SEVENTH FRAMEWORK PROGRAMME

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b) End-to-end Immersive and Interactive Media Technologies

Specific Targeted Research Project

VENTURI

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immersiVe ENhancemenT of User-woRld Interactions

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Abstract:	This document is deliverable D.2.1.1 and presents the use-cases, application definition and system requirements for the VENTURI 1st generation demonstrator, based on STE Mobile Platform U8500.
Keywords:	VENTURI demonstrator, use-cases, system requirements, demonstrator, augmented reality, gaming, single player, multiplayer.
References:	Refer to the corresponding section at the end of the deliverable.

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D.0.1	13/12/2011	Viviana D'Alto	First draft.

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Acronyms

AR	Augmented Reality
HF	Hardware Functional (requirements)
HW	Hardware
MP	Multi Player
POI	Point of Interest
SF	Software Functional (requirements)
SNF	Software Non Functional (requirements)
SP	Single Player
SW	Software
UI	User Interface
VeDI	VENTURI enabled device

Executive Summary

Scope

This document describes the use-cases supported by the VENTURI first generation demonstrator, VeDi-1, and the related system requirements.

Audience

This deliverable is public.

Summary

In this report, the use-cases of the VENTURI first generation demonstrator, VeDi-1, will be extensively described in relation to user context, functionalities, and related hardware and software requirements.

Structure

This deliverable is structured in four Sections. Section-1 introduces the main topics described in the document. Section-2 includes tables, explaining the use-cases supported by the VeDi-1 demonstrator, considering user context and related functionalities. Section-3 describes the system requirements to address the use-cases previously introduced. Conclusions are drawn at the end of the document at Section-4.

1. Introduction

VENTURI aims to create a rich and immersive mixed-reality experience - a natural interface with the environment, whilst providing a solution-oriented approach to the e-sensing philosophy, gathering as much information about a person's context as possible from collocated sensors and monitored geo-social activities in the mobile context.

To provide a clearer picture of the envisioned capabilities of the final VENTURI system, and to give some solid means of system validation, the project will provide incremental demonstrators of the VENTURI enabled device (**VeDi**), based on different mobile platforms, covering various real-life situations, i.e. multi-player games, personal assistance and tourism.

The first demonstrator (VeDi-1) will focus on the integration of technology coming from the different partners, where Augmented Reality (AR) software will be installed on a new generation mobile development platform, and where context awareness is limited to the precise real-time localization of the mobile device in space (i.e. the position and orientation of the user's mobile device in a limited indoor working volume around the game platform). In this context, the lighting conditions are better controlled compared to an outdoor scenario, the working volume is in one room limited to the game platform surroundings, and the geometry of the environment is under the control of the user.

The second demonstrator (VeDI-2) will showcase a larger scale environment use-case with increased context-awareness, where the user is assisted in his task of finding products she/he wishes to purchase in a shop. The (sighted or visually impaired) user will be spatially guided from one product to the next. Here, the system helps the user using vision and audio throughout the indoor navigation task. The lighting condition are still quite controlled, but the environment is varying as other people could be shopping at the same time and products are often moved (or possible absent) around the shelves.

The third demonstrator (VeDi-3) will showcase an outdoor environment in a tourism scenario. Here the context awareness is incontrovertible, and the system robustness with respect to the environment changes, as well as

the light changes, are crucial. The final hardware (the platform and the different integrated sensors) and software integration coherence is key for the success of such a demonstrator.

This document (D.2.1.1) will describe the use-cases supported by the 1st VENTURI enabled device demonstrator, VeDi-1, based on the STE mobile platform U8500, providing specific information on user context, hardware requirements, software infrastructure needs, and application specific support to enable the targeted functionalities in the best way possible. The detailed specifications of the VENTURI system supporting the VeDi-1 demonstrator will be provided in document D.2.1.2., and the VeDi-1 demonstrator itself will be available in Month-12 of the project.

