



FI content

D6.3.2

SPECIFIC ENABLERS - INTERMEDIATE RELEASE

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ABSTRACT

This document describes the second release of Enablers for the Future Internet Content project. This performs the launch of specific and common features among the platforms covering Social Connected TV, Smart City Guide and the Pervasive Games Platform. A diversity of client and cloud functionalities are released in addition to experimental monitoring and logging functionalities.



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

This document describes the second release of Enablers within Phase 2 of the Future Internet Content project, which delivers a core set of platforms building upon FI-WARE and XiFi capabilities as part of the FI-PPP programme. The Enablers detailed in this document have been identified with all consortium partners, technical partners and experimentation site owners. They are composed of technologies targeted at key strategic areas for broad uses of interactive entertainment, including social connected TV and virtual and augmented reality environments on the Future Internet.

The Enablers of the Social Connected TV Platform deliver advanced capabilities in audio fingerprinting & mining to enable new interactions with sound in media. Content optimization & content similarity enablers harmonise additional content from dispersed sources. Further, the second screen framework and TV application layer permit unprecedented levels of connectivity between TVs and a variety of devices. Smart City Guide services open up new possibilities in applications delivering new forms of content to users across wide areas of cities. This platform includes local information aggregation services, an open city database providing points of interest, recommendation services based on collaboration and meta-data. Moreover, the Smart City Platform enables end-users through the App Generator SE and the respective frontend (the *Design my App* portal) to create their own apps based on the platform's technology. Finally, the Pervasive Game Platform Specific Enablers is a mashup of augmented reality tracking and 3D internet with Internet of Things capabilities, including a series of Reality Mixer techniques covering seamless integration of audio, visual and physical digital content with the real-world. Further the game platform delivers support for developers to build connected applications, which need content synchronization and social connectivity.

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Table of contents

EXECUTIVE SUMMARY	4#
LIST OF AUTHORS.....	5#
ABBREVIATIONS.....	9#
1 - INTRODUCTION	10#
2 - ROADMAP OF THE SOCIAL CONNECTED TV PLATFORM SEs.....	12#

2.1 - Social Connected TV Platform - Release 06/14	12#
2.1.1 - <i>Audio Fingerprinting</i>	12#
2.1.1.1 - What you get	12#
2.1.1.2 - Why to get it	12#
2.1.1.3 - Documentation	13#
2.1.2 - <i>Audio Mining</i>	13#
2.1.2.1 - What you get	13#
2.1.2.2 - Why to get it	13#
2.1.2.3 - Documentation	13#
2.1.3 - <i>Content Optimisation</i>	13#
2.1.3.1 - What you get	13#
2.1.3.2 - Why to get it	14#
2.1.3.3 - Documentation	14#
2.1.4 - <i>Content Similarity [NEW]</i>	14#
2.1.4.1 - What you get	14#
2.1.4.2 - Why to get it	14#
2.1.4.3 - Documentation	14#
2.1.5 - <i>Second Screen Framework</i>	14#
2.1.5.1 - What you get	14#
2.1.5.2 - Why to get it	15#
2.1.5.3 - Documentation	15#
2.1.6 - <i>TV Application Layer</i>	15#
2.1.6.1 - What you get	15#
2.1.6.2 - Why to get it	15#
2.1.6.3 - Documentation	15#
2.2 - Social Connected TV Platform - Upcoming Releases	15#
2.2.1 - <i>Audio Fingerprinting SE</i>	15#
2.2.2 - <i>HbbTV App Toolkit SE</i>	15#
3 - ROADMAP OF THE SMART CITY PLATFORM SEs	17#
3.1 - Smart City Platform - Release 06/14	17#
3.1.1 - <i>App Generator [NEW]</i>	17#
3.1.1.1 - What you get	17#
3.1.1.2 - Why to get it	17#
3.1.1.3 - Documentation	17#
3.1.2 - <i>Recommendation as a Service [NEW]</i>	17#
3.1.2.1 - What you get	17#
3.1.2.2 - Why to get it	18#
3.1.2.3 - Documentation	18#
3.1.3 - <i>Open City Database</i>	18#
3.1.3.1 - What you get	18#

