



**D4.4.2**

**ADDITIONAL PROTOTYPES AND  
COMPLEMENTED PLATFORM FOR USER TEST  
2ND ITERATION**

**August 2015**

**ABSTRACT**

This deliverable is a complement to D4.4 and D4.5. It reflects the added contributions, in the Pervasive Games application area, brought by the three new partners selected through the open call.

This document is a deliverable of the FI-CONTENT 2 integrated project supported by the European Commission under its FP7 research funding programme, and contributes to the FI-PPP (Future Internet Public Private Partnership) initiative.

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## **EXECUTIVE SUMMARY**

The “Pervasive Games Platform” consists of a number of Specific Enablers that are relevant for games on mobile devices with a focus on Augmented Reality applications and social interaction. This deliverable is a complement to D4.4 and D4.5. It reflects the added contributions brought by the three new partners selected through the open call:

- It includes a detailed specification of SLAMflex and ARTool SEs by DunavNET and the way how they are integrated within the platform, indicating the integration and test plan;
- It demonstrates the integration of takomat’s existing PHENOME 3D-character engine and the phenomobile Dialogue Manager to the animation system of UNITY3D for mobile devices;
- The release of the FA-TTS enabler from MIVOQ was added to the platform.

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## ABBREVIATIONS

<b>AR</b>	Augmented Reality
<b>CG</b>	Computer Graphics
<b>API</b>	Application Programming Interface
<b>SE</b>	Specific Enabler
<b>GE</b>	Generic Enabler
<b>FAQ</b>	Frequently Answered Questions
<b>XML3D</b>	Three Dimensional Extensible Markup Language
<b>POI</b>	Point of Interest
<b>GPU</b>	Graphics Processing Unit
<b>FI</b>	Future Internet
<b>FI-PPP</b>	Future Internet – Public Private Partnership
<b>GPS</b>	Global Positioning System
<b>SLAM</b>	Simultaneous Localization and Mapping

## 1 - INTRODUCTION

### 1.1 - Overview

While most of the contributions of the Open Call (OC) partners were already described in D4.5, two new SEs are being added and described in this document. This document provides an overview of all SEs from the OC partners and complements D4.4 and D4.5.

### 1.2 - Terminology

The following table contains terms, which are used in multiple deliverables. Therefore, we provide their shared definitions to ensure consistency across several documents.

Term	Definition
Application or Application software	Software layered on top of one or several platforms for realizing various useful tasks for end-users
Architecture	A structure of functional elements organized in a given way and presenting well defined interfaces
Capability	The ability of a component to satisfy a requirement
Conceptual Model	A set of view with written description of the organization of the FIcontent infrastructure to offer services
Enabler Software	Module or web service providing well-specified functionality, accessible and usable by application developers through clearly-described APIs (Application Programming Interfaces)
Experiment or Experimentation	Concrete test with actual users of one scenario in one of the experimentation sites in a given time frame
FI-WARE Tools	The tools put in place by FI-WARE to send requests for Generic Enablers are based on a backlog list in the frame of an agile methodology
Functional requirement	Either calculations, technical details, data manipulation, processing or other specific functionality that define what a system is intended to accomplish
Generic Enabler	An enabler realized by the FI-WARE project or its follow up sustainability project
Platform	A comprehensive combination of technology infrastructure and Generic Enablers as well as Specific Enablers capable to host and to support development of application software
Point of Interest	A POI is a place, an area or a journey (short distance) which are geo-located. For example: a place (a restaurant, etc.), an area: a public garden, a journey (a hiking trail, etc.). A POI has possibly features such as : static features (opening hours, address, name description, etc.), dynamic features (price, menu, number of available places, the delay before the next bus, etc.), event features (a beginning and an end)
Scenario	Description of foreseeable interactions of users with one or several applications
Specific Enabler	An enabler realized by the FIcontent project. Specific Enablers may be layered on top of, or otherwise make use of, Generic Enablers. Please refer to the definition of a FIcontent Specific Enabler from deliverable D6.1 Architecture specification [3]
Interface	The connections between domains (or sub domain or functional elements) serving the actor's actions by exchanging information

Interoperability	The capability of two or more networks, devices, applications to exchange and use information
Technology	A standard or industry specification that has the capability of addressing requirements

## 2 - PERVASIVE GAMES PLATFORM – OC PARTNER RELEASE

This release is about the enablers of the open-call partners. Two new enablers, the phenomobile Dialog Manager and the phenomobile Character Manager are described. Three other enablers (ARTool, SLAMflex and FA-TTS) were already reported in D4.5 but are described again in this document to provide a full description of the OC enablers in one place.