The use-cases and system requirements for following VeDi-2 and VeDi-3 demonstrators will be described in Deliverable D.2.1.2, whilst the detailed specs of the related platform will be provided in document D.2.2.2.

Technical discussions and interaction amongst the project Partners will lead to a better insight into system characteristics, capabilities and future evolutions. For this reason, although documents D.2.1.1 and D.2.1.2 are aimed at providing a description of the targetted use-cases supported by each demonstrator, there will be the possibility to re-assess the supported use-cases by VeDi demonstrators throughout the duration of the project, without dismissing the VENTURI primary target.

2. VeDi-1 Demonstrator: Use Cases Description

The 1st VeDi demonstrator, VeDi-1, will focus primarily on the **Gaming Use-case**, enabling the User to play a game with AR functionalities providing a greater sense of immersion in the game itself using a mobile platform.

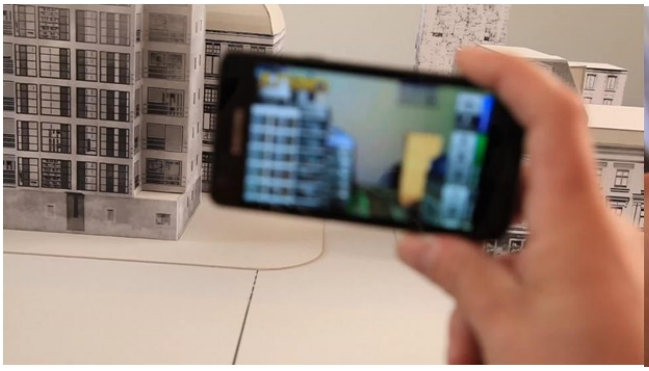
The User can play alone or can challenging other players: two gaming modalities will then be demonstrated, i.e. Single Player (SP) or Multi-Player (MP) mode.

To provide a more stable environment, VeDi-1 will operate indoors. The game will be presented in a table-top manner and the theme will be a 'Treasure Hunt'. The User(s) will move around the spatially constrained gaming area and interact with the virtual-model, overlaid onto a real-model present in the scene through their VENTURI device. The environment surrounding the game area will be stable (i.e. the environment will not change significantly), and the model will be 3D.

The table-top game area could be presented on a non-planar 3D structure (e.g. a miniature city) and/or a planar surface (e.g. a standard planar city map).

To support the above features, the 1st VeDi demonstrator will support real-time visual marker-less tracking on 3D pre-learned real-world modules and/or real planar surfaces, using the VENTURI mobile platform supported by inertial sensors and a single camera.

In VeDi-1 context awareness will not be implemented however, it will feature in later demonstrator generations.



The gaming experience will also be enriched with sounds and/or text messages to act as clues (e.g. to find hidden item). Also, the player(s) will have the ability to place new multimedia objects in pre-defined discrete and sparse positions (from pre-loaded text, video, audio, graphics objects) within the scene, to create personalised contributions to the game itself.

The model and/or a game score will be updated based on the interaction of the user(s) with the game. The Server will keep track of multiple participants scores/results and contributions by the various players.

In the following table, a detailed description [1] is provided for the two modalities relating to the Gaming Use-case supported by VeDi-1, i.e. single player and multi-player modes. For a better connection between the user experience and the functionalities provided by VeDi-1, a schematic description is also presented.

Section 3 includes a detailed description of all of the system requirements inferred by the VeDi-1 Use Cases analysis.

To link each use case description with the related system requirements, the following tables contain a column with the reference requirements fundamental to cover the described function. Since some requirements (such as HF4, HF5, HF8, HF9, HF10, HF11, HF12, SF1, SF6, SF7, all SNF) cover all of the use-cases functionalities, to avoid replications and for better readability, only the most relevant system requirements are reported in the specific column.

