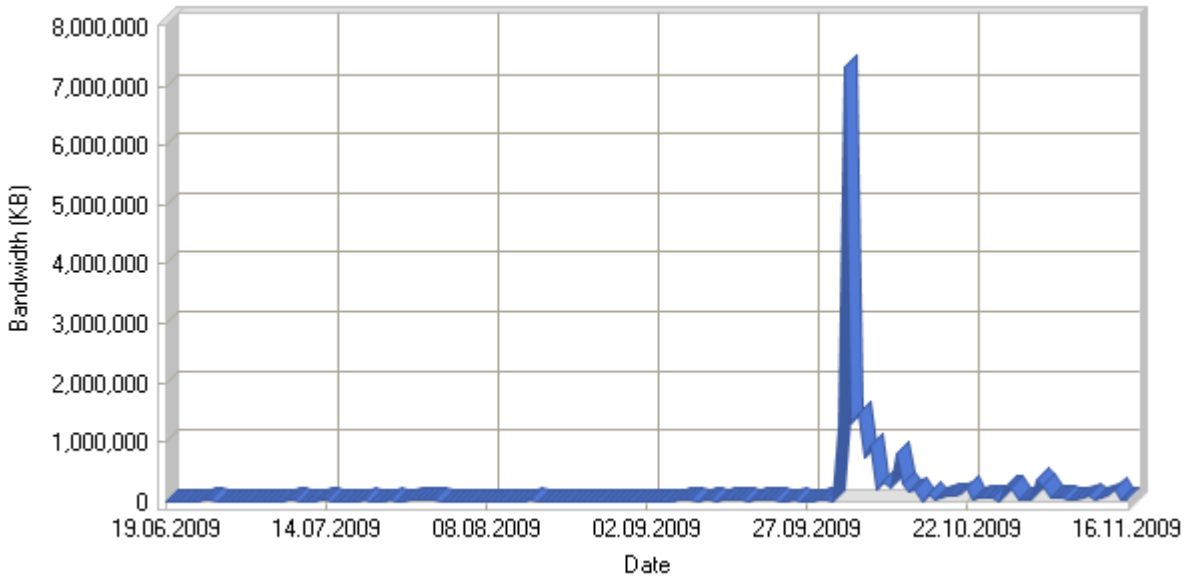
A separate website ipcity.eu/summerschool was set-up in preparation of the IPCity Summer School 2009 and was maintained to handle announcement, participant preparation and overall documentation of the event.



During the observed period from the start of the site to November 2009 the site had 33 average unique visitors per day with peaks at 150 visitors during the announcement. In total we had 2.520 unique IPs visiting to the site with a total of 36.655 total page views.



The news on the Summer School had a wide spread popularity, we had over 50 different countries visiting the website with largest volumes coming from USA 16%, Germany 11,5%, Austria 10,5%, Finland 8,5%. Still significant access from outside of EU was documented from Brazil, South Africa, Canada, China, India, New Zealand, and Russian Federation.



Daily bandwidth statistics clearly show, that however general information was most retrieved ahead of the event, many visitors returned after the event in September to browse the extensive documentation of the Summer School we put on-line, including introductory slides, slides and videos of all final presentation talks, and a photo gallery of the event.

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 had 280 page views during 2009, and total of 1 472 page views during the whole project. 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:

- University of Otago, New Zealand
- University of California, Santa Barbara
- University of Udine, Italy
- Grintec GmbH, Graz, Austria
- Mobilizy GmbH, Salzburg, Austria
- See UMVL for contact with user groups in Cergy-Pontoise

OULU:

WP4 and WP5 tools have been demonstrated to end-users in cooperation with the Department of Architecture, University of Oulu, during one of their field-oriented classes (13 end-users in the suburban area of Ylikiiminki near the city of Oulu).

FIT: 7

- Bitou, Germany
- Geogames, Germany
- Cologne Competence Cluster Virtual Reality
- University of Duisberg-Essen
- University of Otago, New Zealand
- Samsung Electronics
- LG Electronics

TKK : 9

- Nokia Research Centre, Finland
- Couchsurfers, Finland
- Media Lab, Taik, Finland
- University of Otago, Dunedin
- Fraunhofer, FIT, Germany
- New York University, NY NY, USA
- University of Helsinki, Finland.
- HitLab NZ
- Elisa, Finland

UMLV: 13

- Cergy-Pontoise Metropolitain Authority, France
- CAUE '95
- LTMU/Université de Paris 8, France
- Lab'URBA/UMLV, France
- The Chamber of Commerce and Industry, Cergy-Pontoise, France
- MRTE/Université de Cergy-Pontoise, France
- University of Cergy-Pontoise, France
- The city of Pontoise, France
- Ecole des Ponts et Chaussées : Master AMUR, France
- Thales and Terramagna project partners, France
- PIRVE / CNRS « Environnement et co-production de projets : échanges franco-italiens » research program, France
- Cité Cezanne Artists Association, France
- Urba-Concept Innovation Platform, France

TUW : 2

- Oslo University, Design Group, Faculty of Informatics
- See UMVL for contact with user groups in Cergy-Pontoise

Imagination and UniAK: >35

Imagination and UniAK demonstrated and presented the concepts and results of the IPCity research project and especially the output of the WP9 City tales work package to various entities, including:

- Urban Strategies Lab students, Vienna – 13 persons
- Independent authors interested in digital-story telling, Vienna – 4 persons
- Verdandi GmbH, Vienna & Salzburg
- Group BBVA, Spain
- Pattern Recognition Company GmbH, Germany
- Universität Lübeck, Germany
- Swiss Federal Institute of Technology, Switzerland
- Joanneum Research, Austria
- Nokia Corporation, Finland
- Telecom Italia, Italy
- Independent writer, Germany
- Certicon A.S., Czech Republic
- Sengaro, Austria
- Institute of Information Theory and Automation, Czech Republic
- ISTI Consiglio Nazionale delle Ricerche, Italy
- Mobilera, Turkey
- Forschungzentrum Telekommunikation Wien, Austria
- Joaennum Research, Austria
- Univerza v Ljubljani, Slovenia

Field trials and User Tests

The number of field trials or user tests in each showcase application in 2009-2010 and the total number of end-users involved are described in this section.

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

Urban Issues Workshop, CAUE ’95 Pontoise. 18 participants on the 4th of may, 8 participants on the 5th of may

Pontoise workshop, Jardins des Lavandières, Pontoise. 20-25 participants

Oslo workshop, 20-25 participants

WP7 Environmental Awareness

During 2009 we have organised multiple events and field trials around the showcase prototypes. Our evaluation was organised so, that different members of the IPCity project could participate in organising the trials, guaranteeing us as wide group of professionals from different fields as possible. Visiting researchers from FIT, TUG, UOulu, Nokia Research, New York University, University of Otago and HitLabNZ participated in planning and organising our field trials during the summer.

- Two field trials 23 and 30 August 2009, Helsinki, Finland (37 people)

Two trials were held over two Sundays, in urban Helsinki, 23rd and 30thAugust 2009WP8 TimeWarp

- Field Trial February 2010: Christchurch New Zealand (11 people plus pilot study users)
- Field Trial January-February 2010: Cologne, Germany (66 people, 33 groups + 12 people, 6 groups for pilot study)

WP9 City Tales

- 1st Urban Strategies Workshop; May 2009; N=12
- 2nd Urban Strategies Workshop; July 2009; N=14
- Summer School Workshop; Sept. 2009; N=10
- Field Trial: Naschmarkt Stories; Okt/Nov. 2009; N=6
- Field Trial: Naschmarkt Stories; Jan. 2010; N=8

Total number: 50.