3.1.3.2 - Why to get it	18#
3.1.3.3 - Documentation	18#
3.2 - Smart City Platform - Upcoming Releases	18#
3.2.1 - <i>POI Explorer</i>	18#
3.2.2 - <i>OpenDataSoft (ODS-DP)</i>	18#
4 - ROADMAP OF THE PERSVASIVE GAMES PLATFORM SES	20#
4.1 - Pervasive Games Platform - Release 06/14.....	20#
4.1.1 - <i>Networked Virtual Character [NEW]</i>	20#
4.1.1.1 - What you get.....	20#
4.1.1.2 - Why to get it	20#
4.1.1.3 - Documentation.....	20#
4.1.2 - <i>Geospatial - POI Interface [NEW]</i>	21#
4.1.2.1 - What you get.....	21#
4.1.2.2 - Why to get it	21#
4.1.2.3 - Documentation.....	21#
4.1.3 - <i>Geospatial - POI Matchmaking [NEW]</i>	21#
4.1.3.1 - What you get.....	21#
4.1.3.2 - Why to get it	21#
4.1.3.3 - Documentation.....	21#
4.1.4 - <i>Reality Mixer - Reflection Mapping</i>	21#
4.1.4.1 - What you get.....	21#
4.1.4.2 - Why to get it	22#
4.1.4.3 - Documentation.....	22#
4.1.5 - <i>Reality Mixer - Camera Artifact Rendering</i>	22#
4.1.5.1 - What you get.....	22#
4.1.5.2 - Why to get it	22#
4.1.5.3 - Documentation.....	22#
4.1.6 - <i>Leaderboard</i>	22#
4.1.6.1 - What you get.....	22#
4.1.6.2 - Why to get it	23#
4.1.6.3 - Documentation.....	23#
4.1.7 - <i>Augmented Reality - Fast Feature Tracking</i>	23#
4.1.7.1 - What you get.....	23#
4.1.7.2 - Why to get it	23#
4.1.7.3 - Documentation.....	23#
4.1.8 - <i>Augmented Reality - Marker Tracking</i>	23#
4.1.8.1 - What you get.....	23#
4.1.8.2 - Why to get it	23#
4.1.8.3 - Documentation.....	24#
4.1.9 - <i>Game Synchronization</i>	24#

4.1.9.1 - What you get.....	24#
4.1.9.2 - Why to get it	24#
4.1.9.3 - Documentation.....	24#
4.2 - Pervasive Games Platform - Upcoming Releases	24#
4.2.1 - Reality Mixer - Augmented Audio.....	25#
4.2.2 - Augmented Reality - Image Marker Tracking	25#
4.2.3 - Reality Mixer - Simulation Continuum.....	25#
5 - ROADMAP OF THE COMMON SPECIFIC ENABLERS USED ACROSS PLATFORMS	26#
5.1 - FIcontent Common Enablers - Release 06/14.....	26#
5.1.1 - 3D-Map Tiles [NEW].....	26#
5.1.1.1 - What you get.....	26#
5.1.1.2 - Why to get it	26#
5.1.1.3 - Documentation.....	26#
5.1.2 - POI Storage [NEW]	26#
5.1.2.1 - What you get.....	26#
5.1.2.2 - Why to get it	26#
5.1.2.3 - Documentation.....	27#
5.1.3 - Social Network	27#
5.1.3.1 - What you get.....	27#
5.1.3.2 - Why to get it	27#
5.1.3.3 - Documentation.....	27#
5.1.4 - Content Sharing	27#
5.1.4.1 - What you get.....	27#
5.1.4.2 - Why to get it	27#
5.1.4.3 - Documentation.....	27#
5.1.5 - Content Enrichment.....	27#
5.1.5.1 - What you get.....	27#
5.1.5.2 - Why to get it	28#
5.1.5.3 - Documentation.....	28#
5.2 - FIcontent Common Enablers - Upcoming Releases	28#
6 - CONCLUSION.....	29#
REFERENCES	30#

ABBREVIATIONS

API: Application Programming Interface
CMS: Content Management System
CSV: Comma Separated Value
DB: Database
DP: Data Provider
GIS: Geographical Information System
HbbTV: Hybrid Broadcast Broadband TV
HTML: Hyper-Text Markup Language
SOAP: Simple Object Access Protocol
REST: Representational State Transfer
SEO: Search Engine Optimization
NLP: Natural Language Processing
SE: Specific Enabler
SME: Small to Medium Enterprise
GE: Generic Enabler
FI: Future Internet
ODS: Open Data Soft
POI: Point of Interest
UGC: User-Generated Content
SaaS: Software as a Service
RaaS: Recommendations as a Service
RTS: Real-Time Strategy
TAL: TV Application Layer
WebGL: Web Graphics Language
VoD: Video on Demand

1 - INTRODUCTION

The FIcontent platforms are a collection of tools and techniques, designed to enable the creation of applications on mobile and web-enabled devices. This technical portfolio takes advantage of established tools and frameworks, of specific technical contributions (FIcontent Enablers), and generic Future Internet technology (FI-WARE Generic Enablers).

This deliverable mainly consists of the second release of the Enablers for the FIcontent platforms, which is a further integrated delivery of a core set of platforms building upon FI-WARE and XiFi capabilities as part of the FI-PPP programme. Moreover, we provide this additional document with a brief description of the Specific Enablers (SEs) per platform as well as the common Specific Enablers used by multiple platforms. The Enablers detailed in this document have been identified with all consortium partners, technical partners and experimentations site owners. They are composed of technologies targeted at key strategic areas for broad uses of interactive entertainment, including social connected TV, smart city guide and virtual and augmented reality environments on the Future Internet.