VEDI-1 GAMING USE CASE - SINGLE PLAYER (SP) MODE					
SUCCESS END CONDITION	• The Game Organizer is able to personalize the game according to the possibilities provided by the Game Designer. • The Player can interact with the virtual model, rendered on top of the real scene viewed by the camera. • The Player can see virtual surrounding's content, and receive relevant information that helps him to be lead through the game play. • The game score is updated based on the results of the game. • User attention duration span can be used to asses a level of game engagement and enjoyment for evaluation.				
FAILED END CONDITION	• The Game Organizer is not able to personalize the Game. • The Player cannot view augmented content due to failing registration/tracking. • The virtual model/game score is not updated. • The virtual model/game score is not updated with data added by game participants.				
USER CONTEXT	**TRIGGER**	**RESULT**	**STEP NR**	**FUNCTIONAL DESCRIPTION**	**SYST. REQ**
It is Sara's birthday. Her parents want to organize a live AR "Treasure Hunt" game. For this purpose they place some riddles and clues to guide Sara to find the treasure.	The Game Organizer launches the application to personalize the game.	The Game is personalized.	1.1	The Game Organizer launches the VeDi application and chooses the single-player game mode of the Treasure Hunt.	SF5-6
			1.2	A previously recorded 3D feature map is loaded from the server via an internet connection, if not already stored on the device. The feature map covers an area in the range of 1 m^3. The lighting conditions indoors are stable (i.e. not multi-illuminant sources).	HF2, SF2
			1.3	The Application allows the Game Organizer to link to specific points of the scene's multimedia objects, i.e. text messages, audio, video, or graphics objects, to personalize the game. Graphics objects can be pre-loaded into the VeDi device to be added by the Gamer Organizer in the scene. Audio can be integrated as POIs source. An XML file will reference audio files associated to events. The Game Organizer will create off-line an xml audio file with an authoring tool running on a PC.	HF4, HF5, HF7

VEDI-1 GAMING USE CASE - SINGLE PLAYER (SP) MODE (cont'd)					
USER CONTEXT	**TRIGGER**	**RESULT**	**STEP NR**	**FUNCTIONAL DESCRIPTION**	**SYST. REQ**
On the day of her birthday, Sara gets her VeDi device and opens up the "Treasure Hunt" application in the gaming area.	The User launches the application to start the game.	The User starts the game.	2.1	The User launches the VeDi application and chooses the single-player game mode of 'Treasure Hunt'.	SF5-6
			2.2	A previously recorded 3D feature map is loaded from the server via an internet connection, if not already stored on the device. The feature map covers a (relatively stable) region of interest of limited volume (in the range of 1 m^3). The lighting conditions indoors are good, simple (i.e. not multi-illuminant sources), static and stable.	HF2, HF7, SF2
			2.3	The application starts the capturing of live video and begins tracking the relative camera position/orientation based on the 3D feature map, with a tracking precision accuracy of 1cm at 1m distance.	HF1, HF3, SF8, SF9
Sara looks at the display of her VeDi device and she's able to spot on the game map several objects related to the Treasure Hunt, revealing the various hints on the path to the treasure.	The User views AR objects in the game area.	The User is able to interact with AR contents.	3.1	At initial registration, the virtual content is accurately overlaid onto the real scene. Overlay will be continuously updated according to the specific camera pose as the User moves around the game space.	HF3, HF6, SF4, SF8, SF9, SNF4
			3.2	The User now looks for clues by interacting with the augmented model. Clues may be provided as POI (Point of Interest) or are hidden in the mixed-reality model. For example, the player might watch a video (or listen to audio content) and solve a riddle. The User interacts with the virtual model e.g. by : • touching the screen of the device to select a POI for closer inspection, to pick up a virtual item or to interact with it; • receiving information when triggered by a POI as soon as it is first registered by the device; • having the mobile device following a certain 3D path. For demonstration and benchmarking purposes, it will be possible to optionally enable a debug mode, where the run time algorithmic parameters will be displayed to the user as well as the key features extracted by the computer vision processing.	HF1, HF3, HF4, HF7, SF3, SF8, SF9