Scientific cooperation with other projects or organizations

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: Valerie Maquil
Supervisor: Ina Wagner

Type: Dissertation

Title: The ColorTable: an interdisciplinary design process

Date: near completion

Candidate: Ann Morrison
Supervisor: Stephen Viller, Margot Brereton, informal: Giulio Jacucci

Type: Dissertation by monograph

Title: Situated Play in Interactive Environments

(In future work references MapLens evaluation methodology as example of larger implementation of method implemented in thesis)

Date: near completion (tbs June)

Candidate: Georg Hackenberg
Supervisor: Wolfgang Broll, Thorsten Fröhlich, Rod McCall

Type: Masters Thesis

Title: Development of a Multi-Touch Interface using a 3D Camera

Date: near completion (tbs April)

Candidate: Toni Laitinen
Supervisor: Tapio Takala

Type: Master's thesis

Title: Biofeedback in Affective Gaming

Date: 30.4.2010

Visits to foreign research labs

During 2009-2010 a number of IPCity researchers visited other consortium members:

- Richard Wetzel (FIT) Visited HIT Lab NZ
- Rod McCall (FIT) visited HIT Lab NZ
- Mira Wagner (TUW) visited HIT Lab NZ
- Michal Idziorek (TUW) visited HIT Lan NZ
- Stephan Gahmon (TUW) visited HIT Lab NZ
- Hartmut Seichter (HIT Lab NZ/UoC) visited FIT
- Alessandro Mulloni from TUGraz visits TKK, 10 August - September 6. (IPCity and MARCUS partner)
- Andreas Deunser from HitLabNZ visits TKK, 6 July - 17 August. (IPCity and MARCUS partner)
- Gabriela Richards from University of New York, visits TKK, 1 June – 1 September (participated in Worlds of data analysis)
- Thorston Froehlich, FIT, Germany visits TKK, 23rd August trials (IPCity and MARCUS partner)
- Ann Morrison (TKK)) visited HIT Lab NZ
- Peter Peltonen (TKK)) visited HIT Lab NZ
- Vilma Lehtinen (TKK)) visited HIT Lab NZ
- Saija Lamella (NRC/ TKK) visited HIT Lab NZ
- Zsolt Szalavári (IMAG) visited HIT Lab NZ
- Tobias Langlotz (TUG) visited HIT Lab NY (MARCUS partner)
- Ann Morrison (TKK) visited Nokia Research Tampere
- Peter Peltonen (TKK) visited Nokia Research Tampere
- Ann Morrison (TKK) visited FIT, Germany
- Ann Morrison (TKK) visited University of Queensland, Australia
- Ann Morrison (TKK) visited State Library research project Edge, Queensland, Australia
- Lisa Blum (HIT) visited University of Otago (MARCUS Partner)

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).

- Holger Regebrecht from Univ. Otago, NZ visits TKK, August 1st - 20 August (MARCUS partner) to learn about qualitative field trial methods.
- Maria Basile (UMLV) visited all showcase partner sites to undertake urban studies work.

Visits of senior researchers

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

- UOulu: A demonstration session was organized, where the technologies developed in Oulu were presented to Prof. Yoshitsugu Manabe from Nara Institute of Science and Technology (NAIST), Japan, and Jaako Hyry (University of Oulu).
- Hyowon Lee from Dublin City University, UK, visits TKK, 27 November, 2009 (participated in multi-touch workshop and evaluating Worlds of Information interaction design)
- Catherine LAVANDIER from Université de Cergy-Pontoise visited UMLV, 13.02.2009, participated to the discussion panel organized by UMLV with urban professionals and researchers from public and private institutions.
- Pascal Amphoux from CRESSON (Centre de recherche sur l'espace sonore et l'environnement urbain) visited UMLV, 11.12.2009, participated to the discussion panel organized by UMLV with urban professionals and researchers from public and private institutions.

1.1.4 Exploitation

Patents

There were no patent applications from the consortium partners in 2009.

Standards

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

Members of TUG organized a workshop on “Social AR” at IEEE Int’l Symposium on Mixed and Augmented Reality (Orlando, Florida, Nov 2009) and discussed possible standards for annotations in social AR applications with several industrial representatives. While there is common interest, the state of the commercial market seems too early to establish more than an informal interest group.

Industrial and other non-scientific collaborations

Fraunhofer FIT is currently collaborating with Bitou in the area of mobile gaming which is likely to feature concepts from TimeWarp.

Components used by other projects or 3rd parties

Concepts and technologies from the project are currently being explored for use within other project proposals.

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.

WP6

All work within WP6 was done in a gender-balanced research team. There was also a gender balance concerning participants in field trials. In our field trials, participants were informed about the recording of data and consent forms were collected.

WP7

During 2009-2010 work within WP7 was conducted with an emphasis on gender neutrality and a mindset to proactively support less-technically 'competent' citizens, from the manner in which tasks were constructed for the game. From an ethical standpoint all participants are fully briefed beforehand so they understand how to use the equipment, and safety issues. As well they are informed of our data capture methods and how their data will be used. Additionally they signed an informed consent form before participation.

- Actively recruited an equal balance of male and female subjects for trials. Gender was equally distributed across the two trials and the fifteen teams, with 12 females and 11 males in the first trial and seven females and seven males in the second.
- Worked with a gender-balanced team of people where possible.

WP8

During 2009-2010 work within WP8 was conducted with a gender neutral way from both a study and development perspective. From an ethical standpoint all participants are fully briefed beforehand with respect to the equipment, safety, data capture methods and how their data will be used. Additionally they were fully briefed on safety issues and were asked to sign an informed consent form. This is the same process which has been used since 2007 and to date no problems have arisen.

- Strived recruited a balance of male and female subjects for within its studies
- Worked with a gender balanced team of people on the redesign of TimeWarp New Zealand

WP9

- WP9 trials and field studies conducted during 2009-2010 were gender neutral from the perspective of the test subjects. All participants were briefed beforehand with respect to the equipment, safety, data capture methods and how their data will be used.

Recommendations

The Scientific Board could not observe problems with ethical issues. In 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

IPCity has a large number of women researchers both as junior and senior researchers, for example WP3, WP6 and WP7 are led by women, who are also represented within relevant project boards. Additionally significant work within the project has been undertaken by women across all elements of the project in areas from user studies through to the development of underlying technologies.

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 D1.14 – Annual Progress Report.

Adequacy of showcase structure

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. The showcase address both very specific, professional objectives and users (urban renewal) and more casual, creative audiences (environmental awareness, time warp, city tales). Similarly, technical environments range from heavyweight (MR tent) over medium weight (city tales) to lightweight (environmental awareness).

Overall, the SB believes that the spectrum of possible application themes and technological approaches was well covered with IPCity's four year worth of showcases.

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 4 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. In 2009 trials, we took away ANY need to collaborate and found this phenomena was still present.
- WP8 has explored place, presence, interaction and collaboration within the context of MR games. 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 was restarted in Year 3 after the replacement of partner Sony with partner Imagination. However despite the new start and delay with the amendment significant advances were made during year 4. A new scenario was developed, which focuses on the joint contribution of professional authors and students of urban planning. The target location Naschmarkt in Vienna is a lively environment which lends itself to fueling the theme of the showcase. This approach much better resonated 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 Urban workshop in CAUE '95, WP6 involved several user groups:

- **Urban experts:** an urban planner from the metropolitan authority of St Quentin Yvelines, four architects working at CAUE and two consultants
- **Local Authorities:** technical staff from the city of Pontoise (the head of public space service and for green spaces, as well as one of the gardeners), two elected councilors, the manager of the city of Pontoise (representing the CCI)
- **Users & associations:** a tenant of a family garden above the Patis basin, two residents, two artists living in Ateliers Cézanne, and a student from Cergy School of Art

For the Pontoise workshop in the gardens of Lavandières, WP6 involved several user groups:

- **Urban experts:** 2 architects working at CAUE, 1 urban planner working in St Quentin Yvelines
- **Local Authorities :** an elected councillor of the City of Pontoise for education (former president of the local inhabitants association), a responsible from the CCI, head of the green spaces service of the City of Pontoise, a gardener for the City of Pontoise
- **Users & associations:** two habitants from the neighbourhood (members of the local association), three artist working in film sets and living in the Cité Cézanne (members of the artists association), a student from the Cergy School of Art

For the workshop in Oslo, WP6 cooperated with designers, and computer scientists from the University of Oslo in preparing and carrying out the workshop. Participants in the workshop were: architects, representatives of the University, residents, two researchers focusing on people with disabilities, a PhD student specializing in urban flows, a sound expert, and students representing different interests.

WP6 cooperated as well with students, professionals and colleagues of ECSCW during IPCity summer school and the ECSCW Masterclass.

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 (except where there have been expected technical sustainability issues, usual in running a public installation over such a lengthy period of time). There has been estimated average of a 10/20-300 users per week, depending on activity in the area. Most of the visitors to youtube site displaying the 3D video were either part of the large international multitouch community, new technology users or e.g school groups. Most local users are school or university groups, interested researchers, or passers-by.

Analysis of footage of the largest audience at Paris, European City of Sciences exhibition at Grand Palais took place this year. 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 had a background in graphic design, interaction design, engineering or technology related fields, and were from a range of countries. We would consider the user group to mostly fit the category of expert users. The education level of our participants ranged from an intermediate school student to doctorates, with the majority holding some university level qualification. Most of the users had some professional or interest relationship to the environment and/or technology.

WP8: Showcase 3: TimeWarp

During year 4 two major studies were conducted involving TimeWarp. The participants in both studies varied from those working in IT and related areas of research through to journalists and members of the public.

WP9: Showcase 4: City Tales

Participants of field tests and workshops were of mixed education background including computer science, architecture, urban planning, media design. Most users were familiar with IT technology and mobile phones, partially with Augmented Reality technology or digital story-telling and gaming.