The Enablers of the Social Connected TV Platform offer advanced capabilities to enhance connected TV services with the Audio Mining SE and Audio Fingerprinting SE (an upcoming open source release) to enable new interactions with sound in distributed media. The Content Optimization and Content Similarity SEs orchestrate additional content from disparate sources with recommendations according to interests, whereas the Second Screen Framework SE and TV Application Layer (TAL) SE unlock connectivity between TVs and a variety of devices, such as set top boxes, phones and tablets. Also, in a further release, the HbbTV App Toolkit SE provides a structured set of APIs for programme related interactive TV applications.

The Smart City Platform has a major update opening up new possibilities in applications delivering new forms of content to users across such wide areas as cities, Themeparks and expo parks. The Smart City Platform includes local information aggregation services, an Open City Database SE providing points of interest and Recommendation as a Service SE based on collaboration and meta data. The newly provided App Generator SE uniquely allows effortlessly bringing together Enablers in deployable mobile apps. Upcoming POI explorer and OpenDataSoft SEs further enhance the power of this platform with multiple tracking methods and diverse data sources.

Finally, the Pervasive Games Platform Specific Enablers is a carefully targeted collection of video game services providing augmented reality tracking and 3D internet with Internet of Things capabilities. Importantly, this platform includes a series of Reality Mixer techniques advancing the state of the art in seamless integration of audio, visual and physical digital content with the real-world. The game platform delivers support for developer to build connected applications including new Enablers for Networked Virtual Characters, Geospatial POI Interface, Geospatial POI Matchmaking and established ones, such as, Leaderboard, and Game Synchronization.

The common enablers among these platforms share their technology across use case scenarios of FIcontent. These include our new Enablers, 3D-Map Tiles and POI Storage. Of course our established common Enablers are now well maintained and maturing services. These are the Content Sharing, Content Enrichment and Social Network common Enablers.



Please be aware about the fact that this document is generated from the FIcontent Wiki [1]. Thus, the document may sometimes still refer to the FIcontent Wiki. All information in this document are also available online. We suggest to use the online version [2] for an advanced reading experience.

2 - ROADMAP OF THE SOCIAL CONNECTED TV PLATFORM SEs

2.1 - Social Connected TV Platform - Release 06/14

The Social Connected TV Platform is a toolbox that offers powerful instruments to enhance connected TV services with:

Multi-screen interaction

- Intuitive interaction for advanced TV services
- More versatile content presentation across screens

Personalized TV experience

- Connected TV services tailored to single and multiple users
- Social interaction between users
- Search and discovery of content

User tracking and privacy

- Visualizing personal content consumption
- Tracking implicit and explicit user interaction
- Providing users with simple control over personal data

The features of the Social Connected TV Platform SEs address developers as well as providers of connected TV services. The following Specific Enablers are included in the September release of the Social Connected TV Platform.

2.1.1 - Audio Fingerprinting

Important: The development of this Specific Enabler is discontinued following the recommendation of the Commission. It will be released as Open Source software in the next release of the Social Connected TV platform.

2.1.1.1 - What you get

The Audio Fingerprinting SE consists of an indexing component (adding/removing media to/from a fingerprint database) and a matching component (testing unknown fingerprints against a database). Furthermore, a mobile SDK/software library for Android and iOS is available, which can be linked into a mobile application. It takes care of recording the audio signal, calculating an acoustic fingerprint (while also encrypting the data), sending the fingerprint to a server and passing the results back to the application.

The algorithm works independently of the spoken language and is robust towards regular background noises and distortions. Synchronisation will work for compressed data and in lively living rooms. It was also successfully tested during presentations with larger crowds and over laptop speakers. Furthermore, the algorithm can be tuned to trade off speed against accuracy.

2.1.1.2 - Why to get it

The Specific Enabler 'Audio Fingerprinting' targets at second-screen scenarios like 'Multi-Screen Experience'. Therefore, the SE recommends matching content for second screen devices: It analyses an incoming audio signal (e. g. from a TV or a VoD stream), computes a fingerprint and checks that fingerprint against a database potentially containing the

analysed content data. Finally, the service returns matching content either as links to a repository or as the content itself. The service can be implemented into Android-based applications.

2.1.1.3 - Documentation

- Technical Documentation of the Audio Fingerprinting SE [3]

2.1.2 - Audio Mining

2.1.2.1 - What you get

The Audio Mining SE is based on Fraunhofer IAIS' Audio Mining software and consists of a number of analysis services (called iFinder services), a media asset management framework including a persistence layer, a search engine and a SOAP/REST interface. The component is a backend application, without having end-users interacting directly with the system. Tests have so far been conducted with German-language video/audio content.

iFinder services

- Structural analysis: The audio is segmented according to speaker changes or variations in the acoustic environment. Afterwards, every segment containing human speech is subject to further processing.
- Speaker identification: For every segment containing speech, the most probable speaker is determined based on features derived from the voice's sound.
- Speech recognition: Uses optimized models for previously detected speakers to ensure highest accuracy.
- Keyword Extraction: The final step is a keyword extraction to identify the most significant, distinctive and important terms from the speech recognition transcript.