VEDI-1 GAMING USE CASE - SINGLE PLAYER (SP) MODE (cont'd)					
USER CONTEXT	**TRIGGER**	**RESULT**	**STEP NR**	**FUNCTIONAL DESCRIPTION**	**SYST. REQ.**
Sara is able to pass the various levels of the game. She accumulates points.	The User is able to finish a game level.	The score is updated.	4.1	A game score is locally updated counting the virtual items the user collected.	HF10, HF11
			4.2	The server application can update the overall gaming score on the cloud.	HF2
After having found all of the clues, Sara finally gets to the hidden treasure place. She discovers the present she will receive from her parents (through a video or text message). Meanwhile, she can hear an audio message, recorded by her parents.	The User finds the treasure.	The game ends.	5.1	When the User is close to the treasure, it is displayed on the device and she touches the screen of her VeDi to get it.	HF1, HF3, HF4, HF6, SF3, SF4,SF8, SF9
			5.2	Some multimedia content (video, audio, text), inserted by her parents in advance and associated to the treasure, is shown to the user in response to this touch.	HF5, HF6, HF7, SF3
			5.3	The game ends.	SF5

VEDI-1 GAMING USE CASE – MULTIPLAYER (MP) MODE					
SUCCESS END CONDITION	• Each User can interact with the virtual model rendered on top of the real scene shot by the camera. • Each User can see virtual content and receive relevant text/audio information that helps him/her to play the game. • Each Player is able to introduce their own multimedia content (in line with what is permitted in the game). • The server keeps track of the various Players' contributions, or, the server synchronizes with the various Players' contributions at the end of each game level, and the game is able to evolve accordingly. • Each Player is able to access information placed by the other Players. • The game score is updated based on the results of the game. • In multi-player mode, the virtual model is either updated based on the interactions of other Users with the same model or at least a common game score is shared.				
FAILED END CONDITION	• At least one Player cannot view augmented content due to failing registration / tracking; • The virtual model / game score is not updated due to failing of the connection. • The virtual model / game score is not updated with data inserted by the various players. • The server fails updating game data with all the information provided by the various Players. • Players cannot insert additional content as foreseen in the game.				
USER CONTEXT	**TRIGGER**	**RESULT**	**STEP NR**	**FUNCTIONAL DESCRIPTION**	**SYST. REQ**
Game organization (see SP1.1-1.3)	See SP	See SP	SP1.1 -1.3	See SP1.1-1.3	See SP1.1-1.3
Marc wants to challenge his friends to a game of "Treasure Hunt". They decide to form two different teams, trying to delay each other in finding the treasure.	The User selects the Players in the surrounding area.	Info on friends in the surroundings (position, orientation, etc.) is presented to each Player. Team members can be selected and teams formed.	1.1	Each Player launches the application on his own VeDi-1 device and selects the multiplayer game mode. All Players enter in a specific "game room".	SF5-6
			1.2	Each User selects the multiplayer mode. Users can choose their teams (at least two) and play with each other.	HF2
			1.3	A previously recorded 3D feature map is loaded from the server via an internet connection, if not previously stored on each device. The feature map covers a relatively stable region of interest. The lighting conditions indoors are good, and simple, static, stable.	HF2, HF7, SF2

VEDI-1 GAMING USE CASE - MULTIPLAYER (MP) MODE (cont'd)					
USER CONTEXT	**TRIGGER**	**RESULT**	**STEP NR**	**FUNCTIONAL DESCRIPTION**	**SYST. REQ.**
Marc and his friends look at their VeDi displays and they are able to spot on the game map several objects related to the Treasure Hunt, revealing the various hints on the path to the treasure.	Each Player views the AR objects in the area of the game.	Each Player is able to interact with AR contents.	2.1	At first registration, the virtual content is accurately overlaid onto the real scene. Overlay will be continuously updated according to the determined current camera pose as the user moves the device.	HF3, HF6, SF4, SF8, SF9, SNF4
			2.2	Each User now looks for clues by interacting with the virtual model. Clues may be provided as POI (Point of Interest) or are hidden in the virtual model in another way. For example, the Player might need to watch a video (or listen to audio content) and solve a riddle. Users interact with the virtual model as described in the Single Player Mode use case.	HF1, HF3, HF4, HF7, SF3, SF8, SF9
The two teams start playing, inserting some obstacles/hints for the other Players.	Players put content to be accessed by other Players.	Content placed by the Players is updated to the virtual model, during, or, at the end of each game level.	3.1	The application proposes each player various options to insert multimedia content into specific positions. Predefined multimedia objects can be pre-loaded into the VeDi device to be added by each player in the scene, in predefined positions and in limited number.	HF4
			3.2	The virtual model is either updated based on the interactions of other users with the same model (e.g. a virtual item can only be found once), and with the multimedia elements added by the users.	HF2

