SEVENTH FRAMEWORK PROGRAMME

FP7-ICT-2011-1.5 Networked Media and Search Systems
b) End-to-end Immersive and Interactive Media Technologies

Specific Targeted Research Project

VENTURI

(FP7-288238)

immersiVe ENhancemenT of User-woRld Interactions

Periodic activity report 1st Year

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Abstract:	This document provides information about the activities that VENTURI has carried out between October 2011 and September 2012. This is the 1st annual report of VENTURI project..
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0.1	23/10/2012	Paul Chippendale	Initial draft
0.2	24/10/2012	Paul Chippendale	Second draft
0.3	07/11/2012	Paul Chippendale	Added final contributions from all partners
1.0	09/11/2012	Paul Chippendale	Ready for submission

Contents

1. Executive Summary

Scope

This document provides information about activities in the first year of the VENTURI project and gives an overview of the preparation steps made to regulate the project. This report corresponds to the timeline October 2011 till September 2012.

Audience

This deliverable is restricted and it is addressed to all VENTURI partners.

Summary

During the first Project Year, the following major managerial activities were undertaken:

- Preparing and organizing the kick-off meeting in Trento on the 13-14 October 2011
- Preparing and organizing the first technical face-to-face meeting in Paris on the 26-27 January 2012
- Preparing and organizing the second technical face-to-face meeting in Valencia on the 30-31 May 2012
- Preparing and organizing the third technical face-to-face meeting in Munich on the 3-4 October 2012
- Preparing and organizing monthly general phone conferences
- Preparing and creating promotional material for exploitation activities

In terms of research and development efforts, this reporting period has been characterized by the integration and alignment of Augmented Reality research efforts towards the hardware platform developed by STE, with the eventual goal of creating a 1st year use-case demonstrator. In the scope of this effort, the various elements can be summarised as follows:

- Use case definition given current State-Of-The-Art (SOTA) algorithms and self-imposed environmental constraints, i.e. controlled indoor lighting scenario
- Requirements definition of use-case (and more generally for AR applications) for mobile platforms
- Analysis of the requirements and related architectural work
- Implementation of the requirements, including:
    - Creation of a common and accurate timestamping across imaging and sensor systems
    - Integration of 3D tracking algorithms into the AR framework
- Integration of partners' development algorithms onto the platform and subsequent debugging
- Development of the Use-case 1 application into an interactive project demonstrator

Structure

This deliverable is structured as follows:

- Section 1 is this Executive Summary
- Section 2 covers the more pertinent issues, research and management activities together with results from the project during its 1st year period.
- Section 3 presents a list of VENTURI meetings, where all of the partners came together to discuss and steer the project.
- Section 4 covers dissemination and promotional activities in the 1st year, and,
- Section 5 summarizes the main staff that have worked on VENTURI at the various partner sites.

2. Overview

Objectives addressed during the 1st year

WP	Partners	Progress towards achieving objectives
WP1: Project Management	**FBK**	• Interfacing communications between consortium and EC • Organising, attending and documenting the kick-off meeting • Organising, attending and documenting project meetings • Organising teleconference meetings, plus elaboration of minutes • Transfer of the pre-financing to the Consortium • Design of document and presentation templates • Quality checking, submitted and placing deliverables on website • Steering the project towards a timely and successful result • Creation of a Risk Identification, Management & Quality plan • Monitoring of the project (4-month breakdown by activities)

WP	Partners	Progress towards achieving objectives
WP2: Architecture definition and development	**FBK**	FBK actively contributed to the definition of use-cases (UCY1 and UCY2), in the context of task T2.1.1. In particular, FBK's efforts mainly focussed on deliverable D2.1.1 (M3) and on the vision of the UCY2 storyboard, also providing feedback from external entities directly relating to the addressed application context (i.e. visually impaired people).
	Fraunhofer	Fraunhofer has been engaged in task T2.1 and T2.2 discussions covering the analysis of system requirements and the definition of use cases of the yearly prototypes. Specific contributions have been made for the very first report on use cases, application definition and system requirements for D2.1.1 delivered in M3.
	ST-Italy	ST-Italy drove the effort, accomplished with the cooperation of all the Project Partners, to define the Use Cases and System Requirements of the Venturi system. In particular, it was decided to follow an incremental approach, by describing the use case and related HW, SW, and general system requirements for three different platform demonstrators, one for each year, called VeDi-1, VeDi-2, and VeDi-3 (where VeDi-1 relates to UCY1, etc.). The deliverable D.2.1.1. described in detail UCY1 and system requirements for VeDi-1, which were followed by the implementation of the demonstrator itself. ST-Italy has also driven the setup and the maintenance of the web-based Steerforge infrastructure which hosts the tools that all VENTURI partners use for knowledge sharing, code revisioning, bug tracking and documentation management. ST-Italy integrated and delivered software platforms coming from ST-E and metaio, as well as providing support to all partners on how to install and operate the U8500 hardware provided by ST-E in the form of: deliverable D2.4.1, deliverable D2.4.2, Wiki pages, e-mail and defect tracking tools.
	metaio	metaio actively took part in the use case definition process for the different demonstrators to ensure that incremental complexity steps are respected over time. This was specified in the metaio co-authored document D2.1.1. metaio has also provided input to document D2.2.1 which defines the detailed design specifications for the hardware platform. One of metaio's most important WP2 tasks is the development of the mobile AR client framework. First, a mobile application called Mobile Creator was implemented, enabling vision-based environment map geometrical reconstruction, using extensible markerless 3D tracking, initialised by marker-based tracking. The Mobile Creator application enables on-the-fly map testing as well as debug information to be displayed during the environment map reconstruction. Based on the reconstructed environment map, the 3D markerless tracking algorithm with respect to non-planar scenes