1.2.4 Assessment of Publications and presentations

Assessment of type and quality of publications (SB: Dieter)

The Scientific Board is satisfied with the level of publication success in the final year. 21 publications were accepted, among them 4 journal papers, which clearly implies the maturity of the work in the project. In early 2010, also several PhD thesis from IPCity's junior researchers have been submitted or are in a very advanced stage. 2009 was also the year were the second paper emerging from IPCity work received a best paper nomination at ACM CHI.

Invitations to journals and presentations

Members of WP8 have been invited to write a paper for the Journal of MobileHCI and a special issue of the Journal of Personal and Ubiquitous edited by members of WP8 computing is pending.

Joint publications

In 2009-2010 there were at least four joint publications by the project consortium:

TUW, FIT, HIIT, UOulu, TUG and UMLV co-operated in writing "On the Role of Presence in Mixed Reality", in PRESENCE special issue from RAVE'09, MIT Press.

Hiit, TUGraz, UOulu cooperated in writing Sharing Through the Screen: From Single to Multi-Lens Collaborative Augmented Reality on Mobile Phones, submitted to Mobile HCI 2010

HIIT, UCAM, UOulu cooperated in writing "Like bees around the hive: a comparative study of a mobile augmented reality map" in Proceedings of the 27th international Conference on Human Factors in Computing Systems (CHI '09).

TUW and TUG cooperated in writing "MR Tent: A Place for Co-Constructing Mixed Realities in Urban Planning" in GI 2009.

TUW and UMLV cooperated in writing "Supporting the Formation of Communities of Practice: Urban Planning in the MR-Tent" in C&T 2009.

UniAK and TUW cooperated in writing "Enhancing synergies between computer science and urban disciplines: Semi-automated applications for tangible user interfaces, a case study" in CAADFutures 2009.

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 published.

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 Uolu 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.

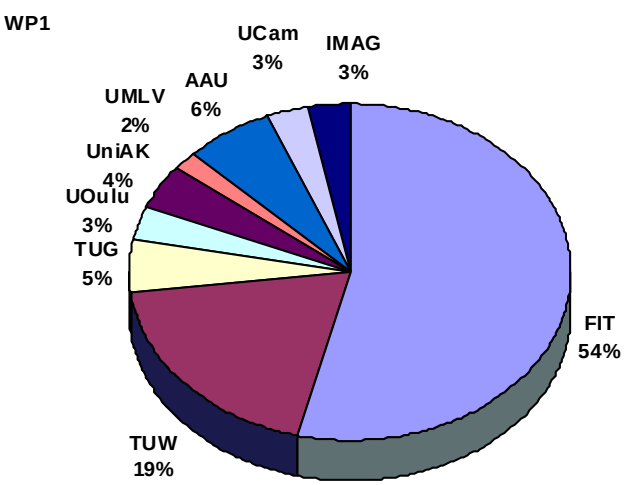
Contributions to joint deliverables

The graphs represent the planned budgets for the final phase periodic management report. They do not represent the actual work which will be reported after the close of the project. There was a high degree of co-operation between partners especially within presence research, showcase, and the dissemination activities. The UCAM figures will be amended to reflect their input after the close of the project.

WP1

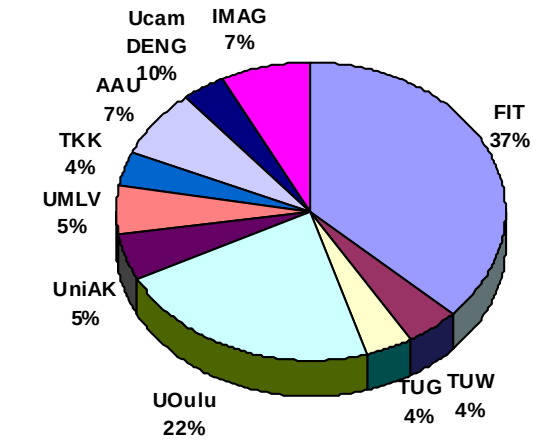
All partners contributed to the WP1 deliverables.

All partners contributed to D1.12 (revised plan) and the end of project deliverables D1.14 and D1.15.



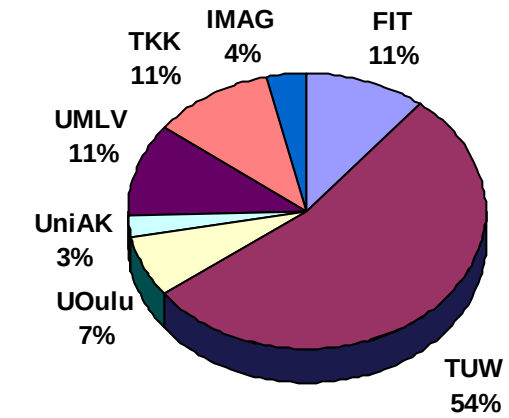
WP2

While dissemination was carried out by almost all project partners, the deliverable D2.4 was assembled by UOulu with input from other project partners.



WP3

The preparation of D3.5 benefited from the intense engagement of FIT, HIIT, UMVL, Imagination, TUG and TUW who cooperated closely in the definition of a common methodological and analytical approach to carrying our and analyzing field trials. All contributed substantial amounts of text to D3.5.

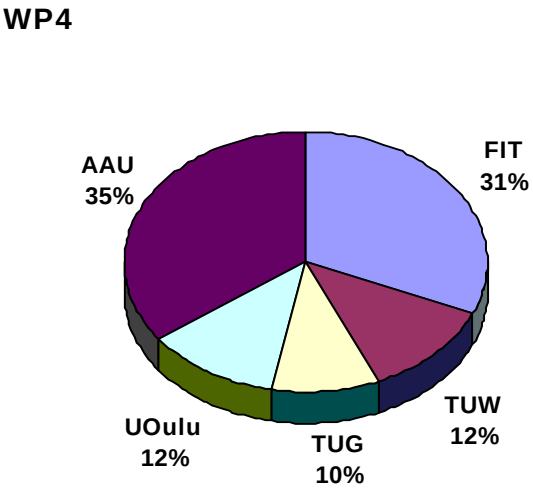


WP4

During the final phase of IPCity the main aim was to provide building block technologies which specifically supported research questions or specific needs within showcases. As a result the development focused on improving stability, reducing problems or providing specific features rather than on the development of new tools. A complete description of these technologies can found in

WP4 building blocks (aligned with D4.4) and contributing partners:

- Authoring:
  - FIT, TUW, UOulu,
- Data and Event Distribution:
  - FIT, TUG, UOulu
- Interaction:
  - FIT, TUW, UOulu, TKK
- Ambient Displays:
  - TKK



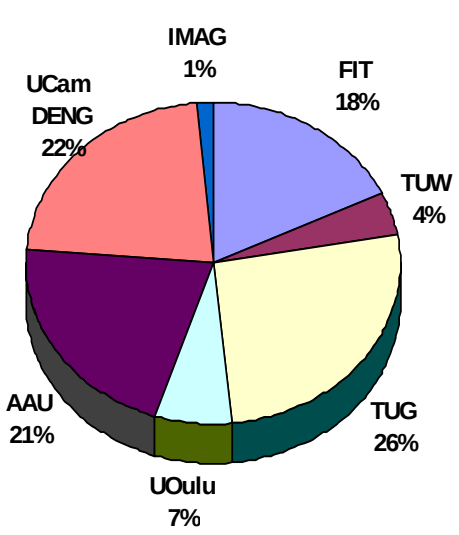
WP5:

All partners engaged in the infrastructure research work contributed to the deliverable D5.4 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.

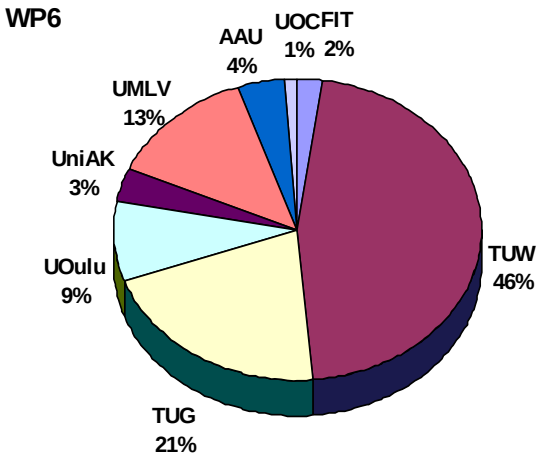
Building blocks of WP5 (aligned with D5.4) and contributing partners:

- Tracking:
  - UOulu, AAU, TUG, IMAG
- Storage / Content:
  - UOulu, TUW, IMAG
- Computation:
  - FIT, TUG
- Mobile AR/MR
  - TUG, FIT, IMAG



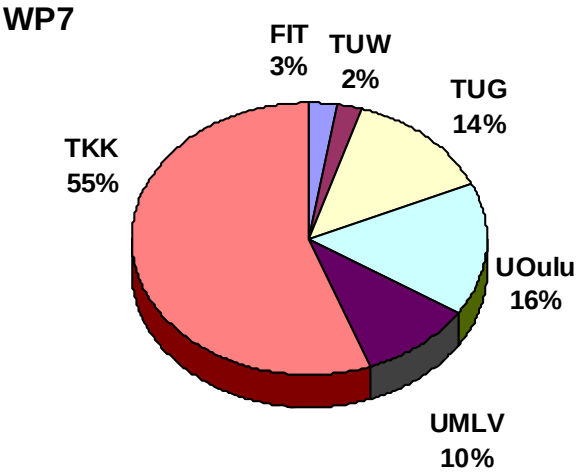
WP6

In WP6 UniAK, UMLV, and TUG joined TUW in preparing and carrying out field trials, analyzing the results, and contributing texts to D6.4. AAU further cooperated with TUW in IPCity Summerschool.