VEDI-1 GAMING USE CASE – MULTIPLAYER (MP) MODE (cont'd)					
USER CONTEXT	**TRIGGER**	**RESULT**	**STEP NR**	**FUNCTIONAL DESCRIPTION**	**SYST. REQ.**
The teams find virtual items and accumulate points.	One team is able to finish a game level	The score is updated	4.1	A game score is locally updated counting the virtual items collected by the users of each team, a common game score is shared. In the background, the server application updates the overall gaming score to the cloud	HF2, HF10, HF11
			4.2	The team with the highest score passes the level.	
After an hour of playing the game and finding clues, finally Team-2 reaches the treasure and the game ends.	Team-2 finds the treasure	The game ends.	5.1	When the second team is near to the treasure, the application loads the riddle left by the first team and presents it to the second team.	HF1, HF2, HF3, HF5, HF6, SF8, SF9
			5.2	One player from the second team gives the right answer and gets the treasure	HF5, HF6, HF7
			5.3	The game ends, and Team 2 wins. The application terminates.	SF5

3. VeDi-1 Demonstrator: System Requirements

This section includes system requirements derived from the use-case definitions described above and are meant to be used as inputs for the "Early Detailed Design Specifications for STE U8500-based platform" deliverable D2.2.1.

Since requirements impact on hardware and software platforms, the following classification has been adopted:

- Hardware Functional requirement (HF): describes a feature or functionality that the hardware platform must support in order to fulfil a given use case.
- Software Functional requirement (SF): describes a feature, functionality or behaviour that the software stack must support or expose in order to fulfil a given use case.
- Software Non-Functional requirement (SNF): describes a specific global property that the software stack architecture or implementation shall fulfil. Typically, Software Non-Functional requirements have direct impact on overall system architecture and design specifications.

If not specifically written, software requirements refer to the software stack as a whole, ranging from low level sensor firmware up to the final application. Some software requirements (e.g.: power management) may also span equivalent hardware requirements.

For each requirement, the following information is provided:

- Requirement Unique ID: a symbol that uniquely identifies each requirement. It is used to link Use Cases and requirements without ambiguities and ease requirement tracking in design specification documents and final implementation.
- Name: synthetic name of the requirement.
- Description: concise description of the requirement itself. Might contain hardware or software figures.

3.1 Hardware Functional requirements

3.1.1 HF1: Camera

The hardware Platform must support a rear colour monocular-camera. Camera latency should be acceptable for a live view. The following camera parameters must, as a minimum, be supported:

- Resolution needed for the vision part: 640x480, gray-scale;
- Frequency needed for the vision part: 15fps;
- Resolution needed for the rendering part: colour images and ideally similar to the display resolution;
- Frequency needed for the rendering part: 30fps;
- Latency: max 180ms.

Moreover, image time-stamp generation is required, ideally by using the same clock as the one used for the inertial sensors, thus all data is synchronised.

3.1.2 HF2: Connectivity

The Platform must support cellular network connectivity and wireless LAN network connectivity. Supported bandwidth must be at least 4Mbps, with round trip time of 1000ms as a maximum.

3.1.3 HF3: Sensors
The Platform must support the following sensors: 3 axis accelerometer, 3 axis magnetometer, 3 axis gyroscope. Sensor sampling frequency should be higher than the camera frame rate. Sensors must provide at least 10-bit resolution samples and support range selection capabilities.