		developed in WP4 has been integrated into the mobile AR client framework which forms the basis of the AR browser junaio development. It enables the development of applications to localize the camera and estimate its pose with respect to a previously vision-based reconstructed environment map (for more details, see delivery D2.3.1). Concerning the SW development, delivery and support, applications have been adjusted to take into account the hardware reference board encompassing VeDi-1, pertaining to inertial sensors, camera and display and the *apk* of the AR browser (see the delivery D2.4.1) as well as the Mobile Creator (see delivery D2.4.2) provided for integration (in close collaboration with the other project partners) as pre-installed applications on the hardware reference board. Concerning the server infrastructure and communication, a SOLR integration in the junaio server has been implemented to speed up the POIs full text search. Amazon Route 53 was explored to provide faster requests responses (Geo DNS). Amazon Auto Scaling service was tested to automatically start new servers or stop running servers when needed. Local Geo-localization was tested to reduce the response time of the servers, and finally a better caching technique was tested in the server to reduce the communication latency between the database and the servers. For more details, see the delivery D2.6.1.
	STE	As WP2 leader, STE drove the Use-Case driven developments of the VeDi platform. Firstly, STE physically provided the VeDi-1 platform to all partners (13 boards and all of the necessary accessories), together with an initial SW baseline, based on Android Gingerbread version (D2.4.1), that permitted an initial port of the AR framework from metaio, and an early development of a dataset recording tool created by FBK for WP4. STE participated actively in the UCY1 demonstrator (Task 2.1.1) and to the associated formal system requirements elicitation (Task 2.1.2), both leading to Deliverable 2.1.1. STE led the analysis phase of the aforementioned collected requirements, summarized in Deliverable 2.2.1. This analysis refined system requirements by indicating which of them were fulfilled in the current STE platform, which of them required some specific developments, and, which of them were out-of-scope for Year-1 development and platform delivery. This analysis (detailed design specification) paved the road to the STE developments performed in Task 2.4: *SW development, delivery and support*. More precisely, platform developments engaged to fulfil the VENTURI requirements were: • Update of the VeDi platform baseline to Android Ice Cream Sandwich (4.0) version, that offered a simpler timestamping interface for video capture. • Update of the VeDi platform multimedia framework, in particular the imaging part, in order to expose, all the way through to the application level, HW-based

		counters present in the ISP (Imaging Signal Processor) accelerator, as a basis for common timestamping between the imaging and sensor systems • Integration (and debugging) into the VeDi platform of the updates of the sensor system (see WP4) These developments were delivered as two incremental updates on top of a full baseline SW delivery (named DV1.0), provided by to ST who were responsible for merging all partner developments (including the AR framework from metaio) and providing it to all partners as a consistent compiled baseline (D2.4.2). STE also handled the various issues that were encountered, in particular the one related to: • 180° rotation of the video preview stream, linked to the use of an HW adapter allowing the position the camera on the back side of the platform (with respect to the display) • HW issues relating to the starting of the ISP-based counter upon platform boot.
	e-Diam	• E-Diam participated in the definition of the UCY1, which ended up being developed as the VeDi-1 demonstrator. • E-Diam was involved in the definition of UCY2. • E-Diam participated in the D6.3 definition document detailing Use Case definition. • E-Diam reported and evaluated technical questions relating to the implementation of UCY1 for VeDi-1.
	INRIA	Three of INRIA's more important tasks during this year were the development of : • an audio engine specific to mobile AR which used a declarative approach • a localization framework for pedestrian dead-reckoning on a navigation network • an audio scene analysis framework INRIA was also involved in identify use-cases and system requirements for these three tasks