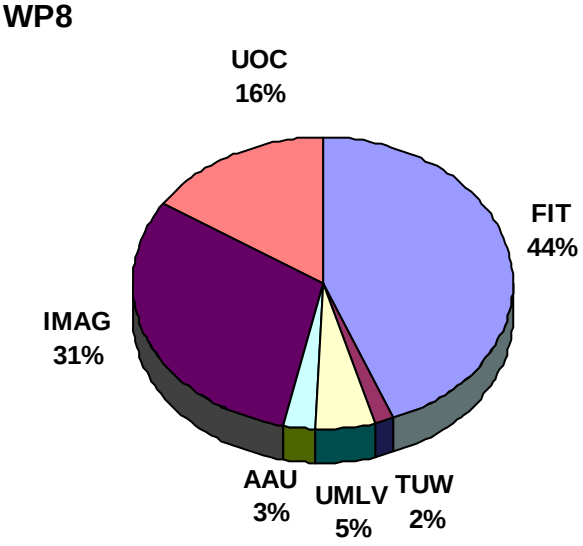
WP7

In WP7 field trials were prepared, implemented and analyzed by TKK researchers with the cooperation of TUG, UOulu, HitLabNZ, UOtago, FIT,, 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.



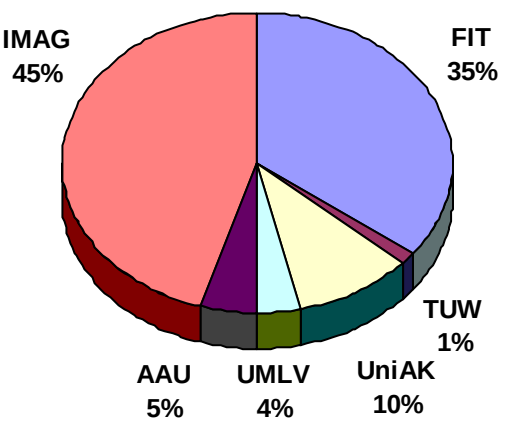
WP8

FIT collaborated extensively with IMAG in the development of new models. Furthermore FIT worked with UOC on implementing and testing the TimeWarp game in Christchurch New Zealand. Further collaboration was conducted with UMLV on the urban issues report.



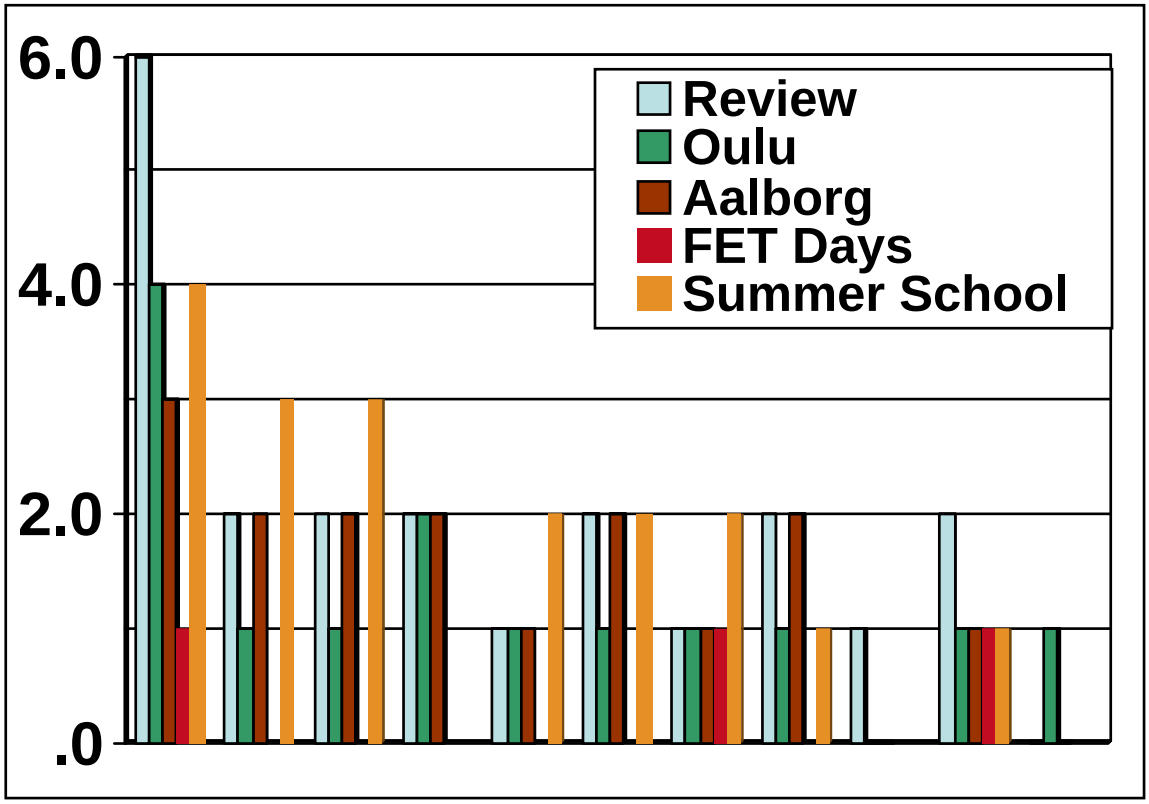
WP9

In WP9 IMAG collaborated tightly with UniAK in content creation, the organization of the workshops to assess the Naschmarkt from a wide number of perspectives including digital story-telling. 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 by TUG. TUW and FIT supported IMAG on the design and planning of field studies, user trials and evaluation of those. UOC was involved in the planning of a common field study and the planning of the evaluation as well as in the dissemination of the server technology for re-application.



Participation in general meetings

All project partners participated in regular project meetings, i.e. the review meeting in Barcelona, two project meetings in Oulu and Aalborg were held. The overall number of participants from each partner to those meetings is shown in the diagram. Furthermore project members participated in the Prague FET Days, The Summer School, and shortly the Final Event and review.



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:

- 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.
- 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.
- 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.

- All partners except UCAM contributed to and participated in two workshops (Oulu and Aalborg) focussing on interaction and presence within the project.
- TUW, UMVL, and FIT further cooperated in sound research. 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.
- TKK, TUG, UOulu, and IMAG cooperated in the development of MapLens technology
- TKK and Oulu cooperated in the development of CityWall technology
- AAU and TUW collaborated to test and improve the color tracking for the ColorTable.

- TUG and TUW collaborate in developing and testing 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 the organization of the Urban WS in May 2009
- UMLV, TUW, and TUG collaborated on workshop scenario development
- UMLV and TUW collaborated on the preparation of visual and sound content
- IMAG and UniAK collaborated in common workshops and dissemination activities
- IMAG and TUG started collaboration on the content integration of TUG internal data into Second City database
- IMAG and HitLabNZ started collaboration on the content integration of TUG internal data into Second City database
- TKK, TUW, FIT and IMAG collaborated on evaluation methodologies, looking at best practice for case-by-case examples in the showcases.

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 D1.12 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

During the final year of the project a decision was taken to place more balanced emphasis on the interaction and presence aspects of the project, rather than focussing almost exclusively on presence. The concept map was used as a starting point for this development and discussion with the objective of validating certain elements derived from results within the various showcase studies. At the conclusion of the project rather than presenting a concept map the results will focus on presenting a set of generic guidelines for MR experiences and some that are specific to each showcase, these aspects are largely defined from work carried out earlier on within the IPCity concept map.

Joint analysis

The final analysis done in WP3 contributed to: the notion of presence in an urban context; the design of outdoor MR applications; design for tangible and embodied interaction; the notion of presence in urban studies.

Key findings were identified and a set of guidelines for designing MR applications formulated.

Publications

A workshop on Natural User Interfaces Workshop at CHI2010. for CHI 2010 is in preparation between Microsoft Research and TKK. Co-organisers of workshop Giulio Jacucci, HIIT, Ann Morrison, HIIT, Steve Seow, Microsoft Surface, Dennis Wixon, Microsoft Surface.

