



**Integrated Project on Interaction and Presence  
in Urban Environments**

FP6-2004-IST-4-27571

[ipcity.eu](http://ipcity.eu)

**Detailed Work Plan for Months 25-42**  
Deliverable D1.9



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## Abstract

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This document represents an excerpt of the current description of work (technical annex / Annex I) of the project related to the detailed work package descriptions for project phase II (i.e. months 25-42).

It is created for planning, reviewing, and negotiation purposes between the IPCity consortium and the European Commission.

## Revisions in Response to Review Report

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In order to emphasize the overall subdivision of the phase into individual major periods, aligning the activities of all work packages, the general description has been modified and extended by an appropriate Gantt chart. The individual tasks of all work packages have been revisited and realigned to each other. The individual per work package Gantt charts have been updated accordingly. Finally, the Pert diagram, showing the interconnections and dependencies between the individual tasks has been updated and complemented. Additionally, the work package description of WP3 has been updated to better reflect the work package's role within the project.



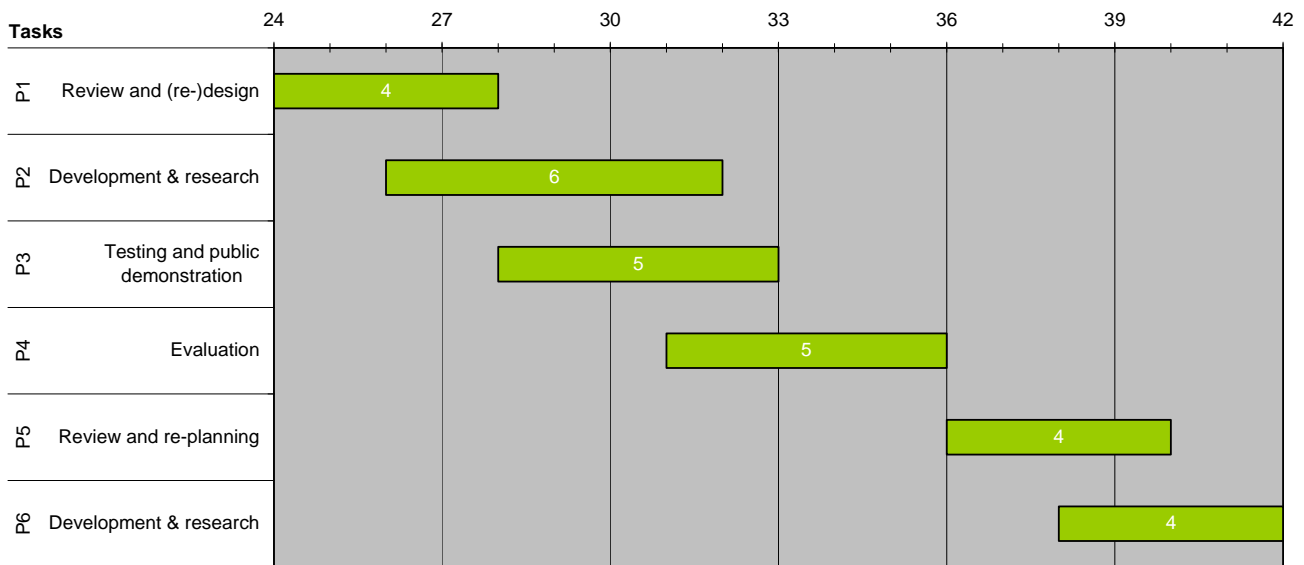
# 1 Detailed implementation plan – months 25 - 42

The general objective for the third 18 months of the project is to modify and improve the research and development based on the feedback and initial evaluation of the early demonstrators realized in year 2 of the project. Our principle approach – using a set of sample applications (the showcases), which are organized as sub-projects and aim to design and develop selected applications within different areas of overall project theme – has proven to be useful for the overall project as it allows us to experiment in these areas to gain a better understanding of the needs and wishes of citizens, resulting in better overall project results.

In this project phase, first prototypes of the services, tools and infrastructure components developed within the research work packages will be provided to the showcases, where they will be tested and evaluated. Feedback will given to the research work packages, which will revise their work plan and adapt or re-design their prototypes accordingly.

In general we sub-divide the month 25-42 into the following periods:

- The analysis and (re-)design period (25-28, depending on WP)
- The development period (month 27-32, depending on WP)
- The testing and public demonstration period (months 29-33, depending on WP)
- The evaluation period (months 32-36)
- The review and re-planning period (months 37-40)
- The start of third development period (months 39-42)



The analysis and re-design phase following the evaluation phase at the end of year 2 will provide the necessary feedback to the individual showcases and research work packages for the re-design of their prototypes. Similar to the previous analysis and re-design phase in year 1, the re-design will be based on requirements relevant for particular showcases on one hand and those applying to several showcases and therefore addressed by one of the research work packages on the other hand. The research work packages will re-define the set of tools, services, or infrastructure components to be used by the showcases. Based on the requirements from the showcases the time-line priorities for their development will be updated. In contrast to all other work packages, work package 9 will start with an analysis and design phase as a new application showcase is started, which, while benefiting from the results and experiences from the original WP9, will not continue previous work done by Sony, but start a new application prototype.

The subsequent development phase will consider the re-design and adapt and extend the prototypes according to the needs of the showcase applications. Additionally, new prototypes may be developed or prototypes not already started in year 2 of the project.

The development phase will be followed by a testing period. In the testing and evaluation phases the showcases evaluate their developments as field tests or public demonstrations (see demonstration activities for details) providing the necessary feedback from outside the consortium for the year 3 evaluation. The research results from the showcases will be evaluated by the research work packages to foster two-directional integration about all work packages. The research work packages will also provide trainings on tools and infrastructure components where appropriate.

In the review and re-planning phase the results of the individual showcases are reviewed. The project's Scientific Board will review the showcases and propose changes to the overall showcase structure and topics. Within the research work packages, the results and the future plans will be reviewed based on the feedback received from the showcases as well as regarding new general trends and developments in the area of interactive mixed reality environments and presence, which have to be addressed or considered by the project. Based on these reviews the individual work plans for the work packages will be adapted or extended.

### **Risk Analysis**

In IPCity innovative new technology is developed within the research work packages, while the showcases focus on application design. Thus there always is a certain risk that the technology developed will not perfectly suit the requirements of the applications. There is also the risk that a technological development will not be finished by the time it is required by the applications. In phase III the showcases will actually use new components developed within the research work packages in phase II, which may not always already be mature enough for the desired purpose. Thus they may occasionally have to rely on existing technology developed in Phase I or as used in year 1. This may cause severe problems, since new technologies developed may be essential for any major progress in the showcase. Additionally, showcases having realized their earlier prototype(s) on top of existing or earlier developed technology may refuse to exchange certain parts to new tools and infrastructure components developed within the research work packages. Further, it may be impossible or very hard for individual showcases to actually use a particular technology provided since the individual components do not fit (e.g. using different programming languages or even operating systems).

### **Contingency Plans**

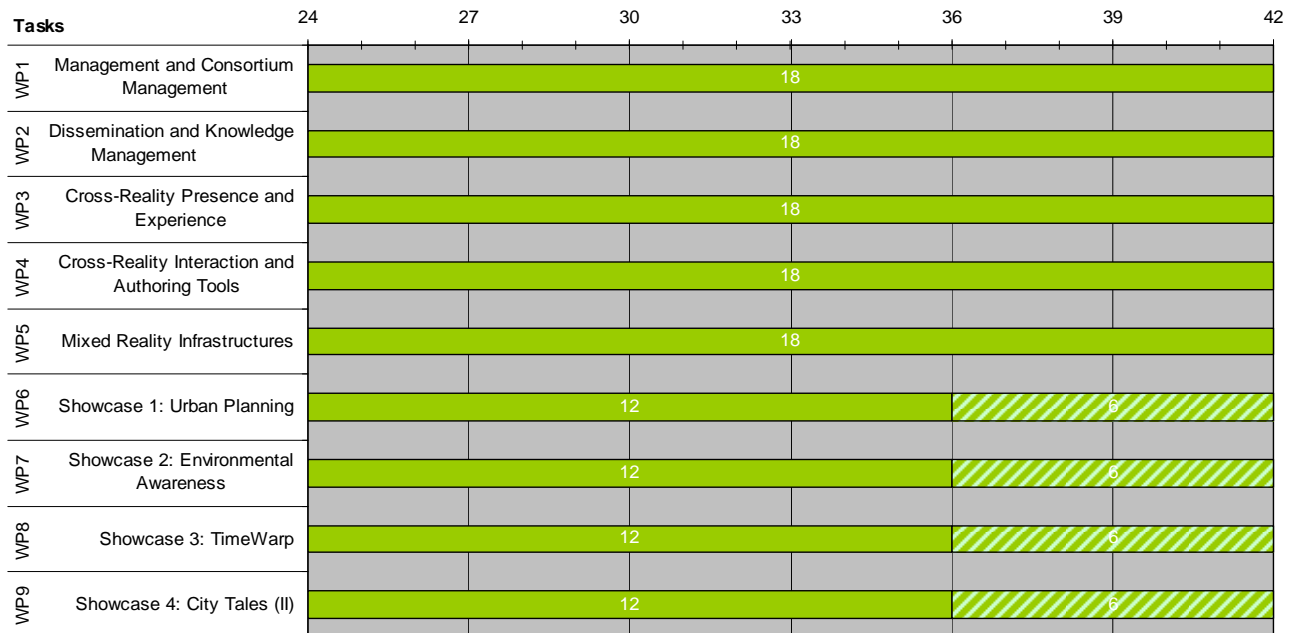
We target the risk of unsuitable technology by the overall structuring of the project, which guarantees an iterative design approach with exchange of knowledge and the adaptation of goals in each of the four phases. Additional smaller iterations are facilitated allowing for design changes at an early stage. Thus the risk of missing the intended timeline is reduced to a minimum. By the frequent project meetings and the additional monthly Executive Board telephone meetings, in combination with strict reporting, such delays are discovered very early, resulting in appropriate early plan adaptations. We address the start-up problems described above by ensuring that in each showcase the technical development partners providing a baseline tools or infrastructure are involved. We additionally lower this risk by the tutorials to be provided by these project partners at the kick-off conference. The close interaction and regular exchange between the research work packages and the showcases will also ensure that the technology developed can easily be integrated and really provides an appropriate additional value to these showcases. The interoperability issues are additionally supervised by the scientific committee. We further try to provide technological alternatives for all mission-critical components. This is also reflected in the current and anticipated members of the consortium.