WP	Partners	Progress towards achieving objectives
WP3: User interface and interaction design	**metaio**	• metaio designed the end-user interface of the environment map reconstruction tool (which is a developer tool) with the majority of work being done in the definition of the user expectation and interface. • Work was also carried out in interaction design during the implementing of the Creator Mobile application and its successor the Toolbox application.
	Sony	• Contributed to use case descriptions for T2.1.1 from a usability and User Experience perspective. • Documented research topics and conceptual framework for T3.1 and T3.2. • Conducted AR Gaming user studies for T3.1 • Development of Wizard of Oz tool which will be used to develop mock ups for T3.2
	INRIA	• Indoor-outdoor navigation experiments in Grenoble and in Osaka with visually impaired people have been made during Spring and Summer. Following these experiments, a new design for the localization framework has been done to better meet user expectations, such as enabling detour re-routing, recovery from errors, heading stabilization for 3D audio integration and localization on a network instead of a route. • An Android end-user interface of the localization framework has been developed User centric audio design and testing for the UCY1 game

WP	Partners	Progress towards achieving objectives
WP4: Context Sensing and Interpretation	**FBK**	• Management of WP4 • Creation and sharing of an Android-based acquisition tool that can simultaneously dump to disk visual, audio, and sensor data • Analysis of SOTA techniques for robust detection of interest points / regions • Analysis of SOTA and preliminary testing (on standard, real-world datasets) for text detection and recognition algorithms • Preliminary testing of real-time terrain model rendering on a mobile device • Development of algorithms for auto-alignment of landscape images with terrain models • In the context of deliverable D4.1, acquisition and sharing of a dataset consisting in geo-referenced outdoor video sequences taken in a mountain environment, their sensor streams, and manually determined Ground Truth orientation for each frame • Coordination and writing of deliverable D4.2: Report on expected platform requirements of WP4 algorithms
	Fraunhofer	• Fraunhofer contributed to deliverable D4.2 by detailing the expected platform requirements of dense 3D reconstruction methods for registration and surroundings modelling tasks (T4.3.2 and T4.4). • In preparation for the upcoming report D4.3, Fraunhofer has elaborated an analysis on the integration modalities for dense reconstruction algorithms. • In task 4.3, Fraunhofer has worked on the precise estimation of camera location and pose, based on the registration of 2D camera images with geo-referenced 3D models of buildings. To achieve this, methods for feature extraction and vanishing point analysis, as well as for the estimation of intrinsic camera parameters and lens distortion have been developed. • In relation to the physical surroundings modelling task T4.4, Fraunhofer has worked on algorithms for the dense 3D reconstruction of object surfaces from high resolution stereo images.
	ST-Italy	• Started the development of an advanced algorithm for scene classification • Training and testing on SOTA dataset for evaluating visual scene classification algorithms • Benchmarked visual scene classification algorithms on Torralba-Oliva dataset • Conducted a deep analysis of SOTA techniques for generating a sparse 3D map associated to a user's position whilst acquiring a video signal from a single (not stereo) camera (FAST, PKLT, binary descriptors, N-Points algorithms, PNP, various triangulation and refinement techniques) • Developing an algorithm to generate a robust optical flow • Acquisition and sharing of test sequences for evaluating optical flow algorithms • Studying how to integrate the developed optical flow algorithm into the Android environment, combining Java and C++ functions, using JNI
	metaio	• metaio participated in the delivery of D4.1 where a set of synchronized datasets for VeDi-1 were made. This contained a dump of all of the on-board sensors for testing vision-based localization and tracking algorithms. • The map reconstruction algorithm (physical surrounding modelling) and 3D markerless tracking algorithm (visual analysis of the environment and geo-

		position refining) used in VeDi-1 were developed in this work package. The algorithms were targeting indoor and small scale environments (restricted to tabletop scenarios) with roughly a one meter cube volume. Vision-based localization and tracking with respect to larger scale environments were also tested in preparation for VeDi-3. • metaio's office surroundings were laser scanned and globally registered in a geo-referenced coordinate system and several image sequence were created, accompanied by 3D position and inertial sensor data in order to generate ground truth data for large scale 3D markerless tracking.
	STE	STE was involved in T4.1: *Hardware Sensor Interpretation*. In order to deliver a platform capable of recording synchronized datasets (purpose of Delivery D4.1), STE performed the necessary architectural study and prescribed updates related to: 1) use the ISP-based counter as a timestamping source for sensors 2) use the IIO framework, permitting the accurate timestamping of sensor data. The associated developments and unitary tests were performed. The modifications were integrated into the VeDi platform baseline as part of WP2 activities (D2.4.2).
	INRIA	INRIA has developed : • a localization framework for pedestrian dead-reckoning • an audio analysis framework to enhance the localization framework or understand user/environmental context The localization framework is based on the joint use of an indoor-outdoor-navigation network and MEMS sensors. Accelerometers are used to compute the distance and gyroscopes are used to compute the orientation. Drift is removed using some innovative heuristics and map-matching. This framework has been extensively and satisfactory tested in two railways stations in Japan and one public building in France. It has been presented at the annual OpenStreeMap conference in Tokyo (September 2012) and will be one important component of UCY2 concerning navigation for visually impaired people. An audio analyser tool for mobile has been defined and implemented. The focus was the analysis and recognition of discrete sound events and general acoustic environment types. With the help of OpenStreetMap semantic data, the auditory scene analysis system divides the auditory scene into two layers: sound objects and audio scenes. Recognition is done using semantic data found in OpenStreetMap.