MultiTouch and Surface Computing workshop at CHI2009. Co-organised with Steven C Seow, Microsoft Corporation, Dennis Wixon, Microsoft Corporation, Giulio Jacucci, HIIT, Ann Morrison, HIIT, Scott MacKenzie, York University.

Jacucci, G., Morrison, A., Richardson, G., Kleimola, J., Laitinen, T. and Peltonen, P. *Worlds of Information: Designing for Engagement at a Public Multi-touch Display* (in press) ACM CHI 2010.

Jacucci, G., Peltonen, P., Morrison, A., Salovaara, A.,Kurvinen, E., & Oulasvirta, A. (2009) *Ubiquitous media for collocated interaction*. In Willis, K. (Ed.), Shared Encounters. Springer Series on CSCW

Jacucci, G., Spagnolli, A., Chalambalakis, A., Morrison, A., Liikkanen, L., Roveda S., Bertoncini, M., *Bodily Explorations in Space: Social Experience of a Multimodal Art Installation,* Interact 2009.

Wagner, I., Broll, W., Jacucci, G., Kuutii, K., McCall, R., Morrison, A., Schmalstieg, D., Terrin, J-J. (2009), *On the Role of Presence in Mixed Reality,* PRESENCE special issue from RAVE'09, MIT Press.

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

McCall, R., Wetzel, R., Löschner, R., Braun. A. (2010) Using Presence to Evaluate An Augmented Realitiy Location Aware Game. In Journal of Personal and Ubiquitous Computing. (accepted for publication)

Common evaluation approach

Analysis in WP3 is based on a common methodological and analytical approach, which is described in detail in D3.5.

Joint analysis of presence and mixed reality across showcases

Field trials and participatory workshops were chosen as evaluation formats. The analytical focus was on multimodal analysis of fieldwork material, with a focus on the interrelations of talk with gestures, use of space, visual and audio elements of MR scenes, tangible and embodied interaction, modes of collaboration, as well as presence issues.

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.

In contrast with previous years the final phase objectives focus more on supporting other aspects of the project rather than developing new technologies:

- Improvements to existing technologies which specifically support research objectives or improve the user experience such that the showcases can now better support the research objectives.
- The ability of showcases to conduct the required user studies
- Each technology developed is contributing to the overall project objectives
- Submission of at least five conference and/or journal papers (at least one for each of the five major building blocks

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	**based on existing technologies**	**new technologies**
• 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 -3D interaction • Mobile Media Collector • Location Based Media Browsing on Paper Maps • Augmented Map Table	none were developed during the current perod.

Significance of progress in the development of technologies

See Deliverable D4.4 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	-

Paper submissions for individual building blocks

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
Interaction	Wagner et. al (2009) Morrison et al. (2009) Morrison et. al. (2010) Wagner et. al . (2009) Wagner et. al. (2009)
Interaction Prototyping and Authoring	Wagner et al (2009) Haltunen et al (2009)
Ambient Displays	Morrison et al (2009) Maquil et al (2009) Jaccucci et. al (2009)
Data and Event Distribution	

New technologies developed not available elsewhere

At the end of the project the following unique technologies will have been developed:

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

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 four major building blocks
- Identify new technologies developed within the project not available elsewhere

Tools and services developed within previous working periods

29 different technologies have been developed used by the different showcases.

Tools and services developed		
before/during 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 • Sound Component • Illuminate Technology • Studierstube ES • Morgan Light • Content Manager • Muddleware • Dotted Map Tracking • Mobile Map Tracking from natural features • Outdoor Tracking • Scouting • Urban Sketcher	• Physics Abstraction Layer • Slow-Fast Rendering • GPU Painting • In Situ Content Creation • Color Table RFID content assignment • Mobile Navigation and Panorama Annotation • Considerations for Multi - Display Infrastructure	• Augmented Map Table • HMDB • Morgan • Studierstube

Significance of progress in the development of technologies

A description of the progress of each major building block is given in deliverable D5.4.

Use of technologies by showcases

Each technology developed must be requested by at least two showcases and must actually be used by at least one showcase. The following table shows for each technology, which showcases are interested in this technology.

The following table shows which IPCity showcases use infrastructure components developed or extended within work package 5.

Tool or service	Showcases
Augmented Map Table	WP 6, WP 9
Scouting	WP 6, WP 9
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
Cal3D XSG	WP 8
Color Table Tracking	WP 6
Dottet Map Tracking	WP 7
Content Manager	WP 7, WP9
Urban Sketcher	WP 6

Audio/Video Streaming	WP6, WP9
Studierstube ES	WP9
Muddleware	WP6
Mobile Map Tracking from natural features	WP7, WP9
Outdoor Tracking	WP6, WP7, WP8, WP9
GPU Painting	WP6
Slow-Fast Rendering	WP6
In Situ Content Creation	WP9
Mobile Navigation and Panorama Annotation	WP9

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, Studierstube
Device abstraction and independency	Muddleware, OpenTracker
Cross-reality content authoring	HMDB & interfaces, Bluetooth Media Dispatcher, Cal3DXSG, Content Manager, In Situ Content Creation, GPU Painting
Configurable infrastructures	Muddleware, Illuminate, Map Table, Vision Based Localization, Spatial Sound, Morgan Light, Urban Sketcher
Semi-stationary outdoor Mixed Reality	MR-Tent, Mobile Presence Scanner, AR-Scouting, Mobile AR System, Urban Sketcher

Paper submissions for individual building blocks

There are 29 publications about mixed reality infrastructure components.

Conference/journal, date or timeframe	Title or topic	Authors	Status
Tracking			
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	Like Bees Around the Hive: A Comparative Study of a Mobile Augmented Reality Map	Morrison, A, Oulasvirta, A, Peltonen, P, Jacucci, G, Lemella, S, Juustila, A., & Reitmayr, G.	Published, Nominated For Best Paper Award.

CHI 2010.	Worlds of Information: Supporting multiplicity at a public multitouch display	Jacucci, G., Morrison, A., Richardson, G., Kleimola, J., Laitinen, T. and Peltonen, P.	in press
ISMAR 2008	Pose Tracking from Natural Features on Mobile Phones	Daniel Wagner, Gerhard Reitmayr, Alessandro Mulloni, Tom Drummond, Dieter Schmalstieg	Accepted
Proceedings of the 2009 8th IEEE International Symposium on Mixed and Augmented Reality	Global Pose Estimation using Multi-Sensor Fusion for Outdoor Augmented Reality	G. Schall, D. Wagner, G. Reitmayr, M. Wieser, E.Taichmann	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 2010	Atelier Infrastructure for Ubiquitous Computing.	Juustila, A., Räisänen, T.	Accepted
VR 2007	Muddleware for Prototyping Mixed Reality Multiuser Games	D. Wagner, D. Schmalstieg	Accepted
Proceedings of New Zealand Computer Science Research Student Conference (NZCSRSC '09)	An Authoring Tool for Mobile Phone AR Environments	Y. Wang, T. Langlotz, M. Billinghurst, T. Bell	Accepted
Mobile AR/MR			
To appear in AVI 2010 International Working Conference in cooperation with ACM-SIGCHI, ACM-SIGMM, SIGCHI Italy May 25-29, 2010 - Roma, Italy	Bimanual Handheld *Mixed* Reality Interfaces for Urban Planning	M. Sareika, D. Schmalstieg	Accepted
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. 2008	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

GI '09: Proceedings of Graphics Interface 2009	MR Tent: A Place for Co-Constructing Mixed Realities in Urban Planning	V. Maquil, M. Sareika, D. Schmalstieg, I. Wagner	Accepted
IEEE Pervasive Computing	Indoor Positioning and Navigation with Camera Phones	A. Mulloni, D. Wagner, I. Barakonyi, D. Schmalstieg	Accepted
IEEE Computer Graphics and Applications	Making augmented reality practical on mobile phones	D. Wagner, D. Schmalstieg	Accepted
IEEE Transactions on Visualization and Computer Graphics	Comprehensible Visualization for Augmented Reality	D. Kalkofen, E. Mendez, D. Schmalstieg	Accepted
International Symposium on Mixed and Augmented Reality ISMAR 09	In-Situ Content Creation for Mobile Augmented Reality	T.Langlotz, S. Mooslechner, D. Schmalstieg	Accepted
International Symposium on Mixed and Augmented Reality ISMAR 09	Adaptive Visualization in Outdoor AR Displays	D. Kalkofen, S. Zollmann, G. Schall, G. Reitmayr, 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, 13^th -15^th , 2007, Duesseldorf, Germany	Spatial Augmented Reality	Katharina Garbe, Iris Herbst, Jens Herder	Accepted
Proceedings of the IEEE Virtual Reality (VR'09)	Explosion Diagrams in Augmented Reality	D. Kalkofen, D. Schmalstieg	Accepted
Proceedings of the 2009 Ninth International Conference on Intelligent Systems Design and Applications	Context-based adaptive filtering of interest points in image retrieval	Giang P. Nguyen, Hans Jørgen Andersen	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, Slow-Fast Rendering, GPU Painting, Urban Sketcher

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. The requirements placed on showcases were further extended by requesting showcases to work on specific research questions and to agree on evaluation approaches.