### 2.1 - phenomobile Dialog Manager [NEW]

#### 2.1.1 - What you get

The phenomobile Dialog Manager allows the simple and fast creation of text dialogues in story-based games. The dialogue manager handles all of the dialogues of all game characters in every game scene. It displays the dialogues as 2D-speech bubbles and provides control buttons for the player to advance the dialogues. The dialogue manager comes with a complete trigger system for game events to manage the dialogue sequences in a game scene based on game events or based on the predefined dialogue sequence.

The Phenomobile Dialogue Manager is written in C# and available as a class system with API in UNITY3D.

#### 2.1.2 - Why to get it

The Dialog Manager allows you to easily import your dialogue sequences for each scene of your game made with UNITY3D. It controls the appearance of game characters in a scene, their emotional state when saying a text line and displays the speech bubble with dynamic text as you have predefined it in your dialogue sequence.

#### 2.1.3 - Documentation

- Specification and API: <http://wiki.mediafi.org/doku.php/ficontent:gaming:enabler:phenomobiledialogmanager:start>
- Devguide: <http://wiki.mediafi.org/doku.php/ficontent:gaming:enabler:phenomobiledialogmanager:developerguide>
- Installguide: <http://wiki.mediafi.org/doku.php/ficontent:gaming:enabler:phenomobiledialogmanager:installguide>

The documentation and software will also be published on FIWARE Media & Content lab at the end of the project.

### 2.2 - phenomobile Character Manager [NEW]

#### 2.2.1 - What you get

The phenomobile Character Manager allows the simple and fast creation of 3D-character animation in mobile 3D-games made with UNITY 3D (tested on iPhones). It can be applied to both humanoid and non-human character rigs. The phenomobile Character Animation Engine handles all of the animations of all game characters. It displays the animations and provides a complete trigger system for game and simulation events, e.g. switching emotional states of a character or following an AI that generates animation commands for the Character Animation Engine.

The Phenomobile Character Manager is written in C# and available as a class system with API in UNITY3D.

#### 2.2.2 - Why to get it

The phenomobile Character Manager allows you to easily organize and display your 3D-character animation sequences. It controls the animation of game characters in a scene with a trigger system for game and simulation in UNITY3D.

#### 2.2.3 - Documentation

- Specification and API: <http://wiki.mediafi.org/doku.php/ficontent:gaming:enabler:phenomobilecharactermanager:start>
- Devguide: <http://wiki.mediafi.org/doku.php/ficontent:gaming:enabler:phenomobilecharactermanager:developerguide>
- Installguide: <http://wiki.mediafi.org/doku.php/ficontent:gaming:enabler:phenomobilecharactermanager:installguide>

The documentation and software will also be published on FIWARE Media & Content lab at the end of the project.

## 2.3 - ARTool

### 2.3.1 - What you get

ARTool SE is a tool that enables a simple and fast creation of AR applications for smart phones and PC requiring no programming knowledge. The tool has two main components:

- Software as a Service (SaaS) – Genie Creator
- Platform as a Service (PaaS) – Genie Deploy
- ARTool mobile application

Genie Creator enables a cross-platform development of smartphone and PC AR applications using a drag and drop with no programming knowledge required.

Genie Deploy is a cloud based backend module enabling building, implementation and storage of developed AR applications. It enables deployment of the complex AR engine in tasks such as image recognition, 3D model mapping as well as in defining the AR content initiated by a marker (based on location, compass, face, QR code or an image).

ARTool mobile application enables the execution of created applications. It is available for both iOS and Android platforms.