## 1.1 Work Planning

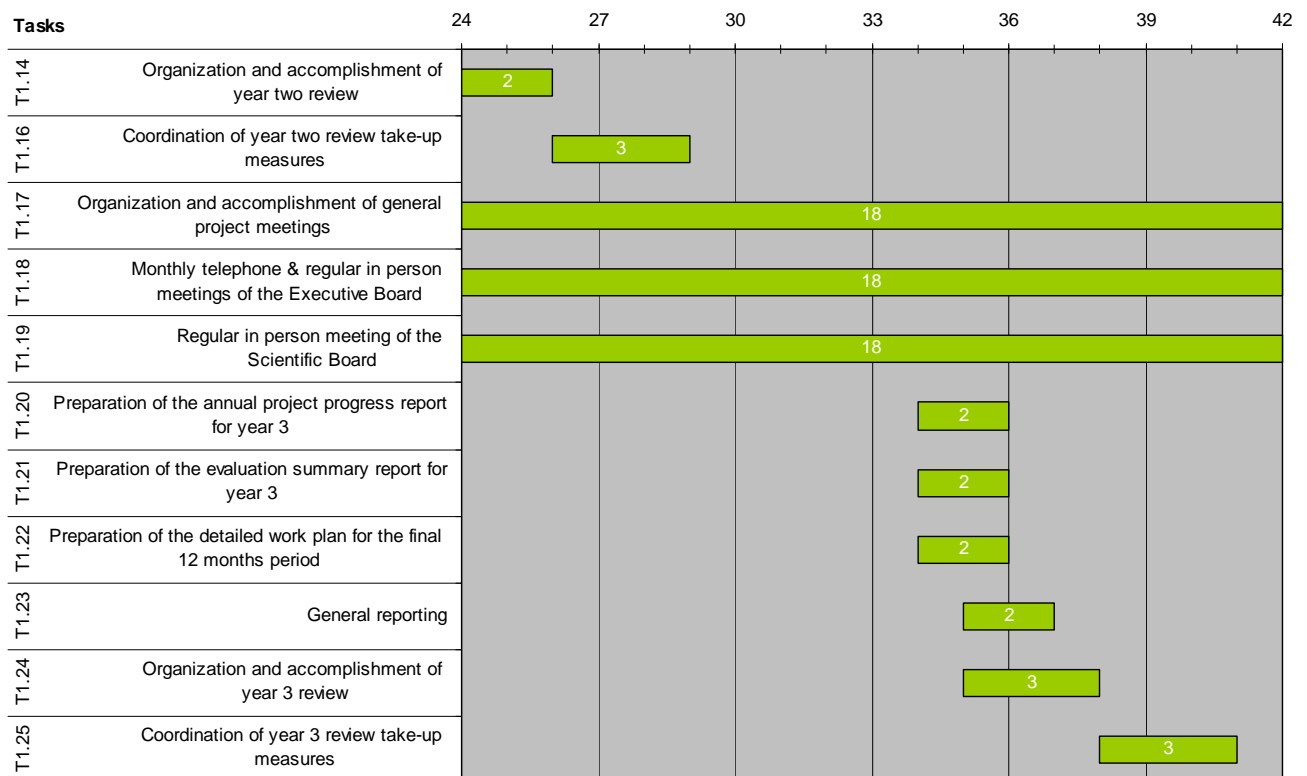
This sub-section will show the timing of the individual work packages as well as the timing of the major tasks within the individual sub-projects (research themes and showcases) within the months 25-42 of the project.

### Overall Gantt Chart (months 25-42)

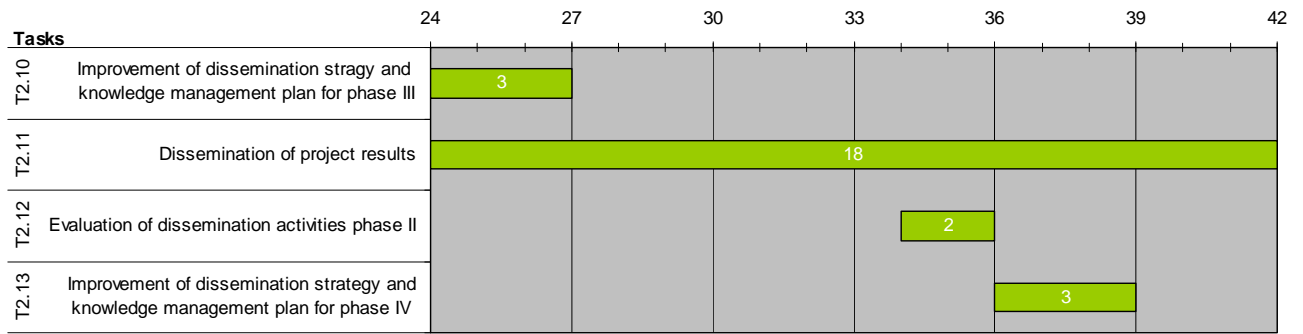


Please note: According to the description of work, showcases will be evaluated by the Scientific Board at Month 36 and might be discontinued, joint, or replaced or complemented by new ones.

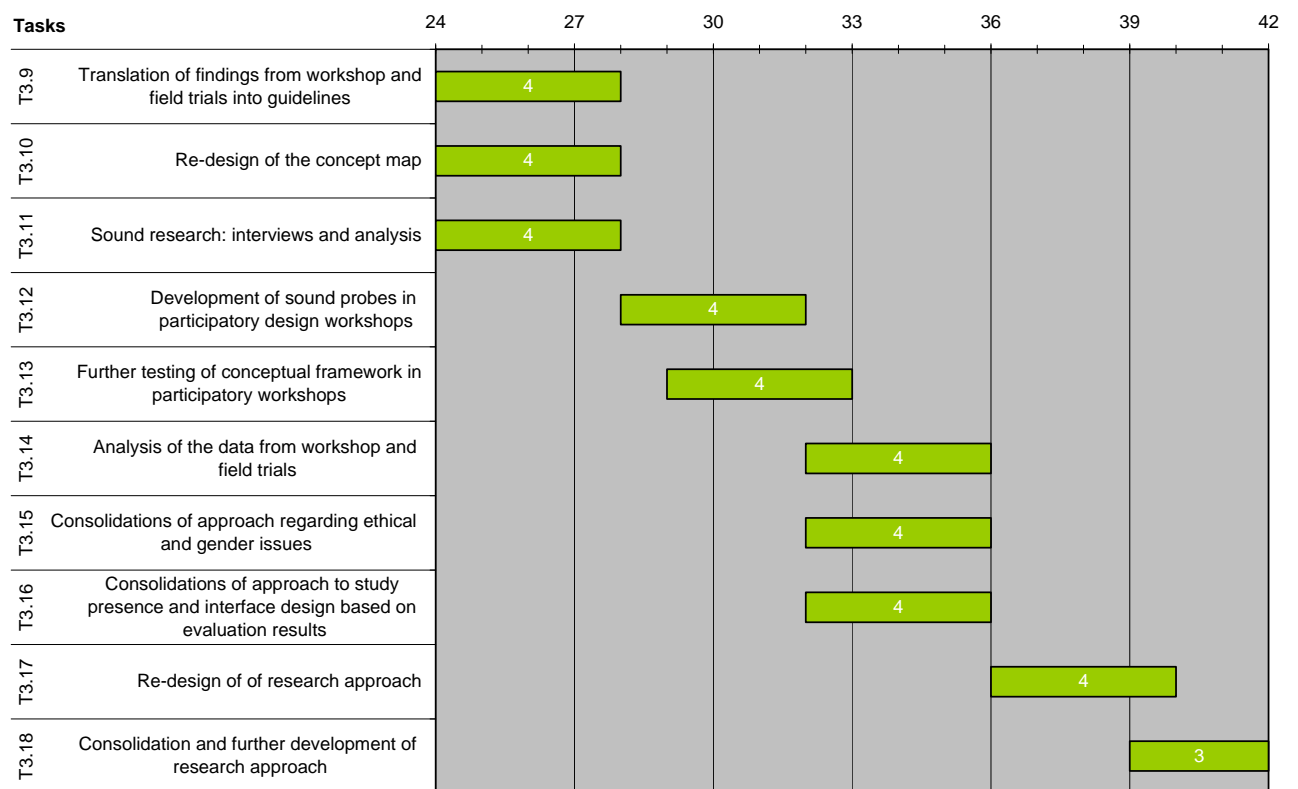
### Gantt Chart on WP1 Tasks (Consortium and Project Management)