WP	Partners	Progress towards achieving objectives
WP5: Adaptive Content Harvesting, Creation and Delivery	**Fraunhofer**	Within Task T5.1.1 (which covers the creation of 3D visual content), Fraunhofer is researching and developing algorithms for the 3D reconstruction of real world objects. Targeting specifically UCY1, occlusion models of all miniature houses used in the game have been created and delivered to the partners. For this purpose, different reconstruction methods have been evaluated (based on sparse features, dense image-based optimization, structured light, and silhouettes), and a workflow has been implemented in order to automate the reconstruction process as much as possible. Tools for camera calibration, automated turntable control and image acquisition, and structure from silhouette based 3D reconstruction were implemented and refined throughout the production phase. Very dense multi-view datasets of all houses under various viewpoints were captured, segmented and reconstructed using this tool chain, producing high-resolution 3D occlusion models consisting of several million triangles per object. For the 3D virtual content fusion task T5.2, Fraunhofer is working on tools and algorithms to create and enhance the visual appearance of rendered 3D virtual content. During the first project year, research and implementation efforts have focused on core tools for the automated generation of texture atlases for 3D models reconstructed from calibrated multi-view image sequences. Different tools, e.g. for mesh segmentation and mesh parameterization, chart packing, and texture filling from multi-view images, have been developed and are under on-going refinement; they will serve as the foundation for more complex texture map creation and registration tasks in the upcoming stages of the project.
	metaio	In order to ensure application reactivity during content delivery, metaio tested different ways to reduce the size of the virtual models to be overlaid in the AR application or to stream them during the application start-up. The possibility to upload and download a compressed version of the models as well as the tracking configuration data and decompressing them on the client device was implemented. To be able to handle occlusions during outdoor AR applications, metaio developed a proof-of-concept implementation where Open Street Map data is used to generate approximate models of the buildings that can be rendered as transparent occlusion models.
	Sony	Investigated the possible contribution of the Sony Human Activity Recognition engine to VENTURI.
	INRIA	An audio engine has been implemented in C++ on Android and INRIA has started to use it in the UCY1 game. It uses an innovative declarative approach based on XML technologies such as SMIL for synchronisation for spatialization and priorities queues for managing audio POI clutter.

WP	Partners	Progress towards achieving objectives
WP6: Technology Integration, Evaluation and Test-cases	**Fraunhofer**	Fraunhofer has contributed to T6.4 by adapting the 3D visual content created in WP5 to UCY1. The high-resolution 3D occlusion models created in T5.1 were simplified in complexity to match the rendering capabilities of VeDi-1, whilst preserving the overall model appearance. Different resolutions of the 3D model houses were prepared to enable e-Diam to test the overall rendering performance in the game. After prototype testing, a 'unified' 3D city model has been created for integration into the game, combining and correctly positioning all occlusion models into the world coordinate system defined by the application.
	ST-Italy	In deliverable D6.1, ST-Italy has extensively described the tools and techniques that shall be used for performance and platform profiling. ST-Italy started the coordination of the algorithmic solutions integration process in the Android operating system and collected feedback from all partners regarding integration feasibility. ST-Italy also coordinated the development of VeDi-1 which resulted in deliverable D6.3 as well as testing the demonstration the application in different environments and light conditions. Finally, ST-Italy assessed different SOTA inter-device communication means and experimented on novel web-based technologies to enable scalable and future proof AR Multi-User use cases.
	metaio	For profiling, bottleneck detection and software optimization, daily timing evaluation, performance and accuracy tests of the marker tracking pipeline (used in the environment map reconstruction tool) has been implemented, running on a dataset of 48000 images (where up to 6 markers can be detected in every image). The dataset was generated with a high accuracy ground truth toolset (robotic arm measurement, high accuracy calibration tools, etc., see delivery D6.1 for more details). Additionally, for profiling, evaluation and optimization of the real-time 3D markerless tracking, a set of test benches have been started to display debug information such as the environment map, its size, and localized timing estimations. metaio has also actively participated in the integration of the mobile AR client framework and in UCY1 development and testing on the hardware reference board.
	STE	STE contributed to the report on the performance of the platform profiling tools and techniques (D6.1), in particular by addressing the offline potential tools and by highlighting specific online profiling tools both at a processor level (sysstat and pcache) and at the SoC interconnect level (SBAG). In addition, STE provided the corresponding SBAG drivers as patches to be integrated as part of VeDi platform baseline (D2.4.2). STE also contributed to D6.3: *Use case(s) implemented on VENTURI integrated plat-*