### 2.3.2 - Why to get it

ARTool platform is designed to enable an easy creation of AR applications using a user-friendly design platform (Genie Creator) as well as the deployment of these applications through the deployment platform (Genie Deploy). Genie Creator is basically a web application which enables an easy template based design and creation of AR applications using GUI. Templates define the AR application through use of configuration components such as:

- Number of screens
- Type of AR marker (GEO or image)
- Position and features of displayed AR content (e.g. interaction between 3D models)
- User interaction components (e.g. buttons, icons, image based interactive elements)
- Use of third party services (e.g. in-app payment, weather forecast, IoT platforms, social networks)
- Integration of sensor based services

The designed applications can be exported and used on iOS, Android, Windows and Mac platforms. Genie Creator platform is designed as SaaS where users can register and get an access to available functionalities based on the type of the monthly subscription. Developed application can be classified as either private or public through a generic Genie Deploy application and the corresponding Genie Deploy platform. Applications can also be classified as “stand-alone” and placed on a specific market. Such applications use the Genie Deploy platform directly. Genie Deploy platform enables deployment and running of AR application developed using the Genie Creator. Genie Deploy consists of two main components, namely Genie Deploy application and Genie Deploy PaaS. Genie Deploy application enables running and operation of designed AR applications on operating systems such as Android, iOS, Windows and Mac and represents a type of container of all user created applications. The user firstly runs a Genie Deploy application that provides an overview of all available AR applications based on user-defined filters. Once the desired AR application is selected, Genie Deploy application enables basic functionalities such as camera operation, view of AR content (2D, 3D, animated 3D, video, audio etc.), user interface, a communication with Genie PaaS infrastructure which offers support for access to additional content such as external AR markers, third party services, dynamic AR content, use of sensor networks etc. Innovative features and functionalities of ARTool SE can be summarised as:

- Using 3D models with support of Unity3D game engine that enables efficient manipulation of 3D models, animation, and their interaction. This aspect enables creation of AR applications, which use animated 3D models. Interaction between the 3D models provides the ability to create simple AR games.
- The use of “third-party” services such as weather forecasts, connecting with other IoT platforms as well as creating services through wireless sensor networks developed by the user and connected to the Genie PaaS.
- Interaction with social networks such as Facebook or Twitter in order to further promote the product or service
- Possibility of on-line shopping through created AR application
- Definition of a dynamic content through AR Genie Deploy platform using the suitable web application. This feature enables defining different AR content for the same marker which will be displayed depending on the location, type of user, date, time of day, etc.

### 2.3.3 - Documentation

The documentation related to ARTool SE can be found at the following links:

- Specification: <http://wiki.mediafi.org/doku.php/ficontent.gaming.enabler.artool>
- Api: [https://github.com/fi-content2-games-platform/FIcontent.Gaming.Enabler.ARTool/blob/master/api\\_guide.md](https://github.com/fi-content2-games-platform/FIcontent.Gaming.Enabler.ARTool/blob/master/api_guide.md)
- Devguide: <http://wiki.mediafi.org/doku.php/ficontent.gaming.enabler.artool.developerguide>
- Installguide: [https://github.com/fi-content2-games-platform/FIcontent.Gaming.Enabler.ARTool/blob/master/install\\_guide.md](https://github.com/fi-content2-games-platform/FIcontent.Gaming.Enabler.ARTool/blob/master/install_guide.md)

## 2.4 - SLAMflex

### 2.4.1 - What you get

The SLAMflex SE is provided as source code and implemented as Unity3D plug-in for Android and iOS platforms.

### 2.4.2 - Why to get it

SLAMflex provides detection and tracking of dominant planes for smartphone devices. This plane can then be used to show AR content relative to the plane orientation. SLAMflex is based on the PTAM algorithm but optimised to run more efficiently. It is based on the following Simultaneous Localisation and Mapping (SLAM) procedure as follows. First corner point detection in one key frame is performed. This is followed by the corner point detection in another key frame. From these corners, 3D points are calculated determining an initial dominant plane. Subsequently, plane tracking using SSD for linear motion is started and smartphone gyroscope is used for rotational movement tracking.