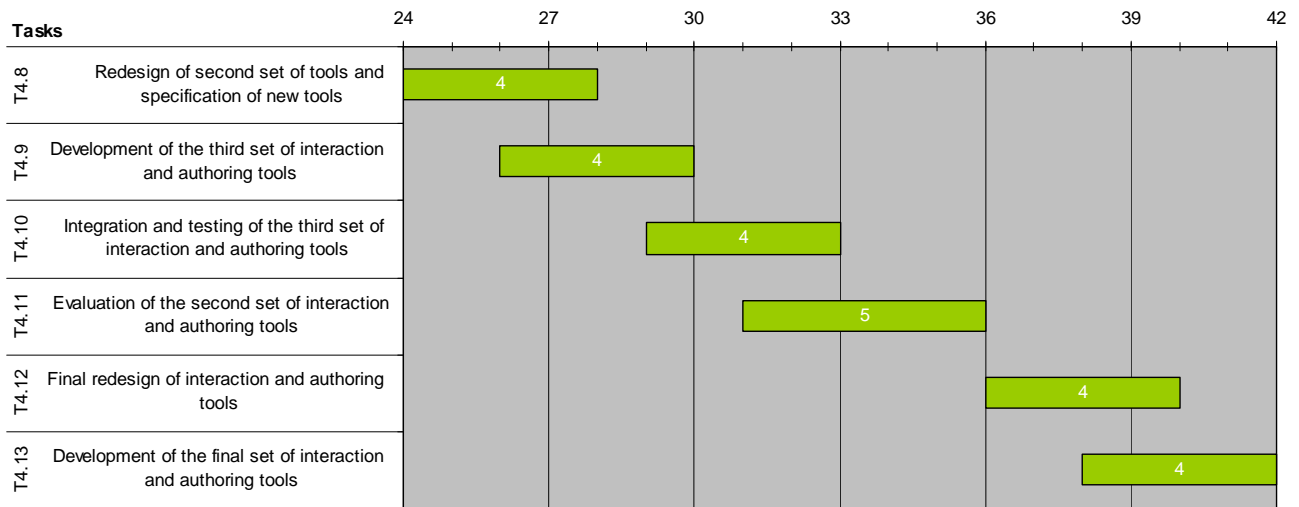
### Gantt Chart on WP2 Tasks (Dissemination and Knowledge Management)



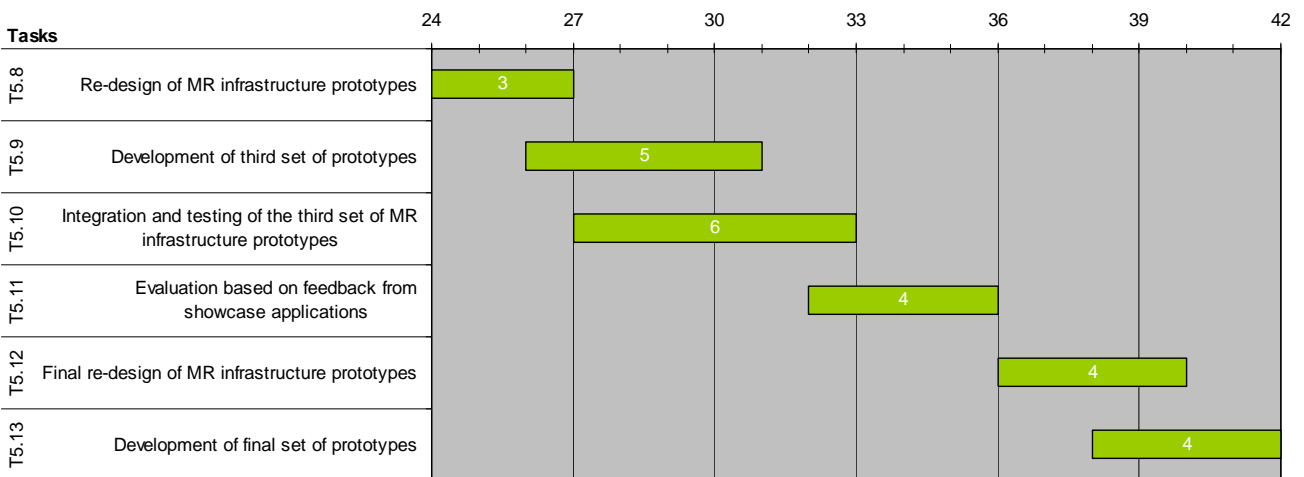
### Gantt Chart on WP3 Tasks (Cross-Reality Presence and Experience)



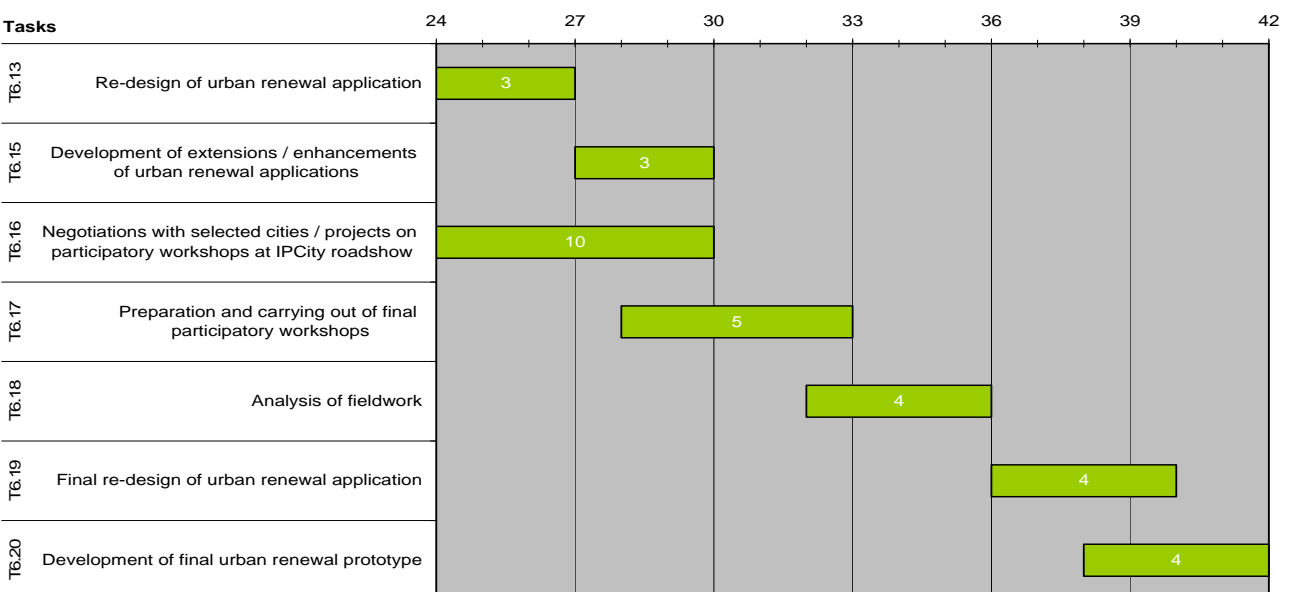
### Gantt Chart on WP4 Tasks (Cross-Reality Interaction and Authoring Tools)



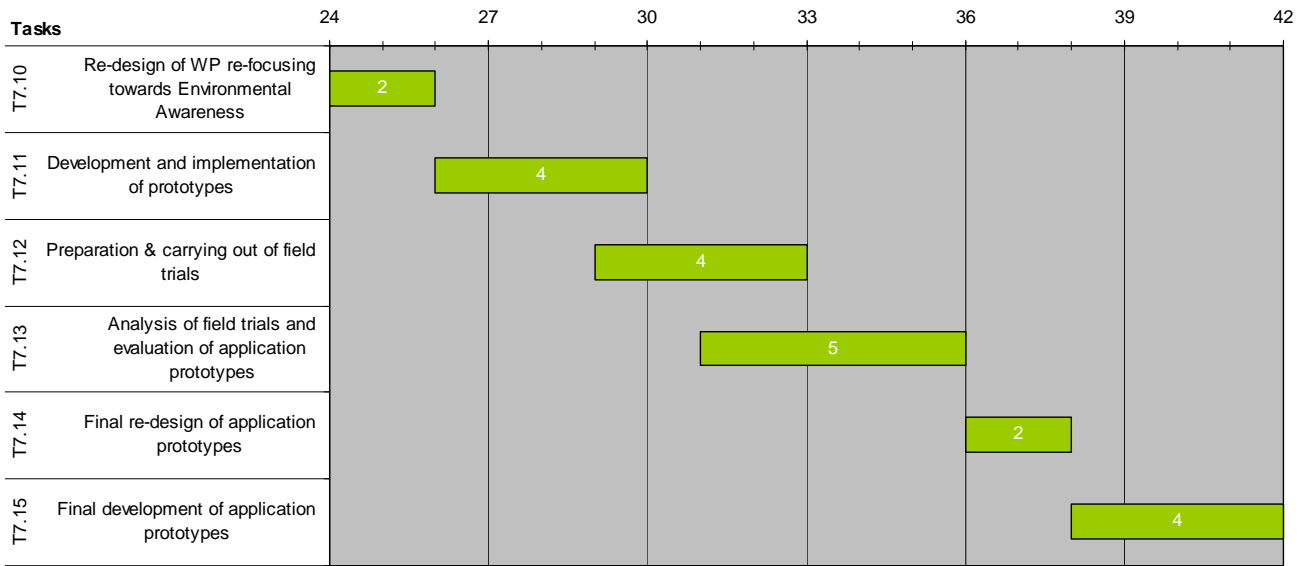
### Gantt Chart on WP5 Tasks (Mixed Reality Infrastructure)