2.1.2.2 - Why to get it

The Specific Enabler "Audio Mining" targets multimedia indexing and search scenarios such as "Rich Content". Therefore, the SE analyses a given audio/video file and returns textual information for indexing. Speech and speaker segmentation as well as speech recognition are performed in order to turn speech into text. It delivers segments, characteristic keywords and various metadata. Finally, the SE builds an index enabling multimedia search.

2.1.2.3 - Documentation

- Technical Documentation of the Audio Mining SE [4]

2.1.3 - Content Optimisation

2.1.3.1 - What you get

The Content Optimisation SE consists of various modules that can be used to enrich textual content. Currently two modules are implemented: Firstly, the recommendation module can be used to generate recommendations for textual content such as audio transcripts. Secondly, the enrichment module can be used to perform Named Entity

Recognition on textual content. The recognition module uses the Semantic Annotation GE and DBpedia-Spotlight to find and link entities.

2.1.3.2 - Why to get it

The Specific Enabler “Content Optimisation” targets at scenarios in the context of Multimedia Mash-ups. Therefore, the SE processes incoming textual content (e. g. from Audio Mining SE) and extracts characteristic keywords. Afterwards, a semantically enrichment based on NLP (Natural language processing) will be performed to connect the transcripts and keywords with contextual information. Therefore, the SE integrates and harmonises additional content from disperse sources. The SE is intended for SMEs, which want to build Second Screen Applications, e. g. for TV documentaries.

2.1.3.3 - Documentation

- Technical Documentation of the Content Optimisation SE [5]

2.1.4 - Content Similarity [NEW]

2.1.4.1 - What you get

Content Similarity enabler is a software solution to provide content-to-content recommendations based only on content metadata. The object is to offer a solution that allows a list of similar movies to be obtained from an initial movie request. The technology is based on a Technicolor algorithm that computes distances between movies. The target customers for this solution are content providers and cinema Information providers in order to offer VOD discovery services.

2.1.4.2 - Why to get it

The Content Similarity specific enabler targets a scenario of VOD discovery. This SE is a component that analyses metadata of a VOD catalog to compute weighting genre of each movie. Then thanks to this weighted genre, the SE computes distance between all movies. This enabler can enrich a VOD portal application by offering a "similar movies" feature.

2.1.4.3 - Documentation

- Technical Documentation of the Content Similarity SE [6]

2.1.5 - Second Screen Framework

2.1.5.1 - What you get

The Second Screen Framework SE provides web applications, which are running on a TV with all the crucial functionalities to establish a persistent bi-directional communication path to a web application running in the browser of any second-screen device. This includes the possibility to launch applications from one TV on the second screen. All functionalities are provided via a slim JavaScript API and can thus be easily integrated into any web application.

2.1.5.2 - Why to get it

Since the solution is fully compliant to the HbbTV standard it enables content providers to create fully interactive applications with direct programme relation potentially targeting millions of already deployed devices on the market. Thus, the concept can be implemented without modifications of hardware and only minimal extensions to existing applications.

2.1.5.3 - Documentation

- Technical Documentation of the Second Screen Framework SE [7]
- Developer Guide of the Second Screen Framework SE [8]

2.1.6 - TV Application Layer

2.1.6.1 - What you get

The TV Application Layer SE (TAL) is an open source library for building applications for Connected TV devices. TAL works to abstract device functionality variations. The bulk of the development can be done on a desktop browser that is built on the same origins as TV browsers.

2.1.6.2 - Why to get it

There are hundreds of different devices in the marketplace and they all use slightly different technologies to achieve the same result. The purpose of TAL is to allow you to write an application once, and be confident that it can be deployed to all HTML-based TV devices.

2.1.6.3 - Documentation

- Technical Documentation of the TV Application Layer SE [9]

2.2 - Social Connected TV Platform - Upcoming Releases

For the upcoming releases of the Social Connected TV Platform, we will enhance our existing Enablers considering feedback gathered from third party developers and (large scale) trials. Moreover we will release new Enablers, that are crucial for realising our upcoming content experimentations and might also be of interest for other developers. These planned Enablers as well as significant changes in existing enablers are described below.

2.2.1 - Audio Fingerprinting SE

The development of this Specific Enabler is discontinued following the recommendation of the Commission. However, it will be released as Open Source software in the next release of the Social Connected TV platform. This will allow Phase 3 partners to use and adapt the software without licensing restrictions.

2.2.2 - HbbTV App Toolkit SE

The HbbTV standard provides a powerful set of APIs for the creation of programme-related interactive TV applications. However, there are only few applications available today that exploit the full potential of HbbTV. The existing applications are rather static

TV-tailored websites, e.g. VoD portals or weather apps. They do not have a real contextual relation to a running TV show and do not provide much additional information on the currently running programme, although these kinds of applications are great media for viewer engagement.

The main reason for this shortage is that the development of HbbTV applications is still quite demanding due to the lack of proper tools for content creators and developers. Creating an HbbTV application just for one single show is simply too expensive.