In the showcases more than half of the issues were addressed. An appropriate analysis is provided in the deliverable D3.5.

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 4 two field trials in the form of participatory workshops connected to real urban renewal projects were carried out. Two elaborate workshop protocols with different scenarios had been prepared. The scenarios deal with 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 individual objects, the sketching directly onto the scene, the creation of additional paper sketches 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

As in phase III, one objective was to involve different types of stakeholders, including non expert users. We recruited, prepared and supported therefore 20-25 users from local authorities or habitants from the neighbourhood and integrated their ideas and visions into

the workshop scenarios. They participated in the workshop and provided us with rich feedback.

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. As in phase III we cooperated with different stakeholder representatives in the preparatory urban workshop to prepare content and panoramas from the perspective of different stakeholders. Further, participants could create their own content by sketching directly onto the screen.

In the second workshop in Oslo, participants were also supported in adding their own paper sketches (for a description see D6.4), 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 D6.4, we received valuable feedback from users in the two 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.

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 dynamic enactment of these scenes; and the mapping between ‚real' and ‚virtual' elements.

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 development 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 acoustic space is crucial for the 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 presence on the site and the co-presence of people; users 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

9 conference papers were submitted in 2009/2010; 7 have been accepted up to now; 4 are in preparation.

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 engagement with the applications and events.

Additional criteria:

- The number of city events in Helsinki in which the prototypes were evaluated
    - 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.
    - 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.
    - Reported in the showcase deliverables verified by WP3

In this fourth year M37-M51 WP7 had to re-design the demonstrators, create a new version of the demonstrator and carry out a new round of field trials. As in the previous years, the demonstrator is divided into three components. The mobile component development continued with the Augmented MapLens prototype. The Public Display application called CityWall was re-designed as Worlds of Information. The Pervasive component has been integrated into Worlds of Information and MapLens applications. Evaluation of both prototypes, MapLens and CityWall, has been successful. The data gathered in the ECS event was analysed and successfully submitted to the CHI 2010 conference. The improved MapLens user interface was evaluated in two field trials in August 2009 and analysed in a thorough way. The improved Citywall *Worlds of Information* interface was informally usability trialed in 2010.

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 D7.4 how we are able to address presence, interaction and engagement through mobile, pervasive and installation components, and sustained engagement for our users is supported by these applications (see also D3.5). 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 D7.4 along with an appendix on MapLens field trials and an appendix on CityWall interaction design improvements.

CityWall has continued running as a permanent installation at Lasipalatsi, in the city centre of Helsinki. Although the new location is not as visible as the old one, it still has cafes and people spending time there and an ongoing online presence through a YouTube video http://www.youtube.com/watch?v=IldDrCcZkZY

This year we analysed the data from CityWall collected at European City of Sciences exhibition at Grand Palais, 2008, published and made improvements according to use feedback.

For MapLens, several field trials were conducted. In the following table is a summary table of dissemination events and field trials and users regarding both CityWall and MapLens. More details can be found in WP7 D7.4

Prototype	Date	Event/trial	More information available at	Participants
CityWall	Jan 1- Dec 31	City installation in cooperation with Cultural Office	http://citywall.org	Average 20-400 per week
CityWall	Apr	Multitouch and Surface Computing Workshop CHI 2009 oragnisers of workshop. With Steven C Seow, Microsoft Corporation, Dennis Wixon, Microsoft Corporation, Giulio Jacucci, HIIT, Ann Morrison, HIIT, Scott MacKenzie, York University	http://www.stevenseow.com/chi09/	12
-	Feb	Attended MARCUS meeting and presented IPCity WP7 and WP6 showcases to UOtago, HitLab and companies Boffa Miskell (Urban Planning) and GRC		20
MapLens	Mar 27	A presentation of MapLens study results was given at Tampere, Finland for Nokia NRC		50
MapLens	Apr 21-23	MapLens presented at FET2009 exhibition	http://ec.europa.eu/information_society/events/fet/2009/	800
CityWall MapLens	May-Jun	3 seminar series on evaluation with Andreas Duenser at HitLabNZ		20
CityWall	May-Aug	CityWall analysis from Lorenza Parizi (summer intern from Facoltà di Scienze della Comunicazione) for ECS. Continuing discussions on comparative ECS and Hki video analysis.		1
MapLens	Aug 6	Workshop on MR/AR examples		15

		and evaluation styles		
MapLens	Sep 9	Workshop on interactional techniques in mobile virtual and augmented reality applications		15
MapLens	Jul-Aug	Visiting Researchers HitLabNZ, UOtago, TUGraz (1 month), FIT, UOulu, NRC (2 months) at TKK for MapLens field trials		6
MapLens	Aug 6	Workshop on MR/AR examples and evaluation styles with Holger Regenbrecht (Uotago), Saija Lemmela (Nokia), Andreas Duenser (HitLabNZ), Gabriela Richard (NYU), Mikael Wahlström (HIIT)	http://www.hiit.fi/~morrison/workshop6August.html	15
MapLens	Aug 16	1st Field Trial		23
MapLens	Aug 23	2nd Field Trial		14
MapLens	Sep 2	Workshop on interactional techniques in mobile virtual and augmented reality applications with Alessandro Mulloni (TUGraz), Antti Nurminen (HIIT), Ville Lehtinen (HIIT)		15
MapLens	Sep 22-25	Workshop on Environmental Awareness	http://ipcity.imagination.at/summerschool/	9
CityWall	Nov 18	CityWall presented in a workshop at Mobile Life center, Stockholm		25
CityWall	Nov 27	Workshop on Multitouch: Design Issues and Knowledges: Limitiations and Affordances with Hyowon Lee (UDublin), Tatu Harviainen (VTT), Mika Nieminen (TKK), Tommi Ilmonen (Multitouch Ltd), Celine Coutrix, Ivan Avdouvevski and Toni Laitinen from HIIT.	See Figure 45 http://www.hiit.fi/~morrison/workshop27November.html	15
MapLens	Jan 18-20, 2010	Urban Computing Workshop at University of Queensland with National ICT Australia (NICTA) University of Queensland (UQ) and Queensland University of Technology (QUT), community, plus other IPCity and MARCUS partners in Brisbane, Australia.		15
CityWall	April 10-15, 2010	Natural User Interfaces workshop at CHI2010, organisers of workshop Giulio Jacucci, HIIT, Ann Morrison, HIIT, Steve Seow, Microsoft Surface, Dennis Wixon, Microsoft Surface	http://www.stevenseow.com/chi10/	12

For WP7 in months 23-52 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 then worked to better increment this instantiation.

We continued with the environmental awareness location-based game to the evaluation of MapLens technology and improved the technology and the trials to ensure our findings were true. We continued to work with the Natural History Museum to achieve this. We continued to work 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. As well we discussed with Urban Mediator project and a forestry investigative project for future works (see 5.1.3, D7.4 for more information)

While for 2008, we spent much of the year publishing in workshops with the aim of entering into as many discussions as possible with other researchers, this year we targeted higher ranked journals, conferences and book chapter type publications to attract a wider public. We successfully targeted a quality conference (CHI), a journal and a Springer series book chapter. We have two submissions pending for Mobile HCI and IHJCS journal.