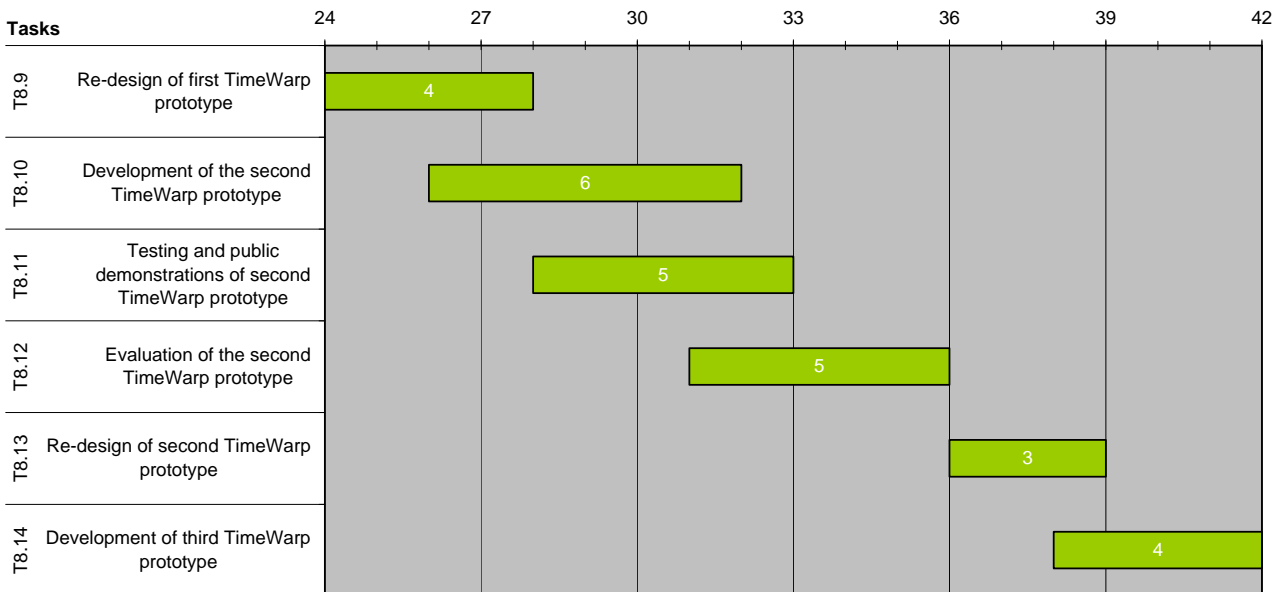
### Gantt Chart on WP6 Tasks (Urban Renewal Showcase)



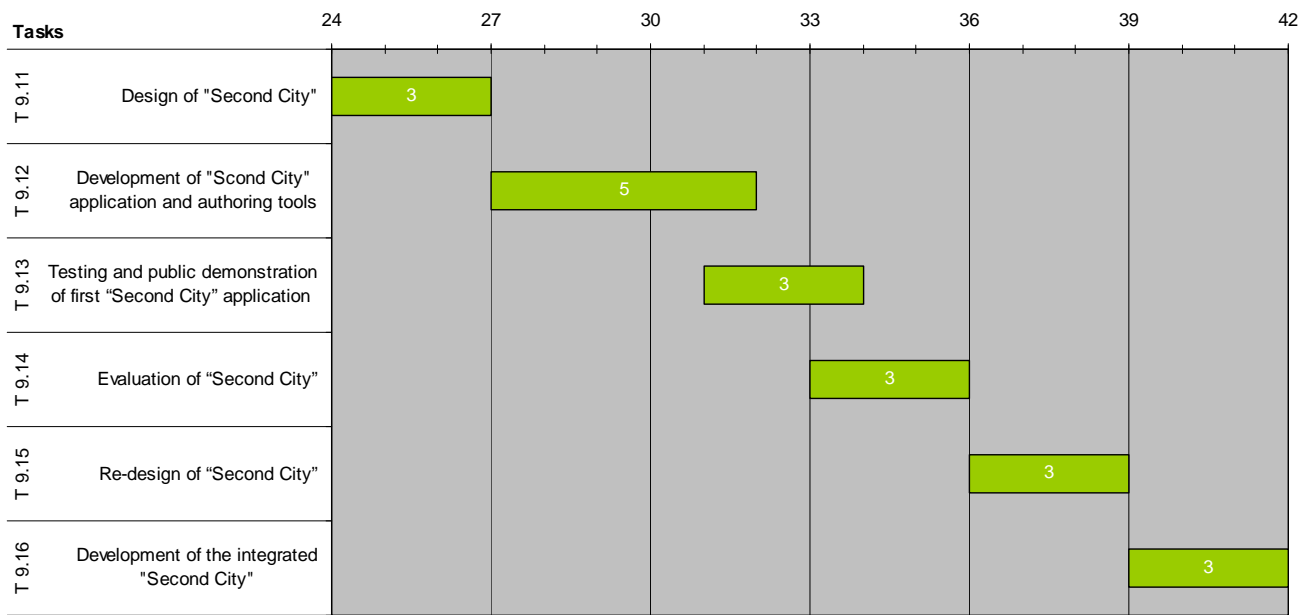
### Gantt Chart on WP7 Tasks (Large-scale Events → Environmental Awareness Showcase)



### Gantt Chart on WP8 Tasks (Time Warp Showcase)

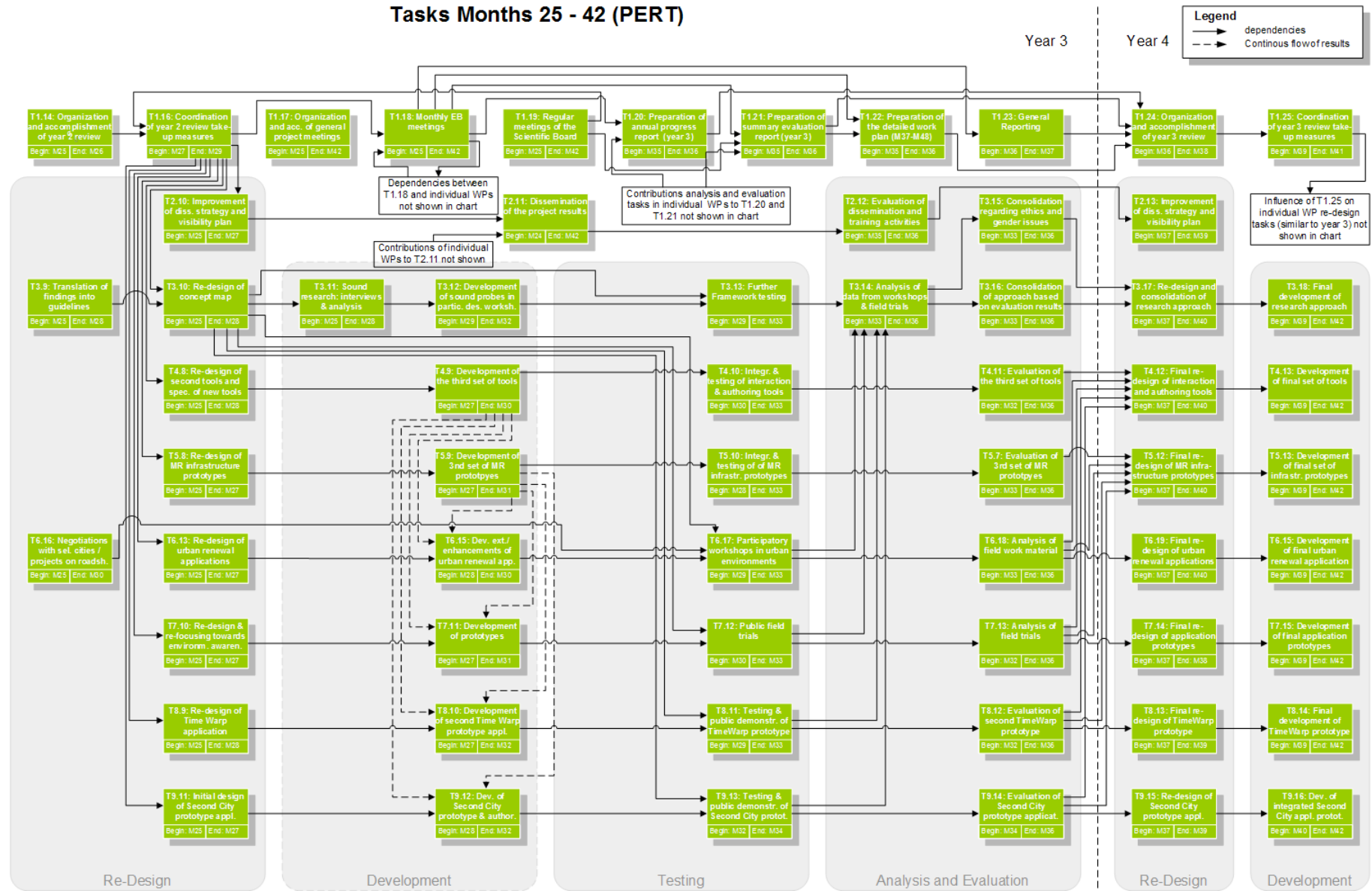


### Gantt Chart on WP9 Tasks (City Tales Showcase)



## 1.2 Project components and interdependencies

Tasks Months 25 - 42 (PERT)



## Workpackage list (18 month plan)

Work-package No <sup>1</sup>	Workpackage title	Lead contractor No <sup>2</sup>	Person-months <sup>3</sup>	Start month <sup>4</sup>	End month <sup>5</sup>	Deliverable No <sup>6</sup>
1	Consortium and Project Management	1 (FIT)	30.65	0	48	D1.11 D1.12 D1.13
2	Dissemination and Knowledge Management	5 (UOulu)	14.4	0	48	D2.3
3	Cross-Reality Presences and Experience	2 (TUW)	39.75	0	48	D3.4
4	Cross-Reality Interaction Tools	1 (FIT)	37.3	0	48	D4.3
5	Mixed Reality Infrastructure	3 (TUG)	74.1	0	48	D5.3
6	Showcase: Urban Renewal	2 (TUW)	35.7	3	48	D6.3
7	Showcase: Large-scale Events →Environmental Awareness Activities	8 (TKK)	45.55	25	48	D7.3
8	Showcase: Time Warp	1 (FIT)	35.6	3	48	D8.3
9	Showcase: City Tales II	12 (IMAG)	39.4	25	48	D9.3
	TOTAL		352.45			

Please note: This table sums up the person months for all activities, i.e. management, RTD, training, demonstration and non-billable additional efforts by AC partners.