The HbbTV App Toolkit SE aims to enable a fast and easy creation of programme-related HbbTV applications. It will provide a CMS with a set of GUI templates that can be filled with content via an easy to use user interface. A REST-API to the content model of the HbbTV App Toolkit SE's CMS will allow its integration into the CMS used by content creators in their production environment. In addition to the CMS, the HbbTV App Toolkit SE will support HbbTV developers by providing a library with solutions for recurrent tasks for developers, e.g. navigation through a button list, scrollable elements, channel change, etc.

Moreover the HbbTV App Toolkit will facilitate the integration of features provided by other Social Connected TV Platform enablers, such as the Second-Screen Framework SE and the Content Enrichment SE, into HbbTV applications. This integration will support exploitation of project results.

The development of the SE will not open a new field of research within FIcontent. The approach is rather to harvest the insights gained during the development of the FIcontent trial applications and allow other developers and content creators profiting from these findings.

First tests will be conducted with RBB content in Q4 2014.

3 - ROADMAP OF THE SMART CITY PLATFORM SEs

3.1 - Smart City Platform - Release 06/14

The Smart City Platform was at the 09/13 milestone a portfolio of functions, designed to foster the development and uptake of Smart City Services based on Future Internet technologies.

Now, the Release 06/14 of the Smart City Platform is at the crossroads of a portfolio of technical assets and an app-generation portal. It aims to show that on one hand, Enablers are fully operational, bringing state-of-the-art answers to real use cases and on the other hand a proof of the main concept of the redesigned WP3: “even non-technical people can build an App” with the newly introduced App Generator SE.

3.1.1 - App Generator [NEW]

3.1.1.1 - What you get

The App Generator SE is a set of services able to dynamically generate a custom mobile application with custom content (app name, icons, data...) to create test-flights of enablers without development efforts. Today, the backend has an API accessed only through one portal [10]. The aim of this portal is to allow App Generator SE to be used by non-technical users. The kind of app generated depends on which template is chosen. For now, the template supported by the SE is a map enriched with different data sources (OpenData, Webservices, Spreadsheets, CSV, JSON, Images...) and related POIs.

3.1.1.2 - Why to get it

This enabler allows to quickly generate powerful apps around a custom use. It provides a very intuitive way of valuing data by being able to show it on a map. Also, it demonstrates the technical ability to generate apps on the fly, targeting non-technical users.

3.1.1.3 - Documentation

- FIContent DesignMyApp portal description [11]
- *NB: the technical documentation won't be released along with the Enabler and the portal. The main reason is that the API is still work in progress.*

3.1.2 - Recommendation as a Service [NEW]

3.1.2.1 - What you get

The Recommendations as a Service (RaaS) SE provides the ability to create a professional recommendation engine with just a few mouse-clicks and no programming skills. This platform can persist your item and user data and will host your recommendation engine as a service in the cloud or on your own server infrastructure. Thereby, decision makers can choose whether to use ratings, likes, check-ins or implicit feedback, such as clicks or consumption time. In addition, they can adjust the way, the personalization works by selecting from a wide range of well-explained algorithms.

3.1.2.2 - Why to get it

Use an automatically-offered example user interface or connect your custom application via dynamically generated APIs to the engine. After following these steps, you can analyse your success by retrieving visual illustrations of usage data and customer statistics.

3.1.2.3 - Documentation

- Technical Documentation of the Recommendation as a Service SE [12]

3.1.3 - Open City Database

3.1.3.1 - What you get

The Open City Database gives you back a JSON structure of a city or Points of Interests. The cities JSON object includes information such as country, image, name, id, POIs, location. The POI JSON object includes more detailed information such as name, image, description, id, location, rating, check ins, opening hours, entry, public transport and contact information's. The users generate the content. Therefore, more and more POIs created by user generated content.

3.1.3.2 - Why to get it

Through the use of user generated content the Open City Database is always up to date, and is constantly expanding. By using the REST API, everyone can create and update POIs and cities inside the Database.

3.1.3.3 - Documentation

- Technical Documentation of the Open City Database SE [13]

3.2 - Smart City Platform - Upcoming Releases

For the upcoming releases of the Smart City Platform we will in particular focus on augmented reality aspects of the platform. We will try to integrate mixed reality concepts and an interactive way to augment POIs with user generated content. Thus, the following Specific Enablers are planned to be integrated into upcoming releases of the Smart City Platform.

3.2.1 - POI Explorer

This Specific Enabler will provide advanced interaction techniques with Points of Interest (POIs) based on Augmented Reality and Mixed Reality applications. It will utilize multiple tracking methods to improve the accuracy for outdoor AR applications. Moreover, it will handle user generated content (i.e. pictures, videos, 3D-content) in order to augment POIs with this.

3.2.2 - OpenDataSoft (ODS-DP)

The ODS-DP SE will serve as a powerful data management platform aiming at providing structured and normalized content through APIs for any user facing application and exposing project data through a state of the art data portal, allowing for data reuse and data visualizations integration into third party sites.