The emphasis for months 37-51 was 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 analysed.
- 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 physical paper 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

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 where 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 (one nominated for best paper award). As well there was one invited book chapter, one journal paper submitted, and accepted (see table below):

Conference/journal, date or timeframe	Title or topic	Responsible person and additional authors	Status (published, submitted, under preparation, planned, presented)
In Willis, K. (Ed.), Shared Encounters. Springer Series on CSCW	Ubiquitous media for collocated interaction.	Jacucci, G., Peltonen, P., Morrison, A., Salovaara, A.,Kurvinen, E., & Oulasvirta, A.	Published
IHJCS.	Studying Collaborative Embodied Interaction	Peltonen, P., Kurvinen, K., Morrison, A., Jacucci, G. and Lemmelä, S	Submitted to IHJCS.
Mobile HCI	Sharing through the lens: Collaborative Augmented Reality on Mobile Phones	Morrison, A., Lemmela, S., Oulasvirta, Schmalstieg, D., Peltonen, P., Mulloni, A., Regenbrecht, H., Jacucci, G. and Juustila, A	Submitted to Mobile HCI
PRESENCE special issue from RAVE'09, MIT Press.	On the Role of Presence in Mixed Reality,	Wagner, I., Broll, W., Jacucci, G., Kuutii, K., McCall, R., Morrison, A., Schmalstieg, D., Terrin, J-J.	Published
ACM CHI 2010.	Worlds of Information: Supporting multiplicity at a public multitouch display	Jacucci, G., Morrison, A., Richardson, G., Kleimola, J., Laitinen, T. and Peltonen, P.	in press

ACM CHI 2009	Like Bees Around the Hive: A Comparative Study of a Mobile Augmented Reality Map	Morrison, A., Oulasvirta, A., Peltonen, P., Lemmelä, S., Jacucci, G., Reitmayr, G., Näsänen, J., & Juustila, A	Published, Nominated For Best Paper Award.
T. Gross et al. (Eds.): INTERACT 2009, LNCS 5727, pp. 62Ð75, Uppsala Sweden, Springer.	*Bodily Explorations in Space: Social Experience of a Multimodal Art Installation*	Jacucci, G., Spagnolli, A., Chalambalakis, A., Morrison, A., Liikkanen, L., Roveda S., Bertoncini, M.,	Accepted and presented as workshop paper

A long paper was submitted to Mobile HCI 2010 conference, (its acceptance status still unknown):

Morrison, A., Lemmela, S., Oulasvirta, Schmalstieg, D., Peltonen, P., Mulloni, A., Regenbrecht, H., Jacucci, G. and Juustila, A. Sharing through the lens: Collaborative Augmented Reality on Mobile Phones.

A journal article has been submitted to International Journal of Human-Computer Studies (its acceptance status still unknown):

Peltonen, P., Kurvinen, K., Morrison, A., Jacucci, G. and Lemmelä, S. Studying Collaborative Embodied Interaction. Submitted to IHJCS.

Like previous years, workpackage 7 prototypes have had a good coverage in the Internet and in the news. MapLens interview was presented in local University of Helsinki newspaper http://www.helsinki.fi/news/archive/3-2009/3-14-12-51, The popularity of the CityWall video has been noted in the news of University of Helsinki http://www.helsinki.fi/ajankohtaista/uutisarkisto/10-2008/20-15-04-37, and naturally also in the HIIT news (http://www.hiit.fi/node/735).

Besides appearing in the Finnish and French written media, CityWall has remained relatively visible in the Internet. We received requests from all over the world to create similar installations. Multitouch Ltd, the spin-off company created by the original development team of the WP7 CityWall prototype, has been growing and receiving attention from both the media and the scientific community: one of the success stories was winning the MindTrek Launchpad 2009 competition. MultiTouch has also succeeded internationally—they have partners all over the world, in Swizerland, Norway, Germany, France, Italy, Australia, New Zealand, Mexico, Russia and Chile. See http://multitouch.fi/ website for further details on the company's activities and partners. The company has been actively demonstrating its products in various venues. In 2009, MultiTouch vsited IBC and Viscom fairs.

1.8.1 WP8 Showcase Activity: Time Warp

The main success criteria for the TimeWarp showcase is to create an engaging mobile mixed reality gaming experience. The involvement of the users into the game play will serve as an indicator on how successful the TimeWarp game is. The main research aspects during the final year cover Presence questions (especially on how to create social Presence between players and virtual characters), Sense of Place (when walking around an urban cityscape), collaboration and the development of suitable design guidelines that are applicable for Mixed Reality games as well as applications.

During months 37 and 52 in this final year, WP8 had to redesign the game after having identified flaws in the setup of the previous year and after having identified our main areas of research for the final year. Collaborative aspects of the game were increased and measures taken to strengthen Sense of Place and Presence. After successful implementation, pilot studies were conducted in Cologne that had a great influence on the main studies in January. For these studies our main improvements over the previous year was a much larger

user base (33 groups with 66 users compared to 12 groups with 24 participants) to create a solid base for our findings. Furthermore, for evaluation purposes we did not just follow the players with a video camera for later analysis but also equipped the players with microphones and recorded the audio output of the gaming devices to the same video. This enabled us to conduct a much more thorough video analysis which was supported by questionnaires, semi-structured interviews and automated log files of the in-game interactions.

Thanks to the visit of two WP8 researchers at the HITlabNZ in Christchurch, New Zealand, we were also able to conduct a small study of 11 participants overseas which on the one hand proved the general portability of the TimeWarp game and also allowed us to focus on some additional aspects for the evaluations.

Common criteria for all showcases

Conformance with concept map

During the final year, we continued building upon the aspects for the IPCity concept. However, our focus was slightly shifted towards working with and analysing our main research questions.

- Collaboration: We investigated how we can increase the amount of collaboration and its beneficial effects on Presence
- Spatial Elements: In contrast to the previous year, the game design now demanded from the players to walk around the area while actually being in-game as opposed to the previous year where walking around always threw players out of the game experience
- Temporal aspects: We streamlined the time frame set-up of the game and reduced the number of visited time periods from 4 to 3 to increase the focus on these. Additionally, players were confronted with a stronger sense of urgency in their actions.
- Mobility: The study in Christchurch focused among other things how paths would alter the users sense of perception
- 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 elements necessary for solving the game, but also as virtual scenery objects that served no direct purpose in the game. The audio content was also translated into German for this year's trials in order to cater for all language levels of test players.
- Multimodality graphical and auditory augmentations were used in combination with a novel device (a UMPC).

Conformance with technologies developed

In the final prototype we used several technologies developed in WP4/5, mainly the Morgan Interaction Prototyping and the mobile AR system.

Collection of user group feedback

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

City specific feedback for Christchurch was also gained by involvement and collaboration with a local history teacher.

Dissemination

The main focus for dissemination in the final year lay on a considerable higher amount of test runs than in previous years and extensive media coverage. As the test runs were only

completed in early February, the evaluation results will only be presented at conferences after the project has ended. However an invitation was received to write a paper for the MobileHCI journal (this will be based on current results) and during 2010 a special issue of the Journal of Personal and Ubiquitous computing edited by current and past members of WP8 will be published.

Pilot study Cologne: late November to early December 2009, 12 participants (6 groups)
Testruns Cologne: January to early February 2010, 66 participants
Testruns Christchurch: late January to early February 2010, 11 particpants

Date	Type	Title	Circulation	Coverage	
19.1.2010	Radio	„Virtuelle Zeitreise durch Köln“, auf DRadio Wissen – Medien, 9 min			[1]
23.1.2010	Print	„Heinzelmännchen zurück in Köln“, Rheinzeitung Nr. 19, 23.1.2010, p.36	205.000	700.000	
31.1.2010	TV / Online	Report, „neues“, 3sat, 4 min			[2], [3]
1.2.2010	Radio / Podcast	„Eine Zeitreise mit TimeWarp“, Computer Club Zwei, Folge 205, 15 Min			[4]
1.2.2010	Print, newspaper	„Tages Thema: Im Papier steckt mehr drin“, Rheinzeitung Nr. 26, 1.2.2010, p. 4	205.000	700.000	
1.2.2010	Print / Online	Webpage for „Tages Thema: Im Papier steckt mehr drin“, www.rheinzeitung.de/ar (paper augmentation with video report)			[5]
1.3.2010	Print, weekly magazine	„Ufos überm Rhein“, in : „Focus“ Nr. 09/10, p.78-79	580.000	5.730.000	[6]
03.2010	Online	CeBIT, Dossier “Connected Worlds”			[7]

[1] http://wissen.dradio.de/details.36.de.print?dram:article_id=159&sid=&random=fb359e
[2] http://www.zdf.de/ZDFmediathek/beitrag/video/959218/Time-Warp---Eine-virtuelle-Reise
[3] http://www.3sat.de/dynamic/sitegen/bin/sitegen.php?tab=2&source=/neues/sendungen/magazin/141510/index.html
[4] http://www.cczwei.de/index.php?id=issuearchive&issueid=276#a605
[5] http://www.rheinzeitung.de/ar
[6] http://meedia.de/typo3conf/ext/m2analyzer/analyzer/graph.php?time=10&category=3&titel=12
[7] http://www.cebit.de/_push_dossier_augmented_reality

03.2010	Online	Medieninformatik Blog "MI meets Dr. Who"			[8]
04.2010	Print, montly magazine	Playboy Deutschland, April 2010 (to appear)	257.000	1.120.000	[9]
0x.2010	Uni	TV-style report, student work, final year project "Technikjournalismus", Hochschule Bonn-Rhein-Sieg (www.h-brs.de)			
0x.2010	Radio	"Forschung aktuell: Computer und Kommunikation", auf Deutschlandfunk (to appear), 4 min			

1.9 WP9 Showcase Activity: City Tales

City Tales work package was started over in period 3 after the leave of SONY with the joining of the new partner IMAG. The new focus set for WP9 is to be able to demonstrate mixed reality story-telling in a distributed urban environment and investigate the impact on the participants in interaction with their environment. The success criteria covers the ability of IPCity to deliver technology prototypes which support individual and group activities that support the engagement with the story topic and foster the identification with ongoing activities and group co-presence.