<sup>1</sup> Workpackage number: WP 1 – WP n.

<sup>2</sup> Number of the contractor leading the work in this workpackage.

<sup>3</sup> The total number of person-months allocated to each workpackage.

<sup>4</sup> Relative start date for the work in the specific workpackages, month 0 marking the start of the project, and all other start dates being relative to this start date.

<sup>5</sup> Relative end date, month 0 marking the start of the project, and all ends dates being relative to this start date.

<sup>6</sup> Deliverable number: Number for the deliverable(s)/result(s) mentioned in the workpackage: D1 - Dn.

## Deliverables list (18 month plan)

Deliverable No <sup>7</sup>	Deliverable title	Delivery date	Nature <sup>8</sup>	Dissemination level
D1.11	Annual progress report (Phase III)	36	R	PU
D1.12	Evaluation summary report for Phase III	36	R	RE
D1.13	Detailed work plan for the final 12 months (month 36-48)	36	R	PU
D2.6	Revised dissemination strategy and knowledge management plan	27	R	PU
D2.7	Report on dissemination, visibility and training activities during Phase III	36	R	PU
D3.4	Consolidated approach to studying presence and interaction	36	R	PP
D4.3	Improved Prototypes of interaction and authoring tools	36	P, R	RE/PU
D5.3	Improved Prototypes of MR infrastructure components	36	P, R	RE/PU <sup>9</sup>
D6.3	Second Prototype of Urban Renewal applications	36	P, R	RE/PU
D7.3	First Environmental Awareness prototype applications	36	P, R	RE/PU
D8.3	Second Prototype of Time Warp application.	36	P, R	RE/PU
D9.3	Initial Demonstrator of City Tales II application "Second City"	36	D, R	RE/PU

<sup>7</sup> Deliverable numbers in order of delivery dates: D1 – Dn

<sup>8</sup> Please indicate the nature of the deliverable using one of the following codes:

**R** = Report

**P** = Prototype

**D** = Demonstrator

**O** = Other

<sup>9</sup> RE/PU refers to restricted regarding access to prototype software/hardware, but public presentation/demonstration of prototypes and public access to corresponding reports.



## Workpackage description (18 month plan)

Workpackage number	1	Start date or starting event			Month 0
Workpackage title	<b>Consortium and project management</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	16	0.6 (+2)	1 (+3)	1 (+0.5)	0.75 (+0.3)
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:	0.5	1	(+1)	0.75 (+0.5)	0.75

Please note that in addition to the PMs listed here, the former project partner SONY will use of up to 1 PM within this 18-months-period for preparing and participating in the year 2 review. Effort related to non-billable costs by permanent staff of AC partners listed in parentheses.

### Objectives

The main objective of this work package is the executive and scientific management, and administration of the overall project. This is performed by the executive board, the scientific board, and the project administration (the project office).

### Description of work

- T1.14 (Months 25-26): Organization and accomplishment of the year 2 project review
- T1.16 (Months 27-29): Take-up measures regarding year 2 project review
- T1.17 (Months 25-42): Organization and accomplishment of 3-4 general project meeting per year
- T1.18 (Months 25-42): Monthly telephone conferences of the Executive Board. In person meetings of the Executive Board at each general project meeting.
- T1.19 (Months 25-42): In person meetings of the Scientific Board at each general project meeting. Particular tasks include ensuring all WPs are relevant to presence and mixed reality and the consideration of privacy ethics issues.
- T1.20 (Months 35-36): Preparation of the annual project progress report for year 3
- T1.21 (Months 35-36): Preparation of the evaluation summary report for year 3
- T1.22 (Months 35-36): Preparation of the detailed work plan for the final 12 months period (months 37-48)
- T1.23 (Months 36-37): Reporting (financial, management)
- T1.24 (Months 36-38): Organization and accomplishment of the year 3 project review
- T1.25 (Months 39-41): Take-up measures regarding year 3 project review

### Deliverables

- **D1.11 (Report) – Month 36:** Annual reports / project progress reports (Phase III)
- **D1.12 (Report) - Month 36:** Evaluation summary report of Phase III
- **D1.13 (Report) - Month 36:** Detailed work plan for the next 12 months period

### Milestones and expected result

- M1.9 – Month 26: Year 2 project review
- M1.10 – Month 36: Evaluation results from work packages and end of third project period
- M1.11 – Month 38: Year 3 project review

Workpackage number	2	Start date or starting event			Month 0
Workpackage title	<b>Dissemination and knowledge management</b>				
Participant id	FIT	TUW	TUG	<b>UOulu</b>	UniAK
Person-months per participant:	3.5	0.6	1	<b>2 (+0.5)</b>	0.75 (+0.3)
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:	0.5	1	(+1)	0.75 (+0.5)	1.5

### Objectives

The aim of this work package is to ensure maximum dissemination and impact for the results achieved during the project both internally within the project and externally in relation to the scientific community, other stakeholder and information society in general. The partners aim at taking full-scale advantage of the results achieved in the project: the business partners as their business activities and the academic partners as building blocks of their research competence.

### Description of work

- T2.10 (Months 25-27): Improvement of the dissemination strategy and knowledge management plan
- T2.11 (Months 25-42): Dissemination of project results
- T2.12 (Months 35-36): Evaluation of dissemination activities in Phase III
- T2.13 (Months 37-39): Improvement of the dissemination strategy and knowledge management plan for phase IV

### Deliverables

- **D2.6 (Report, Annex to the project handbook) – Month 27:** Revised dissemination strategy and knowledge management plan
- **D2.7 (Report) – Month 36:** Report on dissemination, visibility and training activities during Phase III

### Milestones and expected result

- M2.8 – Month 27: Revision and adaptation of dissemination strategy finished  
I2.3 (Internal report): Dissemination strategy and knowledge management for Phase III
- M2.9 – Month 36: Internal evaluation reporting on dissemination activities (contribution to D1.12 – Evaluation Summary Report of Year 3)
- M2.10 – Month 39: I2.4 (Internal report): Dissemination strategy and knowledge management for Phase IV

Workpackage number	3	Start date or starting event			Month 0
Workpackage title	<b>Cross-Reality Presence and Experience</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	4.5	12.5 (+3)	0	4	0.75
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:	5	10			

### Objectives

The objectives of this WP are

- To define a set of multiple methods appropriate for triangulation in data collection on presence and interaction in MR environments
- To analyze data from field trials in the four showcases, achieving a deeper understanding of how mixed reality environments influence the experience of presence and how this enables novel forms of social interaction, of exploration and understanding
- To define a conceptual framework in support of designing 'technologies of presence' that inform the design of interface mechanisms in support of presence within the project and guide the integration of these technologies into real world settings
- To evaluate this framework using data from field trials.

### Description of work

- T3.9 (Months 25-28): Translation of findings from workshop and field trials into guidelines
- T3.10 (Months 25-28): Re-design of the concept map
- T3.11 (Months 25-28): Sound research: to conduct semi-structured interviews with experts on sound in urban contexts from different fields (including urban design and game design) and joint data analysis
- T3.12 (Months 29-32): To develop sound probes (expressive sound, sound as part of interaction design) to be used in showcases and to test these sound probes in a participatory workshop
- T3.13 (Months 29-33): To further test the conceptual framework in participatory workshops, field trials, and other evaluation events with technology prototypes in cooperation with all showcases
- T3.14 (Months 33-36): Analyze data from participatory workshops, field trials, and other evaluation events, further enrich conceptual framework, give feedback to technology development
- T3.15 (Months 33-36): To consolidate IPCity approach to studying presence and interaction, with special attention to ethical and gender issues
- T3.16 (Months 33-36): To extend, deepen, and systemize knowledge on interface design in support of presence and interaction based on evaluation results
- T3.17 (Months 37-40): To re-design the research approach for last round of participatory workshops, field trials, and other evaluation events.
- T3.18 Months 39-42): To further develop and consolidate research approach for last round of participatory workshops, field trials, and other evaluation events.