		form V1, by providing a status of the requirements that have been used and validated in VeDi-1; those identified in D2.1.1 and analysed in D2.2.1 and D2.4.2. This is inherently part of the Use-Case driven development methodology.
	e-Diam	• e-Diam exploited the 3D models produced by Fraunhofer for testing the performance on the VEDI device and to check and create the UCY1 demonstrator. • E-Diam collaborated with metaio in the tracking adjustment phase and tested the performance of the metaio SDK on the VeDi-1 platform.
	Sony	Prepared for T6.1 by researching evaluation methods and processes. Conducted a first user experience evaluation of the VEDI-1 demonstrator.
	INRIA	To ease integration and testing, INRIA has developed a java layer interface to its C++ Android modules, namely: • an audio engine, and, • an audio analyser for the localization framework modules

WP	Partners	Progress towards achieving objectives
WP7: Dissemination and Exploitation	**FBK**	Creation, setting in place, and maintenance of the VENTURI website http://venturi.fbk.eu (deliverable D7.1). FBK contributed to the dissemination activities by presenting research papers at IGARSS2012 and EESMS2012 international conferences. VENTURI was also presented at invited sessions during October 2012 at HiPEAC CSW2012, AugmentedPlanet 2012 and NEM Summit 2012; prior to this at GIRPR2012 (please see dissemination list below for further details). Contributions to deliverables D7.2.1 and D7.2.2. Minor contributions to deliverable D7.4.2.
	Fraunhofer	As part of creating the VENTURI web presence in task T7.1, the consortium has created a white paper describing the project vision and technical roadmap. Fraunhofer has contributed considerably to the overall paper, and specifically with sections on 3D visual content creation and preliminary results targeting the UCY1 demonstrator. In relation to task T7.2, Fraunhofer has been responsible for and has elaborated three reports (D7.2.1, D7.2.2, and D7.4.1 – see below) during the first project year. Deliverable D7.2.1, submitted in M6, presented the consortium's strategy on dissemination and exploitation of the project results. Based on an overview of the current market situation and an analysis of AR stakeholders, an integrated communication strategy was developed and detailed, with the goal to reach the different types of user groups relevant to the project. The subsequent report D7.2.2, delivered in M12, updated the preliminary strategy and presented a complete review of all dissemination activities conducted by the consortium partners during the first project year. Fraunhofer has started to engage in the AR Standards Community group, attending their sixth meeting held in Geneva at the end of July 2012. Here, VENTURI was presented and public deliverable D2.1.1 formed a contribution to an AR Reference Model proposal in MPEG. Deliverable D7.4.1, submitted in M12, presented the consortium's strategy for contribution to related standards. The report presented a comprehensive analysis of the exploitation of standards within VENTURI, identifying areas where current standards support is lacking in order to implement the VENTURI vision.
	ST-Italy	ST-Italy is one of the key drivers of the StreamInput Khronos standardization activities. As such, Augmented Reality requirements collected in VENTURI use cases (e.g.: sensors synchronization) have been fed back to the standardization body.
	metaio	metaio is the leader of this work package. metaio designed the VENTURI logo and the project flyer, participated in the press re-

		lease template, created various input to the website (photos, dissemination description, videos showing the UCY1 demonstrator…). In terms of dissemination, metaio participated at the ISMAR 2011 tracking competition in Basel (Switzerland), presented a joint demo with the VENTURI partners ST-Ericsson at the Mobile World Congress 2012, participated to the Sixth AR standards meeting in Geneva, organized the VENTURI demo stand and presented the VENTURI booth at insideAR 2012. One journal paper is about to be published at Computer and Graphics 2012 and one conference long paper was submitted and accepted at ISMAR 2012. The deliveries D7.2.1, D7.2.2 and D7.4.1 contain more details on the different dissemination, exploitation strategy and the contribution to standards done during the first year of the project.
	STE	STE participated in Deliverable D7.4.1 by attending several standardization bodies related to mobile platforms, especially Khronos APIs. In relation to task T7.2: *Dissemination and Communication strategies*, STE participated to the AR Standards Community group (sixth meeting held in July 2012 in Geneva) and presented, on behalf of VENTURI, the AR requirements elicited from Use-Case driven development (public deliverable D2.1.1). STE contributed to the VENTURI white paper and was also present during InsideAR, where a booth showed the UCY1 demo. Together with metaio, eDiam and Sony Mobile, STE showcased the demo to visitors.
	e-Diam	• Talked about VENTURI in the "Future technologies applied to education" in Tarragona Congress organized by Espiral.
	Sony	• In relation to task 7.2: Dissemination and Communication strategies, Sony presented the project during two public presentations. • Demonstrated the UCY1 demo at InsideAR 2012 together with the other partners.
	INRIA	• Contacts with MWC organizers in Barcelona about organizing a test-bed for indoor localization • Participation to the AR standards community group and monitoring of the W3C audio working group • Conference presentation given in Paris at the 6th European eAccessibility Forum on navigation for visually impaired people • Conference presentation given at SoTM12 in Tokyo about indoor localization using OpenStreetMap