After the initial redesign of both the underlying database structure and the clients in the last period of the project in M37-M52 WP9 focused on the diverse application of the technology to different use scenarios and create a wide variety of cases. Participative workshops in Vienna during spring 2009 with students of urban planning and digital story-telling, gaming were engaged with the use of the system in the Naschmarkt are to field test the application of MR technology to their problems. Content creation workshops in summer 2009 with invited authors created after a phase of training to the fact of non-linear digital story-telling an tremendous impact on how stories can be told. Participants of the summer school in autumn 2009 were invited to experience the stories and participate in the technology of transferring content into the mixed reality system. Instead the engagement reached as far as the autonomous creation of new stories and the extension of the existing story telling universe beyond the originally told stories.

Other success criteria were:

- Involvement of users into the collaborative content creation process.
- Immersion into stories and impact to the environment.
- Ease of use of the MR technology.
- (Re-)application of the methods, content and technology to other use scenarios and other places.

[8] http://blog.medieninformatik.de/index.php?/archives/50-MI-meets-Dr.-Who.html

[9] http://meedia.de/typo3conf/ext/m2analyzer/analyzer/graph.php?time=10&category=3&titel=347

Engagement of co-authoring users

Both IT-professionals and non-IT affine participants quickly showed in our studies the behavior of “contributing creators” rather than only “perceiving only users”. Compared to our initial assumptions 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 we had to learn that the mixed-reality story-telling environment is very attractive. Community based content creation – like in other scenarios such as Wikipedia – is quickly appealing many creators to "publish" their own ideas. There is a characteristic pattern that users are willing to extensively contribute especially taking into account the new possibilities given by a location based technology!

Immersion into the stories

Perceiving location based information on the spot the interaction of the urban surroundings with the digital information creates a mixed reality experience that is able to change our view onto the city rapidly. Strolling through an area with the augmentations provided, heavily alters the perception and engage users beyond the actual experience. Rather than specific elements of the story perceived on singular spots, narration or mixed reality artifacts the whole of the story experience is that what impacts most. Filling in the gap between the real and the virtual the users seems to be immersed into a parallel reality that allows for additions beyond what the authors of the actual story created and ignites imagination.

MR technology for story telling

Using different prototypes during the actual phases of the project we conducted comparisons between the different underlying hardware/software solutions and user interfaces. Most encouraging – and also a brainteaser for future applications – are the results showing the type of interface users are willing to enter into the field of mixed reality story telling. The bottom line of our investigations show that most accepted are interfaces that do rely on the simplest interaction metaphor, including 'magic lens' metaphor to see virtual elements; map view to find elements nearby and narration to listen to virtual conversations and audio commentary. On the content creation side users do want to comment existing elements on site but creating new stories happens rather in an off-location story telling process in the more traditional sense. This impacts to future content creation pipelines and will give rise to other technologies such as remote presence and the technology described as scouting.

(Re-)application of the methods, content and technology

Our own experiences with the application of the technology to story-telling, content retrieval and initial gaming uses demonstrated the flexibility of the construct. These results convinced other participants within the project – among them are TUG, TKK and Hit Lab NZ – to investigate our solution and apply its technology to their own specific problems within and beyond the scope of IPCity.

The amount of work to adapt the application to a different location is highly dependent on the quality of the content and its ties to the real environment. 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. Our findings show however that the created content is in fact published for the specific location, surroundings, local sights & sounds – making it either impossible or not advantageous to transfer to another location. This can be seen also as a big limitation to story-telling using mixed reality technologies as compared to a book one must enter the real situation to be part, we do however encounter here a new opportunity to see a new way of communicating stories on global scale using a new metaphor for staging ideas, thoughts and share imagination.

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 emphasized the relevance of

- Temporal aspects
    - Memories – traces of the past: Stories enhance the engagement with the real environment in the sense of co-creating clues for both the story-line and the real environment.
    - Evolution of an event – the immersion into the non-linear story creates a complex web of conditions and dependencies that in the beginning are distracting but on the long-term create an open story environment inviting to add.
    - Transformation of a place in time – sense of time is altered as the true mixes with the artificial, the here and now with the past and future. Digital artefacts create a suspense of disbelief.
- Mobility
    - Following a path (and the connected story) – the interconnectedness of the story with the place makes it complicated to follow 'one' path, immersion into the web of stories let's users follow rather multiple paths simultaneously.
- Ambience
    - Sense of place and culture – the actual surrounding and environment add a stage and a background to the perceived story elements, having a definitive impact to the perception on the actuality of the experienced. The environment adds channels to the experience – such as smell, temperature, etc. – interacting with the participants senses, sometimes supporting sometimes contradicting with the story. This unexpected gives the mixed reality story experience a performance character.
- Awareness cues
    - Social interaction (members, encounters) – as the environment the people in this environment are not controlled by the original author of the story, so they add the element of unexpected, but can be also there to help, e.g. in way-finding when looking for specific locations mentioned in the stories.
    - Communication (exchanges, viewings) – communication between users helps to supplement and extend each other's view onto the complete information universe. Filling in gaps with other's information pieces is bringing forward understanding.
- Multimodality
    - Sound scenes – soundscapes – sound has been an important element to the story telling experiences we have field tested in the environment as it allows for better mobility and the use of other clues for navigation and way finding, while still being immersed into the story content.

Conformance with technologies developed

The application demonstrators are integrating multiple 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

Feedback has been received from potential user groups during dissemination activities, such as FET'09 conference, IPCity Summer School, personal meetings and discussions with professional authors, archaeologists, urban planners, architects, game and multimedia designers, and telecommunication professionals as well as user trials and field tests.

Dissemination

For City Tales several field trials and dissemination activities were conducted, following table below lists a summary table events and trials and users. As a conservation of the professional author's stories a non-linear to read book was published with three interconnected stories in 100 copies, that will be distributed throughout the final event and that are used to promote the research of City Tales within IPCity at marketing activities.

Date	Event/trial	More information available at	Participants
Apr 21-23	Wall Blogging, Walking Explorer, and MR-Player prototypes presented at FET2009 exhibition	http://ec.europa.eu/ information_society/ events/fet/2009/	800
May-July	2 workshop series with Urban Strategy Workshop students		14
Jun-Aug	Participative authors workshop for story creation		5
Sep 22-25	Presentation of IPCity Technology and City Tales Technolgy Workshop	http://ipcity.imagination.at/ summerschool/	10
Okt-Nov	Field Trial Naschmarkt stories		6
October 29	MIRACLE Workshop in St. Augustin		25 (approx)
Nov-Dez	Prototype studies at Hit Lab NZ		5
Jan 2010	Field Trial Naschmarkt stories 2010		8
March 2010	UniAk Open House with IPCity Final Event		1500 expected
throughout the entire period	Several presentations of the technology to professional authors, archaeologists, urban planners, architects, game and multimedia designers, and telecommunication professionals during company internal presentations		>50

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.

The revised development and testing plan for the final year resulted in minimal delays resulting from technical issues. As a result most milestones were met on time or within a few weeks of their due date.

During the final year we received an initial extension on all deliverables so that they were to be available 1 month before the review. Subsequently we were advised that the requirement was not only two weeks from the review. Taking this into account we extended the time for data analysis to be undertaken such that the experimental deliverables were largely completed during February/March.

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.

From an administrative perspective the delay in the acceptance of the amendment resulted in some difficulties regarding organisation and allocation of tasks. However this was resolved during the summer of 2009 and delays to the overall project were minimised.

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 D1.14). Major changes reported there include the changes regarding the members of the consortium:

- HIT Lab NZ (University of Canterbury, New Zealand) joined the project.

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.

Project partners had identified that in previous years the decision making process for the re-allocation of small amounts of funds was slow, time consuming and inappropriate for the amounts involved. Therefore, it was resolved shortly after the review to create a fast track allocation system for small amounts. This process involves an email decision making process via the management board who are invited to veto any request within 7-days. If a veto is received then the request is rejected. This process has improved communication, made the process faster and resulted in partners being able to obtain budget approval at the time when the funds are needed.

The primary problems within the final year related to the production of internal deliverables and dissemination materials. The main problem with the former element was reflected in the inappropriate dates upon which these fell due. The problems were resolved by introducing a degree of flexibility such that internal deliverables fell due and were ready at appropriate times. This was broadly speaking met and certain internal deliverables have been of significant value across project members. Dissemination activities were handled normally by OULU with contributions from partners, contributions normally increased around the time of major events.

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For further information regarding the IPCity project please visit the project web site at:

ipcity.eu