### Deliverables

- **D3.4 (Report) – Month 36:** Consolidated approach to studying presence and interaction. Consolidated IPCity approach to studying presence and interaction, based on research findings from all four showcases, and guidelines for interface design

**Milestones and expected result**

- **M3.7 – Month 29:** Sound research and plan for the development of sound probes completed  
**I3.2 (Internal report) – Month 29:** Report on sound research
- **M3.8 – Month 36:** Joint analysis of research findings in all four showcases, and guidelines for interface design completed, internal evaluation reporting (contribution to D1.12 – Evaluation Summary Report of Year 3)
- **M3.9 – Month 42:** Research approach for last round of participatory workshops, field trials, and other evaluation events completed.

Workpackage number	4	Start date or starting event			Month 0
Workpackage title	<b>Cross-Reality Interaction and Authoring Tools</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	12	3.8 (+0.8)	5 (+0.5)	10	
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:		2		1	1

## Objectives

The objective of this work package is the development of a set of generic tools for supporting interactions, design of multi-modal user interfaces and authoring of interactive Mixed Reality environments. After the development of the initial set of tools used within the showcases, now these tools will be redesigned based on the experience and the results of the evaluation from the showcases. Additional tools will be designed and developed according to the needs of the showcases. The redesigned and new tools will be delivered to the showcases to be included within phase two.

The focus of our work will be on the following topics and tools due to demands from the showcases:

- Interaction Prototyping/Authoring: A graphical user interface on top of the language describing the interactions will be developed. This will be a major building block together with the language to support easy creation and evaluation of new interaction mechanisms.
- Authoring and Orchestration Interface: This tool supports the showcases by augmenting arbitrary maps with 2D information, e.g. text, objects, users. The functionality can be used to author a showcase event as well as orchestrating and monitoring the running event and evaluating an event by playback functionality.
- Tangible User Interfaces: Clarifying design issues related to the collaborative creation of mixed-reality configurations and making use of material and spatial properties in designing both, physical interface, as well as multiple and simultaneous interactions. Developing and applying methods allowing users to rapidly learn, use and understand the interactions with the ColorTable to gain a basic understanding of the user's presence related to interaction.
- Augmented map table: Integration with the existing application components Urban Sketcher and Color Table. The map table will present a tangible interface to various elements manipulated in the Urban Sketcher and Color Table, such as drawing planes and placeholder objects.
- Audio/Video Streaming: Publishing arbitrary audio and video sources to local and remote hosts in an efficient way, while providing a simple interface in order to access a stream. Integrate the streaming into the device abstraction.
- MapLens (augmented maps on mobile devices over paper maps): development of the mobile client on Symbian OS smartphone in collaboration with HIIT/TUG/CAM. Field trials planned in Fall 2008.
- Mobile media collector: design and development of the tool for collecting and browsing location based media using mobile devices. First prototype implementation planned in Fall 2008.
- UrbanSketcher Interface Streamlining: UrbanSketcher will also undergo extensive user interface redesign, e.g. usability improvements, strengthening the collaborative properties, enhanced visual and/or audio feedback of user action, or additional functions to handle the assumed ground plane in the MR scene. Additionally developing of sketching/3d modelling tools.
- Multitouch large screen. Set up of an infrared tracking based touch screen with rear projection, Development of a catalogue of gestures to manipulate virtual objects using multiple fingers.

**Description of work**

- T4.8 (Months 25-28) Redesign of the second set of tools and design and specification of additional tools, based on the experience, the results of the evaluation, and the adapted or extended requirements from the showcases. These tools will be the third set of interaction and authoring tools.
- T4.9 (Months 27-30) Development of the third set of interaction and authoring tools
- T4.10 (Months 30-33) Integration in showcase application, testing and use as part of public demonstrations (depending on individual technology and showcase demonstrations) of the third set of interaction and authoring tools.
- T4.11 (Months 32-36) Evaluation of the third set of interaction and authoring tools.
- T4.12 (Months 37-40) Final redesign based on the experience, the results of the evaluation, and the adapted or extended requirements from the showcases that used the third set of tools.
- T4.13 (Months 39-42) Development of the final set of interaction and authoring tools

**Deliverables**

- **D4.3 (Prototype + Report) – Month 36:** Improved prototypes of interaction and authoring tools.

**Milestones and expected result**

- M4.5 – Month 28: Re-design of third set of interaction and authoring tools finished  
I4.5 (Internal Report): Design specification of third set of interaction and authoring tools.
- M4.6 – Month 36: Internal evaluation reporting on third set of interaction and authoring tools (contribution to D1.12 – Evaluation Summary Report of Year 3)
- M4.7 – Month 40: I4.7 (Internal Report): Final design specification of the interaction and authoring tools.

Workpackage number	5		Start date or starting event		Month 0
Workpackage title	Mixed Reality Infrastructure				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	12	1.4	22 (+1)	10	0.5
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:			13	11	1

## Objectives

Initial prototypes gave promising results concerning hardware and software developments. The initial software components for augmented and mixed reality applications on different mobile devices will continue according to the requirements of the various emerging showcase applications. In this context, sub-notebook but also PDA-based as well as smart phone-based settings seem to be useful for different showcase scenarios. Therefore, we will continue the core development for these kinds of devices. In addition, a persistent collaborative database and message passing seems to be inevitable in order to exchange data between various devices. We will further work on the localization and tracking of outdoor users by fusing different types of tracking modalities such as GPS, inertia and vision-based systems. Specifically, we will work on software and hardware infrastructure for the following issues:

**Component Integration:** Improve exchange of information between component structures leading to enhanced functionality.

- Wireless Mobile Camera for AR-Scouting
- HyperMediaDatabase (HMDB): developing the technology based on the requirements from WP6 and WP7 especially related to MapLens development.
- Illuminate (including the Atelier Infrastructure): minor development to adjust the technology to specific trials. Focus will be on trialling and research.
- Bluetooth Media Dispatcher: minor development to adjust the technology to specific trials. Focus will be on trialling and research. This also includes other technologies we have developed for entering media to HMDB (eMailEntrance and others).
- HMDB: possible additions and modifications to HMDB and/or Atelier Infrastructure to accommodate to the requirements of the Mobile Media Collector (a WP4 tool).
- HMDB Web Interface: Will be constantly improved to match requirements for content storage and retrieval as well as utilise useful upcoming features of the HMDB. The layout will be refined too.
- Middleware Java API: Is used since a couple of months and regarded as quite stable, however minor bugfixes and improvements will be certainly necessary.
- Sound Application: A configurable software component that processes object coordinates and attendant meta-information and generates network messages that can be fed into existing sound frameworks.

**Interaction table:** A centralized interaction table will act as the main user interface in the MR tent. The existing demonstrator, a table-top display with tangible interfaces, will be further developed and integrated.

**Mobile setups** (handheld mixed reality environments): three different mobile devices (scaled in computing performance) will further be developed: a sub-notebook-based (UMPC-based) approach, a PDA-based approach, a smartphone-based approach. Porting the StudierstubeES framework to

SymbianES will address a new target platform.

**Tracking and localization:** Vision-based tracking and localization will further be developed in order to get more precise positioning for outdoor MR applications.

- Map tracking is a new core issue where development will mainly be in the context of mobile devices. Tracking mobile devices over 2D printed artefacts such as maps will be developed to serve as a user interface. Fast, feature-based methods are being investigated to realize this aim. Extensions of these methods to model-based tracking will be used for UMPC type devices for outdoor tracking.
- Test, integration and development of human computer interfaces for the image based localization system on mobile devices. Development of methods for selection of the most likely images to be displayed to the user.
- Development of illumination invariant method for robust tracking of color markers under changing light conditions. Integration of the method into the color table framework.
- Start upon investigation and development of on-line tracking methods suitable to support augmentation in head mounted displays used in urban environments.
- Pervasive and Tracking Ubicomp: publishing local and remote geographical, information, streamed (e.g RSS feed of local air quality) and user-generated content from and to pervasive, mobile and permanent installation hosts. Integrating into multi-touch at CityWall.

#### Description of work

- T5.8 (Months 25-27): Analysis and (re-)design of MR infrastructure prototypes
- T5.9 (Months 27-31): Development of third set of prototypes. Focus will be on mobile platforms (hardware and software), user tracking and communication infrastructure integration. (27-32, depending on individual technology and showcase requirements)
- T5.10(Months 29-33): Integration in showcase application, testing and use as part of public demonstrations (depending on individual technology and showcase demonstrations)
- T5.11(Months 33-36): Evaluation period
- T5.12(Months 37-40): Final re-design and re-planning
- T5.13(Months 39-42): Start of final development period

#### Deliverables

- **D5.3 (Prototype + Report) – Month 36::** Improved prototypes of MR infrastructure components

#### Milestones and expected result

- M5.7 – Month 27: Re-design of infrastructure prototypes  
I5.4 (Internal Report): Report on prototype redesign decisions
- M5.8 – Month 31: Development of third set of prototypes finished
- M5.9 – Month 33: Integration, testing and public demonstrations
- M5.10 – Month 36: Internal evaluation reporting on infrastructure prototypes.  
(contribution to D1.12 – Evaluation Summary Report of Year 3)
- M5.11 - Month 40: I5.7(Internal Report): Report on final re-design and re-planning actions



Workpackage number	6	Start date or starting event			Month 3
Workpackage title	<b>Showcase 1: Urban Renewal</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	0.8	5.9 (+1.8)	3 (+2)	4	4 (+0.4)
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:	4	1	1	1	1

## Objectives

The objective of this work package is to introduce mixed reality applications in support of presence into urban renewal projects; more specifically:

- To conduct field work in urban planning environments in several European cities, involving users and researchers as reflective co-designers, from early exploring practice and visions to field trials with gradually more integrated scenarios and prototypes
- To design an application based on the *MR-Tent* infrastructure from WP5, equipped with a mixed-media workbench interface, in support of collaborative envisioning (in collaboration with WP5)
- To support users in creating visual and audial scenes using a variety of sources for multimedia content
- To develop mobile technology for public participation supporting situated content creation
- To evaluate the experiences of field trials with the technologies in real urban planning settings, with special attention to participants' experience of presence and co-presence.