Milestones

Milestone	Planned date	Actual date	Comments
MS1: First delivery of STE Current Platform and junaio based platform baseline	31/03/2012	20/12/2011	This Milestone has been achieved by the successful delivery of D2.4.1, which included: o The physical platform provided by STE o The initial SW baseline and associated tools and documentation, provided by STE o The Initial junaio framework, provided by metaio o The successful integration of the junaio framework on the STE platform (HW and SW), performed by ST
MS2: First server-side API and architecture	31/07/2012	02/08/2012	This Milestone has been achieved through: • the successful delivery of D2.6.1. • a SOLR integration in the junaio server to speed up the POIs full text search • the usage of Amazon Route 53 was tested for faster requests responses (Geo DNS) • Amazon Auto Scaling service was tested to automatically start new servers or stop running servers when needed • local Geo-localization was tested to reduce the response time of the servers • a better caching was tested in the server to reduce the communications between the database and the servers.
MS9: First version of chain for geo-localization orientation estimation, based on non-audio non-video	30/09/2012	30/09/2012	This Milestone has been achieved by implementing a localization framework based on the joint use of an indoor-outdoor-navigation network and MEMS sensors. Accelerometers are used to compute the distance and gyroscopes are used to compute the orientation. Drift is removed using some innovative heuristics and map-matching. Algorithms were fully tested in public buildings and railways stations (Demonstrator videos viewable on YouTube: http://youtu.be/F8kE3KTYbhg , and, http://youtu.be/nKG72yT8Dhw)

MS12: Preliminary Requirements for Adaptive Content Harvesting, Creation and Delivery for WP2	30/06/2012	30/06/2012	The preliminary requirements imposed by WP5 activities with respect to the VENTURI mobile platform have been discussed among partners since the project start. They are reflected by and in accordance with report D2.1.1 and D4.2 delivered in M3 and M9, respectively.
MS14: Definition of platform profiling tools and metrics and VENTURI platform V1	30/09/2012	30/09/2012	Platform profiling tool, techniques and metrics have been extensively documented in deliverable D6.1 “Report on the performance of platform profiling tools and techniques” May 28th 2012. Venturi platform V1 use cases have been implemented in deliverable D6.3 “Use case(s) implemented on VENTURI integrated platform V1” submitted on Oct 1st 2012.
MS17: Website available	30/03/2012	30/03/2012	In addition to the setting up of a public dissemination website, a collaboration web site for internal usage only has also been setup in M3. This is used by partners to host: documentation, Subversion source code versioning tool and database, tracker system for bug-tracking and change requests, Wiki pages for intermediate living documents and, finally, internal software releases.
MS18: Dissemination and exploitation strategy defined	30/03/2012	30/03/2012	This Milestone has been achieved by the successful delivery of D7.2.1.

Deliverables

Deliverable Code	Deliverable Name	Actual delivery date	Due delivery date	Comments
D2.4.1	STE U8500-based Platform baseline delivery, integrating existing AR framework	23/12/2012	31/12/2012	Submitted
D2.1.1	Use cases, application definition and system requirements for STE U8500-based platform	22/12/2012	31/12/2012	Submitted
D1.1	Risk Identification and Management & Quality plan	29/02/2012	29/02/2012	Submitted
D7.2.1	Dissemination and exploitation strategy	30/03/2012	31/03/2012	Submitted
D2.2.1	Early Detailed Design Specifications for STE U8500-based platform	04/04/2012	31/03/2012	Submitted
D4.1	Synchronized dataset containing a dump of all on-board sensors of a real device, while being used in a real environment	30/03/2012	31/03/2012	Submitted
D7.1	Website	30/03/2012	31/03/2012	Completed and launched on time
D3.1	Report on user expectations and cross-modal interaction	-	Originally 31/03/2012 **Revised to 31/01/2013**	Rescheduled
D2.3.1	First implementation of junaio-based AR framework for STE U8500-based platform	01/06/2012	31/05/2012	Submitted
D6.1	Report on the performance of platform profiling tools and techniques	28/05/2012	31/05/2012	Submitted
D2.4.2	First STE U8500-based Platform baseline delivery, implementing D2.2.1 specifications	11/07/2012	30/06/2012	Submitted
D4.2	Report on expected platform re-	11/07/2012	30/06/2012	Submitted

	quirements of WP4 algorithms			
D2.6.1	First server side API and architecture	02/08/2012	31/07/2012	Submitted
D7.2.2	Dissemination and exploitation strategy	27/09/2012	30/09/2012	Submitted
D1.3.1	Periodic activity report Year 1	09/11/2012	30/09/2012	Submitted late due to the necessity to complete the first year before compiling the report
D6.3	Use case(s) implemented on VENTURI integrated platform V1	01/10/2012	30/09/2012	Submitted
D7.4.1	Contribution to standards Y1	02/10/2012	30/09/2012	Submitted