3.1.4 HF4: Input method
The Platform must support a touch panel based human interface input device.

3.1.5 HF5: Display
The Platform must support a display with at least the following characteristics:

- Size: 3.7”;
- Resolution: WVGA (480 x 854);
- Frame rate: 30fps;
- DPI: 270.

In addition, the platform should be able to support different screen form factors with no or little board modifications.

3.1.6 HF6: Graphics Hardware
The Platform must include a graphics chip capable of performing complex 3D graphics rendering with at least 15000 polygons/s, as a minimum, for all the objects in the scene.

3.1.7 HF7: Audio
The Platform must support stereo audio playback via external headsets. The PCM latency must not exceed 300ms and the DAC frequency must not be less than 44100Hz.

3.1.8 HF8: Power
The Platform must be able to sustain at least 1 hour of continuous operation, when battery operated. This is directly linked to SF7.

3.1.9 HF9: Autonomous mode
Beside development and debug mode, the platform shall be run in autonomous mode, that is battery operated, and no debug console (UART, JTAG, other).

3.1.10 HF10: RAM memory
The platform must be equipped with at least 4 Gbits Random Access Memory.

3.1.11 HF11: Storage memory
The platform must be equipped with at least 16 Gbits non-volatile memory.

3.1.12 HF12: Frequency
Host processor peak value frequency must me at least 1GHz.

3.2. Software Functional Requirements

3.2.1 SF1: User interface Adaptability
The System User Interface must be able to adapt to different screen sizes and form factors with limited or no modifications to the application.

3.2.2 SF2: Offline mode
The Terminal must be able to operate with no network connectivity, using cached data.

3.2.3 SF3: Computing resources access

All non-critical platform computational resources must be accessible to the application. For example by means of standard APIs such as: OpenGL|ES, OpenCL, Renderscript, OpenMAX. The resources which will finally be supported will be defined in Deliverable D2.2.1.

3.2.4 SF4: Sensors Access

The application must be able to access the platform's sensor resources provided by the hardware platform by means of the Operating System or other standard APIs. The operating system shall be capable of delivering sensor samples to the application with no impairment to the sampling rate offered by the sensor.

3.2.5 SF5: Start-up/Exit time

The application must meet average user expectations for start-up time: the application must start in less than 15 seconds, with notifications that progress is ongoing (e.g. UI with a clock or progress bar).
The application must close gracefully and release all platform resources used during its operation. A shut-down progress bar must be displayed at application closure.

3.2.6 SF6: Application Size

The application installer package should not be bigger than 20 MB. This includes all code and application resources (icons, background images, etc) but does not include any multimedia content.

3.2.7. SF7: Power Management

The application should be able to run without interruptions for at least one hour with no external power supply. This requirement is strictly related with HF8 and should be treated as a transversal hardware/software requirement.

3.2.8 SF8: Augmented Reality Video Pipe

The camera resolution needed for the rendering part: colour images are ideally similar to the display resolution.
The camera frequency needed for the rendering part: 30fps.
Time-stamps for the camera images (ideally using the same clock as the one used for the inertial sensors) must be supported.

3.2.9 SF9: Synchronization of AR Video Pipe and Rendering Pipe

The video pipeline should provide two synchronized image qualities: one grey-scale low-resolution for the vision part, and one colour high-resolution for the rendering part.

3.2.10 SF10: Replay Mode (Optional)

To guarantee platform benchmarking repeatability, a modality to record and playback events occurring during platform operation in a specific use-case mode is needed. This modality will be added only if time and resources permit.

3.3. Software Non-Functional requirements

3.3.1 SNF1: Portability

The application will run on Android OS. Nevertheless, applications shall be architected in such a way to easily port over to different mobile operating systems (i.e. C/C++ code that can be recompiled on different OS).

3.3.2. SNF2: Stability

The application shall not exhibit forced closes or hangs. The performance of other applications running on the platform shall not be impaired by the VENTURI stack.