Specific research and development issues for M25-42 related to these objectives are:

- To integrate sound as expressive medium and as part of interaction design into Urban Renewal prototypes
- To develop features that support users in revisiting and comparing MR scenes, adding a history component to collaborative planning
- To further develop and strengthen working with and understanding the impact of rules and constraints in urban renewal projects
- To extend the features that support users in representing different types of expressive and imagined content (in addition to an architectural perspective)
- To integrate augmented map table with Urban Renewal prototypes
- To support in particular non-expert users (interested and involved citizens) in generating 'content' that expresses their perspectives and imaginations
- To strengthen collaboration with WP9 (City Tales).

## Description of work

- T6.13 (Months 25-27): Re-design of Urban Renewal applications
- T6.15 (Months 28-30): Development of extensions/enhancements of Urban Renewal applications, including sound; workshop with sound experts
- T6.16 (Months 21-30): Negotiations with selected European cities/urban renewal projects about participatory workshops/demonstrations in year 3 and 4 as part of an 'IPCity roadshow' (in cooperation with WP2).
- T6.17 (Months 29-33): Preparation and carrying out of third cycle of participatory workshops in a larger scale urban environment project to test the second prototype of Urban Renewal applications, including the first version of the MR-Tent

- T6.18 (Months 33-36): Analysis of fieldwork material from participatory workshop in cooperation with WP3, WP4 and WP5 and plans for re-design of Urban Renewal applications
- T6.19 (Months 37-40): Re-design of Urban Renewal applications and planning for the final round of participatory workshops
- T6.20 (Months 39-42) Final development period.

**Deliverables**

- **D6.3 (Demonstrator + Report) – Month 36:** Second prototype of Urban Renewal applications

**Milestones and expected result**

- M6.7 – Month 27: Re-design of Urban Renewal application finished  
I6.6 (Internal Report): Report on Urban Renewal application re-design
- M6.7 – Month 30: Enhanced demonstrations of the Urban Renewal applications finished
- M6.7 – Month 36: Analysis of participatory workshops and feedback to technology developers as well as WP3 completed, internal evaluation reporting of the initial Second City application. (contribution to D1.12 – Evaluation Summary Report of Year 3)
- M6.8 – Month 42: Final demonstrations of the Urban Renewal applications finished.

Workpackage number	7	Start date or starting event			Month 25
Workpackage title	<b>Showcase 2: Environmental Awareness</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	0.8	4.2	5 (+0.5)	4	0.75
Participant id	UMLV	<b>TKK</b>	AAU	UCAM DENG	IMAG
Person month per participant:	4	<b>18 (+1)</b>		1	

## Objectives

The aim is to introduce environmental awareness in urban activities as a strategic application area and as a creative laboratory for mixed reality application and research on presence, experience and engagement in urban spaces. To be more specific, our objectives are:

- To develop novel applications of mixed reality interfaces in the case of environmental awareness activities including citizens and visitors as active participants.
- Advancing the research on Presence and Engagement and looking at environmental awareness to facilitate spatial distribution, multiplicity and simultaneousness in urban activities.

## Communication Modalities

We investigate the usefulness of:

A large public display *CityWall* as a means for spectators to interact with general, individual and shared co-authored information/ data visualisation

*Annotated Lens Map* for supporting awareness of the impact of mobility choices within the city.

Pervasive Computing e.g. Lights installations at yearly cultural events such as *Illuminate* that identify and respond to pollutants

## Enhancing presence and engagement.

The research aims at investigating how to enhance and sustain engagement and therefore presence in Environmental Awareness activities for visitors to urban activities. Promotion of persistent and re-occurring interactions occurs, where for example, participants return to interact with information sensors, such as those that show toxicity levels, over a number of days—bringing with them different potentially toxic substances / surfaces from their home, work and/or social environments. Over time, we add further interactive devices, responders or modalities as signalled by the spectator requests, interests and popularity of use iterating the designs via participant feedback.

Persistent feedback reinforces research opportunities to refine the conceptual framework around presence and engagement, and proffers opportunity to evaluate how presence and engagement can be further supported.

## Addressing Pollution and Mobility and establishing community

By engaging with the interactive technologies, and sharing information over the modalities and with the emerging community of participants, individuals can then make informed choices and act upon their environment in more responsive and meaningful ways. Collectiveness of activity and co-experience are key components, as is engaging with and identifying pollutants and pollution in order to make overt these hidden aspects of our urban environments.

## Description of work

- T7.10 (Months 25-26) Re-design. Based on the analysis and internal evaluation and the results of

WP3, WP4, and WP5, we will modify and extend the specification for the new Environmental Aware activities demonstrator. This now includes a re-design of WP7 refocusing the components and integrating functionality across the four components Development of demonstrator components as well as a change of topic to Environmental Awareness.

- T7.11 (Months 27-30) Development of new version of components, implementation of Environmental Awareness prototypes. Based on the analysis of the field studies, the internal evaluation and the results of WP3, WP4, and WP5, we will modify and extend the specification for the four components of the demonstrator and the content and focus of the work for permanent and event-based activities.
- T7.12 (Months 30–33): Preparation and carrying out of public field trials.
- T7.13 (Months 32-36): Analysis of field trials. Based on the field trials of the four components an analysis is carried out to evaluate concepts and technologies behind the components
- T7.14 (Months 37-38): Final re-design of Environmental Awareness Prototypes
- T7.15 (Months 39-42): Final development of Environmental Awareness Prototypes

#### **Deliverables**

- D7.3 (Prototype + Report) – Month 36: ~First Environmental Awareness Demonstrator
- D7.4 (Prototype + Report) – Month 42: ~Second Environmental Awareness Demonstrator

#### **Milestones and expected result**

- M7.7 – Month 30: Environmental Awareness re-design finished. I7.5 (Internal Report): Report on Environmental Awareness application re-design
- M7.8 – Month 34: Environmental Awareness Events prototypes
- M7.9 – Month 36: Internal evaluation reporting Environmental Awareness events prototypes. (contribution to D1.12 – Evaluation Summary Report of Year 3)
- M7.10 – Month 36: I7.6 (Internal Report): Report on Environmental Awareness events application re-design
- M7.11 – Month 42: 17.8 Second Environmental Awareness application prototypes

Workpackage number	8	Start date or starting event			Month 3
Workpackage title	<b>Showcase 3: Time Warp</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	15.5	3	0.5	0.5	0.75
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:	2		1	0.5	9

## Objectives

The objective of this showcase is the development of TimeWarp. TimeWarp is a pervasive mixed reality game in an urban context that allows users to experience a city in the past, present and future with a large variety of different media channels and interaction devices.

Based on the first test runs and experiences with the latest prototype, improvements concerning the MR technology especially the usability and reliability will be one of the next steps to do. Furthermore, the redesign of the interface and the gameplay will lead towards a stronger perception and awareness of the real and virtual environment and thus create a cross-reality presence. This fact will be enforced by the fusion of real and virtual object.

The objectives for these prototypes are more specifically:

- To advance the infrastructure and gameplay by
  - Providing a more convenient, intuitive and reliable interface
  - Improving the gaming experience to get a more joyful and exciting adventure to reach a stronger identification with the situation and environment and thus enhance the cross-reality presence.
- To develop and evaluate concepts and tools to gain a stronger presence experience by
  - Evaluating different display techniques regarding the influence of the presence experience
  - Supporting and using spatial sound
  - Exploring and applying techniques for advanced visualization

## Description of work

- T8.9 (Months 25-28): Re-design of first TimeWarp prototype. Based on the analysis of the test runs, the internal evaluation and the results of WP3, WP4, and WP5, we will modify and extend the specification for the second Time Warp prototype. This may include improved interaction and collaboration functionality and additional media channels and interaction devices.
- T8.10 (Months 27-32): Development of the second TimeWarp prototype. Based on the results on the re-design developed in T8.9 and tools and infrastructure provided by WP4 and WP5, we will develop the second TimeWarp prototype.
- T8.11 (Months 29-33): Testing and public demonstrations of second TimeWarp prototype
- T8.12 (Months 32-36): Evaluation of the second TimeWarp prototype.
- T8.13 (Months 37-39): Re-design Based on the analysis of the test runs, the internal evaluation and the results of WP3, WP4, and WP5, we will modify and extend the specification for the third TimeWarp prototype. This may include improved interaction and collaboration functionality and additional media channels and interaction devices.

- T8.14 (Months 39-42) Development of the third TimeWarp prototype. Based on the second prototype developed in T8.10 and tools and infrastructure provided by WP4 and WP5, we will develop the third TimeWarp Prototype.