### 2.4.3 - Documentation

The documentation related to SLAMflex SE can be found at the following links:

- Specification: <http://wiki.mediafi.org/doku.php/ficontent.gaming.enabler.slamflex>
- Api: <http://fi-content2-games-platform.github.io/FIcontent.Gaming.Enabler.SLAMflex/doxygen/html/>
- Devguide: <http://fi-content2-games-platform.github.io/FIcontent.Gaming.Enabler.SLAMflex/doxygen/html/>
- Installguide: <https://github.com/fi-content2-games-platform/FIcontent.Gaming.Enabler.SLAMflex/tree/master/install-Unity3Dpackage>

## 2.5 - Flexible and Adaptive Text To Speech (FA-TTS)

### 2.5.1 - What you get

The Flexible and Adaptive Text To Speech (FA-TTS) SE is a Text To Speech server that enables simple and fast creation of synthetic speech based on a text input. The technology used allows the manipulation of various acoustic and linguistic parameters in order to obtain the synthetic voice that is most suitable for a specific situation. Pitch/rhythm modifications and a vocal tract scaler can be used to generate more expressive speech.

### 2.5.2 - Why to get it

The SE can be used to generate speech from text in an expressive and creative way. A typical use in the context of electronic games is to give voice to the characters of games.

### 2.5.3 - Documentation

- Specification: <http://wiki.mediafi.org/doku.php/ficontent.gaming.enabler.flexibleandadaptivetexttospeech>
- api: <http://lab.mediafi.org/swagger/api-view.html?json=http://fic2.github.io/swaggerfiles/flexibleandadaptivetexttospeech/swagger.json>
- devguide: <http://wiki.mediafi.org/doku.php/ficontent.gaming.enabler.flexibleandadaptivetexttospeech.developerguide>
- installguide: <http://wiki.mediafi.org/doku.php/ficontent.gaming.enabler.flexibleandadaptivetexttospeech.installguide>

### **3 - DEPLOYMENT OF THE PERVASIVE GAMES PLATFORM**

WP4 partners contributed to the creation of FIWARE Media & Content lab. The enablers were adapted, installation and testing scripts were developed and the documentation was changed to the dynamic and modular structure of FIWARE Media & Content lab.

The two last SEs, the phenomobile Dialog Manager and Phenomobile Character Manager, will be deployed at FIWARE Media & Content lab as Unity packages by the end of September 2015. The other SEs from the Open Call partners are already available on FIWARE Media & Content lab and partially also in the Unity asset store [2].

## 4 - CONCLUSION

This document shows the contributions of the Open Call partners. The detailed description of the associated SEs has been outlined together with the deployment within the pervasive games platform. The activities related to the integration within the platform have been influenced and complicated by the delayed start of the funding. However, the FA-TTS SE by Mivoq was successfully integrated in the existing treasure hunt application from ETHZ and DRZ, showing both the collaboration between partners and the ease of use of this enabler.

The ARTool SE uses the Complex Event processing and Orion Context Broker GEs, demonstrating integration with FIWARE. This enabler utilizes SLAMflex in order to provide functionality for the markerless tracking and associated AR applications. As both ARTool and SLAMflex are using Unity3D framework, potential integration with other Unity3D based SEs should be straightforward. This is still an on-going activity and potential integration with for example FA-TTS SE might be carried out which would be transparent to the end users of ARTool SEs. The addition of additional enabler within ARTool SE would be seen as additional functionality in terms of the features available within the AR templates.

takomat's software now mixes animated 3D or 2D characters with the synchronized display of dialogues as text in speech bubbles. They made emotional 3D-character animation possible on a smartphone with Unity3D. This goal was extended to 2D-characters, because the budgets of customers still demand for cost efficient game characters in story and simulation driven games.

Both technologies have been tested and are successfully applied in commercial projects:

- The phenomobile dialogue manager works in a German online game about civic participation.  
Link to the online game: <http://game.buergerbeteiligungsspiel.de>
- The phenomobile character manager engine is currently used in the alpha version of an aquaristic-biological simulation game  
Link to the Game trailer: <https://vimeo.com/takomatgmbh/aquasphere>

Because of the successful implementation and evaluation of the technology with end users, takomat decided to publish their technology on the FIWARE Media & Content lab. Two SEs will be provided at the end of the project and published on FIWARE Media & Content lab: the phenomobile Dialog Manager and the Phenomobile Character Manager.

## REFERENCES

- [1] <http://wiki.mediafi.org/>
- [2] <https://www.assetstore.unity3d.com/en/#!/publisher/13237/>