3.3.3 SNF3: Extensibility

The application shall be extendible with new functionalities without requiring user's manual intervention.

3.3.4 SNF4: Restricted Access

The application shall enforce basic access control for privacy-sensitive content: personalized access or secure login capabilities.

3.3.5 SNF5: Observability

The VENTURI system shall be observable by means of software and/or hardware assisted profiling and tracing tools for performance and power consumption characterization.

3.3.6. SNF6: Scalability

The VENTURI system shall be able to scale well with respect to the number of users and the number of augmented reality content providers.

3.3.7 SNF7: Debug

The Software platform shall expose software ports for application and operating system debugging purposes, possibly using de-facto standard tools.

4. Conclusions

Mobile Augmented Reality (AR) is a relatively recent topic. The first academic and research results appeared at the end of the last decade and were limited to planar marker-based applications. Software developers were mostly working with existing hardware devices that were not thought to be used for AR applications.

The first VENTURI demonstrator, VeDi-1, will be one of the first results coming from the collaboration across hardware (HW) providers and software (SW) developers, where cutting edge technology in non-planar 3D marker-less environment tracking will be integrated onto a next generation mobile platform. It will lay the technological foundation for new AR applications to be developed within the VENTURI project, enabling the development of new features requiring a tight communication between the different sensors (camera, gyroscope, accelerometers) and the possibility of robustly tracking in real-time a 3D structure with a mobile device. The hardware will enable a better synchronization amongst the various sensor measurements, and will provide the software with appropriately formatted data (no need for software post-processing or data conversion).

For the VENTURI use-cases defined in this document, along with the associated platform requirements, both HW and SW will be instrumental to define the success of the project. The overall set of requirements span across typical HW related ones (such as user input modes, camera video input, graphic, sound, inertial sensors) to user mandated ones (such as input lag, quality of tracking for 3D objects on top of real scenes, multimodality of the interaction, user positioning faithfulness), and AR specific metrics for real/virtual concepts compared to current-

ly available state-of-the-art systems (such as faster inter-frame movements of the mobile device, more reactive vision-based re-localization, and better robustness with respect to environment/light changes). The objective is to have a device running a game where the virtual information is seamlessly integrated into the real environment. The combination of all the above mentioned elements constitutes a formidable challenge for mobile terminals, even in the presence of powerful number crunching accelerators such as GPUs, ISPs, blitters, etc., and increasingly more powerful multi-processors host subsystems.

A specific area where the availability of a well thought set of use-cases is key, lies in the integration of all SW layers required to deliver the complex functions needed; this spans across low-level firmware for device drivers, OS kernel, services and APIs'. Additionally, high level features and definitions for user-terminal interfacing percolates all the way down to the HW/SW interfaces, and determines the need for a co-design and tuning that, otherwise, would be generic at best without the guidance of a specific focus.

Nowadays, mobile phone manufactures are being pushed more and more to validate their products' performances and ranking them against a number of industry standard and de-facto benchmarks; these developments are highly affected by their compliance with features in high demand by their customer base, such as 3D gaming, flash player compatibility (to address gaming platforms associated to social network), etc.

Some of the available benchmarks in those domains are EEMBC browser bench, Vellamo, Quadrant, Sun-Spider, etc. Each one of these benchmarks is focusing on a specific set of functionality, often providing only a partial coverage for the features and requirements of an advanced augmented reality workload.

The partners of the VENTURI project hope that, eventually, the use-cases defined in this document might evolve toward a set of industry standard benchmarks whose aim is to allow vendors and OEMs to evaluate each platform in terms of a multi-objective metric, keeping into account the correct mix of HW, SW and user perceived Quality of Experience. This will ultimately unlock the deployment of new and exciting ways of interacting with the real-world for both leisure and serious socially conscious applications.

References

[1] "Writing Effective Use Cases", Alistair Cockburn, Addison-Wesley 2001

[2] "VENTURI Description of Work", 29.06.2011.