**Deliverables**

- **D8.3 (Demonstrator + Report) – Month 36:** Second TimeWarp Prototype + Evaluation Report

**Milestones and expected result**

- M8.8 – Month 29: TimeWarp application re-design finished  
I8.4 (Internal Report): Report on TimeWarp application re-design
- M8.9 – Month 32: Second TimeWarp prototype
- M8.10 – Month 36: Internal evaluation reporting of the second Time Warp application prototype.  
(contribution to D1.12 – Evaluation Summary Report of Year 3)
- M8.11 – Month 42: Third Time Warp prototype

Workpackage number	9	Start date or starting event			Month 25
Workpackage title	<b>Showcase 4: City Tales (II)</b>				
Participant id	FIT	TUW	TUG	UOulu	UniAK
Person-months per participant:	6	2.6	0.5	0.5	0.75
Participant id	UMLV	TKK	AAU	UCAM DENG	IMAG
Person month per participant:	2		1	0.5	21

## Objectives

City Tales will concentrate on the HCI (Human-computer interaction) aspects of presence and more specifically mixed reality. We would like to design users interfaces that are easy to use and easy to understand, that meet the need of the intended user and that support users procuring mixed reality content. In our definition the user interface describes a combination of hardware and software component that receive input from or communicate output from a user; in other words it describes the experience of the user interface. The main aspect of City Tales is the way in which story telling is enabled in a presence sense. For City Tales the way in which a user is enabled to create a mixed reality story in an urban environment is the core research interest and should drive all other related research aims and functionalities.

The objectives for prototypes are more specifically:

- Develop and evaluate concepts for:
  - User generated mixed reality content creation tool
  - Location aware mixed reality light weight mobile browsing tool
- Advancing the research on Presence looking at the HCI and more specifically the user interface design of mixed reality applications
  - How to encourage users to create rich mixed reality content and how can we motivate creative content creation (content creation tools)
  - Presence in the area of HCI, how does a user interface design encourage social presence (browsing tools)

City Tales can be split into two categories, content creation and content browsing. We are calling this tool set "Second City" envisioning a populated second world consisting of stories that are told by inhabitants of that virtual layer of the city.

Initially we will split the two categories but may end up combining the two at a later stage. The initial phases will focus on mixed reality story telling tools, continuously we will create a pool of mixed reality content and in a later phase, when we have collected enough content, we will use the mixed reality content to produce novel story browsing tools. All concepts are integrated through one common mixed reality content database that will host all city tales related stories and will be used for experiencing content via mixed reality content browsing tools.

## Description of work

- T9.11 (Months 25-28): Design of "Second City". Based on the analysis of the test runs and early technology probes. The internal research results of WP3, WP4, and WP5, we will modify and extend the specification "Second City" prototypes. This will include a location based authoring tool and a 3D mobile AR Browser.

- T9.12 (Months 28-32): Development of the "Second City" application and authoring tools. Based on earlier demonstrators and tools and infrastructure provided by WP4 and WP5, we will develop a City Tales content creation tool and an interactive mobile MR application to retrieve stories within the city.
- T9.13 (Months 31-33): Testing and public demonstration of first "Second City" application including user generated MR content creation tool
- T9.14 (Months 33-36): Evaluation of "Second City"
- T9.15 (Months 37-40) Re-design of "Second City" based on the internal evaluation and the results of WP3, WP4, and WP5. We will also design a stationary installation incorporated within "Second City".
- T9.16 (Months 40-42) Development of the integrated multi-modal (mobile and stationary) MR application . Extension to the authoring tool to incorporate the stationary installation.

### Deliverables

**D9.3 (Demonstrator + Report) – Month 36:** Initial Demonstrator of City Tales II application "Second City"

### Milestones and expected result

- M9.8 – Month 28: Second City application (re-)design finished  
I9.5 (Internal Report): Second City design, architecture and requirements
- M9.9 – Month 36: Second City prototype
- M9.10 – Month 36: Internal evaluation reporting of the initial Second City application.  
(contribution to D1.12 – Evaluation Summary Report of Year 3)
- M9.11 – Month 42: I9.6 (Internal Report): Second City extended prototype (integrated mobile and stationary functionality)



## 2 Project resources

### 2.1 IP Efforts for Months 25 – 42 of the Project

#### RTD Activities

RTD/Innovation activities	FIT	TUW	TUG	UOulu	UniAK	UMLV	TKK	SONY	AAU	UCAM DENG	IMAG	TOTAL PARTNERS
WP1: Consortium and Project Management	4	0.6	1	1	0.755	0.5	1	1		0.75	0.75	<b>11.35</b>
WP2: Dissemination and Knowledge Management	3.5	0.6	1	2	0.75	0.5	1			0.75	1.5	<b>11.6</b>
WP 3: Cross-Reality Presence and Experience	4.5	12.5	0	4	0.75	5	10					<b>36.75</b>
WP4: Cross-Reality Interaction Tools	12	3.8	5	10			2			1	1	<b>34.8</b>
WP5: Mixed Reality Infrastructure	12	1.4	22	10	0.5				13	11	1	<b>70.9</b>
WP6: Urban Renewal Showcase	0.8	5.9	3	4	4	4	1		1	1	1	<b>25.7</b>
WP7: Environmental Awareness Showcase	0.8	4.2	5	4	0.75	4	18			1		<b>37.75</b>
WP8: Time Warp Showcase	15.5	3.0	0.5	0.5	0.75	2			1	0.5	9	<b>32.75</b>
WP9: City Tales Showcase	6	2.6	0.5	0.5	0.75	2			1	0.5	21	<b>34.85</b>
<b>Total research</b>	<b>59.1</b>	<b>34.6</b>	<b>38</b>	<b>36</b>	<b>9</b>	<b>18</b>	<b>33</b>		<b>16</b>	<b>16.5</b>	<b>35.25</b>	<b>296.45</b>

Please note that the table above does not contain the additional effort by the AC partners (non-billable costs by permanent staff). This information is provided in the table below.

## Additional Activities by AC Partners

Additional effort by AC partners	FIT	TUW	TUG	UOulu	UniAK	UMLV	TKK	SONY	AAU	UCAM DENG	IMAG	TOTAL PARTNERS
WP1: Consortium and Project Management		2	3	0.5	0.3				1	0.5		7.3
WP2: Dissemination and Knowledge Management		0		0.5	0.3				1.5	0.5		2.8
WP 3: Cross-Reality Presence and Experience		3										3
WP4: Cross-Reality Interaction Tools		0.8	0.5									1.3
WP5: Mixed Reality Infrastructure		0	1						1			2
WP6: Urban Renewal Showcase		1.8	2		0.4							4.2
WP7: Environmental Awareness Showcase		0	0.5				1					1.5
WP8: Time Warp Showcase		0										0
WP9: City Tales Showcase		0										0
<b>Total additional AC effort</b>		<b>7.6</b>	<b>7</b>	<b>1</b>	<b>1</b>		<b>1</b>		<b>3.5</b>	<b>1</b>		<b>22.1</b>

## Demonstration Activities

Demonstration activities	FIT	TUW	TUG	UOulu	UniAK	UMLV	TKK	SONY	AAU	UCAM DENG	IMAG	TOTAL PARTNERS
WP6: Urban Renewal Showcase		0.8	0.5	0.5			1		0.5	0.5		<b>3.8</b>
WP7: Environmental Awareness Showcase		0	0.5	0.5		0.8	1			0.5		<b>3.3</b>
WP8: Time Warp Showcase	0.75	0	0			0.8				0.5	0.25	<b>2.3</b>
WP9: City Tales Showcase	0.75	0.5	0			0.8			0.5		0.25	<b>2.8</b>
<b>Total demonstration</b>	<b>1.5</b>	<b>1.3</b>	<b>1</b>	<b>1</b>		<b>2.4</b>	<b>2</b>		<b>1</b>	<b>1.5</b>	<b>0.5</b>	<b>12.2</b>

## Training Activities

Training activities	FIT	TUW	TUG	UOulu	UniAK	UMLV	TKK	SONY	AAU	UCAM DENG	IMAG	TOTAL PARTNERS
WP4: Cross-Reality Interaction Tools	0.2		0.5	0.5								<b>1.2</b>
WP5: Mixed Reality Infrastructure	0.2		0.5	0.5								<b>1.2</b>
WP6: Urban Renewal Showcase		0.5	0.5	0.5					0.5			<b>2</b>
WP7: Environmental Awareness Showcase		0	0.5	0.5			2					<b>3</b>
WP8: Time Warp Showcase	0.3	0	0								0.25	<b>0.55</b>
WP9: City Tales Showcase	0.3	0.7	0						0.5		0.25	<b>1.75</b>
<b>Total training</b>	<b>1</b>	<b>1.2</b>	<b>2</b>	<b>2</b>			<b>2</b>		<b>1</b>	<b>0</b>	<b>0.5</b>	<b>9.7</b>

## Consortium Management Activities

Consortium management activities	FIT	TUW	TUG	UOulu	UniAK	UMLV	TKK	SNS	AAU	UCAM DENG	IMAG	TOTAL PARTNERS
WP1: Consortium and Project Management	12											12
<b>Total consortium management</b>	<b>12</b>											<b>12</b>

## Total Activities

Total activities	FIT	TUW	TUG	UOulu	UniAK	UMLV	TKK	SNS	AAU	UCAM DENG	IMAG	TOTAL PARTNERS
<b>Without non-billable efforts</b>	<b>73.6</b>	<b>37.1</b>	<b>41</b>	<b>39</b>	<b>9</b>	<b>20.4</b>	<b>37</b>	<b>1</b>	<b>18</b>	<b>18</b>	<b>36.25</b>	<b>330.35</b>
<b>Including non billable efforts</b>	<b>73.6</b>	<b>44.7</b>	<b>48</b>	<b>40</b>	<b>10</b>	<b>20.4</b>	<b>38</b>	<b>1</b>	<b>21.5</b>	<b>19</b>	<b>36.25</b>	<b>352.45</b>





## **Acknowledgements and Further Information**

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

*[ipcity.eu](http://ipcity.eu)*