Deviations from Plan

Causes and Description	*Corrective actions*
Due to a timing inconsistency discovered during the kick off meeting concerning D3.1, its date was adjusted from M6 to M16. As D3.1 is tightly linked to T3.1 which concludes in M16 and in order to complete D3.1 we first need to gather user feedback from the UCY1 demo (M12) to better understand this issue, the deliverable should naturally follow a few months after M12. Hence M16 is the correct time for submission"	D3.1 is now due in M16

Other (e.g. changes to Partner Structure in the DoW)

Causes and Description	*Corrective actions*
ST-Ericsson (France) SAS has effectively transferred its application processor R&D activity and employees to STMicroelectronics from 2012, July 1st.	Due to this transfer, some of the ST-Ericsson (France) SAS people involved in the VENTURI project are now belonging to the French legal entity STMicroelectronics SA. Since the transferred team continues its VENTURI-related activities, a request has been formulated in order to add STMicroelectronics SA as a new Beneficiary and Partner of VENTURI. To simplify the description of the year-1 performed work, "STE" shall be read as "STE and STMicroelectronics SA starting from July 2012, 1st.
Sony Ericsson Mobile Communications AB changed ownership resulting in a change of name to Sony Mobile Communications AB as of February 2012.	Following the change in ownership of Sony Ericsson Mobile Communications AB and its affiliates, Sony Ericsson Mobile Communications AB has changed its name to **Sony Mobile Communications AB**. Subsequently the Ericsson name was removed from the trade name of the company and all its current affiliates. In terms of corporate information, the change in name has no impact on the existing company addresses, registration numbers and/or tax identification numbers. Further, rights against and obligations to Sony Ericsson Mobile Communications AB and/or any of its affiliates remains unaffected by the change in name.

3. Project Meetings

Held and foreseen in Project Programme

Title	Date	Place	Participants from project	Main conclusions
Kick-off meeting	*13-14 October 2011*	*Trento, Italy*	*All partners*	*Introducing all of the partners to one another, understanding mutual competences. General discussion about the project*
Face to Face project meeting	*26-27January 2012*	*Paris, France*	*All partners*	*General discussion about the project*
Face to Face project meeting	*30-31 May 2012*	*Valencia, Spain*	*All partners*	*General discussion about the project*

Held and foreseen, linked to reporting period but occurring after

Title	Date	Place	Participants from project	Main conclusions
Face to Face project meeting	*3-4 October 2012*	*Munich, Germany*	*All partners*	*General discussion about the project and planning for the review meeting*

Held and NOT foreseen in Project Programme

Title	Date	Place	Participants from project	Main conclusions
None	-	-	-	-

4. Dissemination and Promotional Activity

An overview of project publications, including scientific articles, conference papers, presentations, links to other project related components and databases, etc., can be found on the project website and in D7.2.2.

Conferences and Events attended/organized

The information below is an overview of the Events & Conferences taken place in the 1st year of VENTURI.

Date	*Event title and activity*	*People involved*
26.10.2011 – 29.10.2011	**ISMAR 2011** Presentation of 2 scientific papers at the main conference, 1 of the papers was in a parallel special interest workshop; participation and winner of the 2011 tracking contest 	**Presenter:** Selim Benhimane (metaio)
09.11.2011	**Telematics Munich 2011** Introduction of the project in the context of a presentation about windshield AR in the car industry	**Presenter:** Troed Sångberg (Sony)
11.11.2011	**EBE 2011** Introduction of VENTURI in the context of a presentation on visor AR technology	**Presenter:** Troed Sångberg (Sony)
27.02.2012 – 01.03.2012	**Mobile World Congress 2012** Presentation of 3D marker-less tracking technology using a preliminary version of the VeDi-1 at the ST-Ericsson public and private booths	**Organizers:** ST-Ericsson **Presenters:** ST-Ericsson, metaio
26.03.2012	**6th European eAccessibility Forum**	**Presenter:**

	Presentation on next generation accessible pedestrian navigation system as envisioned for UCY2 demonstrator	Jacques Lemordant (INRIA)
28.04.2012	**Jornada Aumentame Congress 2012** Introduction of VENTURI in a talk on AR technologies in educational use cases 	**Presenter:** Javier Campos (eDiam)
22.05.2012	**Convegno GIRPR 2012** Presentation of the VENTURI project and the work on AR at FBK 	**Presenter:** Paul Chippendale (FBK)
22.07.2012 – 27.07.2012	**32nd IEEE International Geoscience and Remote Sensing Symposium (IGARSS2012)** Presentation of two research papers related to VENTURI WP4 vision related research	**Presenters:** Mauro Dalla Mura (FBK) Michele Zanin (FBK)