Being available through a SaaS approach, on the Cloud, the ODS-DP SE will be available for any number of experimentations and support an unlimited number of users.

The ODS-DP SE will be able to process and transform data coming from multiple sources: static content (upload of CSV, XLS, GIS exports ...), real time data, crowd sourcing.

4 - ROADMAP OF THE PERVASIVE GAMES PLATFORM SES

4.1 - Pervasive Games Platform - Release 06/14

The previous release of the Pervasive Games Platform focused on Tier 1 gaming scenarios. For tracking, mostly existing image or marker-based approaches are used. Supported applications mainly consist of two types that will run on most devices. We concentrate in particular on mobile devices with portability in mind. For these requirements, two foundation technologies suit best: HTML5 and Unity.

Install-free HTML5 web applications. Nowadays, many mobile devices support WebGL and therefore, hardware accelerated 2D and 3D graphics. For many users, a dedicated software installation can mean too much effort, but in our case it is enough to just go to a website.

Unity 3D based games for high performance and quick development. For gamers that are willing to install the Unity player software, games can be a bit more sophisticated. For game development and content creation a useful tool exists that is already used by many game developers. A game can be easily deployed to multiple operating systems.

The main contribution of this release is the introduction of the Geospatial group of Enablers. These Enablers deal with the use of geospatial information, such as geo-referenced objects, GPS-based localization of handheld devices and content related to specific POIs, within the Pervasive Games Platform. This group targets in particular tier 3 applications of the platform, i.e. city-wide games and large-scale interactive applications. In addition to that, there was some progress on the animation of virtual characters in large-scale virtual worlds and further improvements on several already existing Specific Enablers.

The following Specific Enablers are included in the June release of the Pervasive Games Platform and provide the technological foundation for our gaming scenarios.

4.1.1 - Networked Virtual Character [NEW]

4.1.1.1 - What you get

The animation of virtual characters is a usual task in game development. Regardless of the way how to animate the virtual character, it is desirable to synchronize the sequence of motions across multiple clients. Therefore, the Networked Virtual Character (NVC) SE is provided as a plugin to the Synchronization GE and thereby extends its synchronization capabilities to virtual characters while supporting a variety of cross-platform clients.

4.1.1.2 - Why to get it

The NVC SE provides an easy and convenient way to synchronize motion of virtual characters in games and large-scale virtual environments. It seamlessly integrates with the Synchronization GE from FI-WARE and amends it with the necessary feature set. Moreover, the NVC SE is not limited to human-like virtual characters as it is flexible and extensible to support also animals like spiders.

4.1.1.3 - Documentation

- Technical Documentation of the Networked Virtual Character SE [14]

4.1.2 - Geospatial - POI Interface [NEW]

4.1.2.1 - What you get

City-wide games rely heavily on the geographic location of the player and the points of interest in a city. Therefore a smooth cross platform integration the POI Data Provider GE is required. The POI Interface SE provides a simple interface to this problem, implementing methods to both add, search and retrieve points of interest.

4.1.2.2 - Why to get it

Instead of having to handle HTTP requests manually. The POI Interface SE provides a C# object-oriented approach to the POI data structure. This eases the access to the POI Data Provider GE outside the javascript and more json oriented platforms. This SE is completely Unity ready but can also be used outside the Unity environment.

4.1.2.3 - Documentation

- Technical Documentation of the POI Interface SE [15]

4.1.3 - Geospatial - POI Matchmaking [NEW]

4.1.3.1 - What you get

POI Matchmaking is an extension of the Spatial Matchmaking SE, originally in the 09/13 release. This enabler allows to group players based on their spatial proximity to POI.

Players connect to the POI Matchmaking when they indicate that they are available and looking to be matched with someone. Upon registration, the service looks for good matches currently available at the nearby POIs. Custom criteria can be used to filter and rank the results. If no valid session exists, the player is placed in a queue to wait for a match to arrive.

4.1.3.2 - Why to get it

The POI Matchmaking provides a straightforward implementation to create networked sessions between groups of clients, which are physically located near POI. These could be people in a square, in a restaurant, at the bus stop, etc. The system is made for volatile sessions in mind, where clients may disconnect and new clients may join later.

4.1.3.3 - Documentation

- Technical Documentation of the POI Matchmaking SE [16]
- Tutorials and Example Code for the POI Matchmaking SE [17]

4.1.4 - Reality Mixer - Reflection Mapping

4.1.4.1 - What you get

All visual oriented Specific Enablers of the Reality Mixer group measure camera properties and adapt the virtual objects to visually fit to the camera image background. The Reflection Mapping SE utilizes a light probe to extract a sphere map from the camera image, which contains the environmental lighting conditions. This sphere map will be used to apply an

appropriate lighting model to rendered virtual objects. Thus, the additional virtual objects are incorporated into the resulting image in a very seamless fashion leading to a more realistic experience of mixed reality applications.

4.1.4.2 - Why to get it

This enables a new level of realism in augmented reality applications. It may be used directly with a diffuse light probe to match the appearance of matt surfaces on virtual characters and vehicles. Furthermore, developers may experiment with mapping different materials to application objects, such as marble or crystal.

4.1.4.3 - Documentation

- Technical Documentation of the Reflection Mapping SE [18]
- Developer Guide of the Reflection Mapping SE [19]

4.1.5 - Reality Mixer - Camera Artifact Rendering

4.1.5.1 - What you get

This SE helps to render plausible virtual objects on top of a camera image. It consists of two steps which are executed on the client side, e.g. a mobile device. First, some camera parameters are estimated, such as noise, motion and white balance. This can be based on images or other sensor information of the device. The second step is to apply those parameters as a post processing fragment shader pass to the rendered virtual objects.

4.1.5.2 - Why to get it

This SE helps making the virtual objects more believable and fit seamlessly to the camera image in the background. When the camera imperfections such as color casts, motion blur or noise are not taken into account, the virtual objects will stand out and not look like belonging to the scene. This SE estimates such parameters from the live image and other sensors and applies a post-processing step to the virtual objects.

4.1.5.3 - Documentation

- Technical Documentation of the Camera Artifact Rendering SE [20]
- Developer Guide of the Camera Artifact Rendering SE [21]

4.1.6 - Leaderboard

4.1.6.1 - What you get

The leaderboard is a high score list for a game. You can submit an integer score together with the player information, usually after a game is over. To compare the score with the score of other players, you can retrieve an ordered list of scores and respective players. For large lists you can also only get a part of the list. In addition you can query the position of a player on the high score list. Multiple scores can be used, such as 'collected items', 'time' and 'overall score'.

4.1.6.2 - Why to get it

A simple interface makes it convenient to use. Internally, the Identity Management GE will be used. With a leaderboard the players can be motivated to improve their skills and competitively compare their results with the results of their friends.

4.1.6.3 - Documentation

- Technical Documentation of the Leaderboard SE [22]
- Tutorials and Example Code for the Leaderboard SE [23]

4.1.7 - Augmented Reality - Fast Feature Tracking

4.1.7.1 - What you get

All Specific Enablers of the Augmented Reality group provide various tracking methods to enable augmented reality applications. The Fast Feature Tracking SE learns targets by color, then matches the center of the color area (for example a colored football) in the camera image to retrieve the relative camera pose information. This extends an application with the capabilities to apply the matching transformation to 3D-scene content and render them onto respective targets.

4.1.7.2 - Why to get it

With the Fast Feature Tracking SE you will be able to easily create applications with basic markerless augmented reality functionality. With this Specific Enabler you can learn the color of targets on the fly in an application and then track the center and size of the target for camera relative placement of animated interactive graphics such as virtual characters or vehicles.

4.1.7.3 - Documentation

- Technical Documentation of the Fast Feature Tracking SE [24]

4.1.8 - Augmented Reality - Marker Tracking

4.1.8.1 - What you get

All Specific Enablers of the Augmented Reality group provide various tracking methods to enable augmented reality applications. The Marker Tracking SE utilizes AR markers to retrieve camera pose information through XML3D/Xflow. This extends XML3D with the capabilities to apply the matching transformation to 3D-scene content and render them onto respective markers in a web-based environment. The Marker Tracking SE follows the declarative approach of XML3D and is real-time capable.

4.1.8.2 - Why to get it

With the Marker Tracking SE you will be able to easily create web applications with basic augmented reality functionality. The Specific Enabler nicely captures all the necessary computations into Xflow operators of XML3D. Thus, you can create AR application without being an expert in computer vision. Basic knowledge in web technologies is sufficient to produce great applications using XML3D together with the Marker Tracking SE.

4.1.8.3 - Documentation

- Technical Documentation of the Marker Tracking SE [25]

4.1.9 - Game Synchronization

4.1.9.1 - What you get

This enabler provides functionality to synchronize the game world. We consider the following taxonomy. For the connection of the parties, we consider Peer-to-peer (p2p) and Server-to-Client (s2c). This enabler serves different networking models, such as:

- RTS-lockstep (p2p) - [September 2013].
- Authoritarian Client (p2p), also known as 'Host' model - [November 2013].
- Authoritarian Server (s2c) - [November 2013].

The RTS-lockstep is intended for games with a large game state that would be hard to synchronize over the network. This is indeed the case of RTS games with many units. In the peer-to-peer scenario, after a hand shaking phase (see the use of SmartFoxServer) the network is only used to transfer the players' input, and the game simulation is done locally on each client. Both Authoritarian solutions are intended for games where the game-state has a manageable size, and can be transferred over the network. The authority (either a client or a dedicated server) will act as authority and simulate the game, sending the updated game-state to the clients. Clients send back the player input.

4.1.9.2 - Why to get it

Synchronization of game content is often game specific. As a developer, one has to choose the networking model, and often invest resources in crafting something that fits the particular needs. The choice of using this enabler depends on the complexity and requirement of your game, as well as your resources.