		
23.07.2012 – 24.07.2012	**Sixth AR Standards Community Meeting** Presentation of the VENTURI project and contribution of a project outcome into the standardization process 	**Presenter:** Olivier Pothier (ST-France) **Further attendees:** Selim Benhimane (metaio) Benjamin Prestele (Fraunhofer)
06.09.2012 – 08.09.2012	**State Of The Map 2012** Presentation of a preliminary version of the Pedestrian Dead Reckoning system based on indoor localization system to be used in UCY2	**Presenter:** Jacques Lemordant (INRIA)
28.09.2012	**2012 IEEE Workshop on Environmental, Energy, and Structural Monitoring Systems** Presentation of a scientific paper on visual-inertial tracking in the context of project-related AR applications	**Presenter:** Michele Zanin (FBK)
1-2 October 2012	**insideAR 2012** Presenting the UCY1 demo running on the VeDi-1 platform on a dedicated stand during a 2 day conference	**Organisers:** Selim Ben Himane (metaio) **Presenters:** Klas Hermodsson (Sony Mo-

		bile) Olivier Pothier (ST-France) Selim Ben Himane (metaio) Norbert Stöffler (metaio) Paul Chippendale (FBK)

Articles Published, Press coverage, web sites

Type, Date and Location	*Details*
Conference **28 September 2012** **Perugia, Italy**	Lorenzo Porzi, Elisa Ricci, Thomas A.Ciarfuglia, Michele Zanin *Visual-inertial Tracking on Android for Augmented Reality Applications* IEEE Workshop on Environmental, Energy, and Structural Monitoring Systems – EESMS 2012
Conference **22-27 July 2012** **Munich, Germany**	Mauro Dalla Mura, Michele Zanin, Claudio Andreatta, Paul Chippendale *Augmented Reality: Fusing the Real and Synthetic Worlds* IEEE International Geoscience and Remote Sensing Symposium – IGARSS 2012, pp. 170-173
Conference **22-27 July 2012** **Munich, Germany**	Michele Zanin, Claudio Andreatta, Paul Chippendale, Mauro Dalla Mura, Fabio Remondino *Feature Preserving Method for Creating Visual Appearance Models and Virtual Views from Collective Images* IEEE International Geoscience and Remote Sensing Symposium – IGARSS 2012, pp. 56-59
Book **2012**	Daniel Kurz, Selim Benhimane *Handheld augmented reality involving gravity measurements* Computer & Graphics, 2012 [doi]
Press release **24 February 2012**	metaio GmbH *metaio Introduces Augmented City Platform at Mobile World Congress* http://www.metaio.com/press/press-release/2012/metaio-introduces-

	augmented-city-platform-at-mobile-world-congress/
Press release **08 December 2011**	STMicroelectronics and ST-Ericsson *ST-Ericsson and STMicroelectronics Working to Make Augmented Reality Part of Daily Life* http://www.st.com/internet/com/press_release/t3245.jsp in English, http://www.st.com/internet/com/press_release/t3245_fra.jsp in French, http://www.st.com/internet/com/press_release/t3245_ita.jsp in Italian
Press coverage **11 November 2011**	l'Adige newspaper *Dai laboratory Fbk la realtà virtuale* issued on November 11th, 2011, page 29
Press coverage **11 November 2011**	Galileo - Giornale di Scienza *Scienza made in Italy (or by italians)* http://www.galileonet.it/blog_posts/4ebd259272b7ab63b5000014
Press coverage **10 November 2011**	Corriere dell'Alto Adige / Corriere del Trentino newspapers *Vedere il passato con gli occhiali 3D* issued on November 10th
Press coverage **09 November 2011**	Alpha Galileo Foundation *REALTA' AUMENTATA: decolla il progetto scientifico europeo VENTURI coordinato dalla FBK di Trento* http://www.alphagalileo.org/ViewItem.aspx?ItemId=114395&CultureCode=it
Press release **09 November 2011**	Fondazione Bruno Kessler *VENTURI Kicks Off the European Scientific Project on Augmented Reality* https://venturi.fbk.eu/documents/2011/11/first-press-release-in-english.pdf

5. Key Staff

Partner	*Key Staff*
Fondazione Bruno Kessler (FBK)	Paul Chippendale Michele Zanin Claudio Andreatta
Fraunhofer Heinrich-Hertz-Institute (Fraunhofer)	Peter Eisert Benjamin Prestele Daniel Buhrig
ST-Microelectronics (ST-Italy)	Olivier Pothier David Siorpaes Viviana D'Alto
Metaio	Selim BenHimane Norbert Stöffler
ST-Ericsson (STE)	Bernard Puel
e-Diam Sistemas (e-Diam)	Javier Campos
Sony Mobile Communications (Sony)	Klas Hermodsson Günter Alce Håkan Jonsson
Institut National de Recherche en Informatique et en Automatique (INRIA)	Jacques Lemordant