With this enabler, we focused on two classic paradigms, peer-to-peer and server-to-client, with the intent to build a base for developers to build upon. This enabler provides a working base that can be extended to the specific needs without having to start from scratch.

4.1.9.3 - Documentation

- Technical Documentation of the Game Synchronization SE [26]
- Tutorials and Example Code for the Game Synchronization SE [27]

4.2 - Pervasive Games Platform - Upcoming Releases

For the upcoming releases of the Pervasive Games Platform we will shift our focus to Tier 2 and Tier 3 gaming scenarios. Therefore, we will extend the portfolio of Specific Enablers of the Pervasive Games Platform and add dedicated Enablers to handle these scenarios. Moreover, we will improve our existing Specific Enablers with additional features, performance improvements and alternative implementations. We may introduce new Enablers based on existing ones to provide a more advanced feature set.

The following Specific Enablers are planned for upcoming releases of the Pervasive Games Platform and will amend the technological foundation for our Tier 2 and Tier 3 gaming scenarios.

4.2.1 - Reality Mixer - Augmented Audio

Sound effects add another level of immersion to games. By taking the acoustic properties of the environment into account, the sound will feel more integrated and less artificial. Especially reflections (echo) are important. Without a direct line of sight, the spectrum of the sound is attenuated non-linearly. With binaural sound we might even add a convincing sense of direction of the sounds.

4.2.2 - Augmented Reality - Image Marker Tracking

All Specific Enablers of the Augmented Reality group provide various tracking methods to enable augmented reality applications. The Image Marker Tracking SE utilizes natural features of suitable images as markers to retrieve camera pose information through XML3D/Xflow. This extends XML3D with the capabilities to apply the matching transformation to 3D-scene content and render them onto respective marker images in a web-based environment.

4.2.3 - Reality Mixer - Simulation Continuum

Augmented reality experiences further take place with virtual objects placed in the real world. Virtual objects under a physically accurate simulation thus far have no physical effect on real objects and conversely rigid and soft body dynamics captured from real objects have no physically simulated effect in virtual objects. This enabler includes development of methods for achieving a simulation continuum between real and virtual objects.

5 - ROADMAP OF THE COMMON SPECIFIC ENABLERS USED ACROSS PLATFORMS

5.1 - Fcontent Common Enablers - Release 06/14

The following common Specific Enablers are included in the June release of the Fcontent platforms. These common Specific Enablers are not dedicated to a single platform of domain-specific applications. Much more, they may have the capability to be later promoted as Generic Enabler in the Future Internet. In particular the newly introduced Specific Enablers target the bridge between Services of the Smart City Platform and city-wide games of the Pervasive Games Platform.

5.1.1 - 3D-Map Tiles [NEW]

5.1.1.1 - *What you get*

The 3D-Map Tiles SE supplies in an OpenStreetMap-like manner map tiles of the ground. These tiles are a 3D representation of the scene ground in contrast to usual image tiles of OSM. Moreover, the 3D-Map Tiles SE supports different backend data providers to offer different kinds of tiles, such as projected OSM-tiles and laser-scanned elevation data with textures. Therefore, the 3D-Map Tiles SE incorporates the GIS-DP GE from FI-WARE.

5.1.1.2 - *Why to get it*

When moving from traditional 2D-map applications towards geo-referenced interactive 3D-applications, a representation of the environmental ground (i.e. terrain) is needed. The 3D-Map Tiles SE addresses this requirement in a flexible approach and easy-to-use way for web-based application. It seamlessly incorporates with the 3D-UI GE from FI-WARE and thereby preserves full control over rendering to the client application.

5.1.1.3 - *Documentation*

- Technical Documentation of the 3D-Map Tiles SE [28]

5.1.2 - POI Storage [NEW]

5.1.2.1 - *What you get*

The POI Storage SE provides a flexible, lightweight webservice to store POI-related data. Furthermore, it is a GE-compliant implementation of the POI-DP GE from FI-WARE and amends the use of this GE with additional features, such as storing and retrieving of custom data components, importing sample data (e.g. geonames.org), and daisy chaining of POI-DP instances.

5.1.2.2 - *Why to get it*

Realizing geo-referenced applications often relies on POIs. The POI Storage SE enables these type of applications to store and retrieve POI-related data. Due to the support of custom data components, it nicely fits any kind of application requirements while maintaining compatibility with POI-DP GE to interface other public well-established POI data sources.

5.1.2.3 - Documentation

- Technical Documentation of the POI Storage SE [29]

5.1.3 - Social Network

5.1.3.1 - What you get

The Social Network SE is a federated social network. It features user and profile management and the ability of creating status updates, uploading assets (text, pictures, etc.) and social functions (liking, commenting, etc.) with real-time updates to your peer group (i.e. followers).

5.1.3.2 - Why to get it

The Social Network SE is one way of 'glueing' the different enablers and components into a full-fledged social network. Users of these components can communicate, share, comment and like assets. This is especially relevant if the business model and the use cases of the SME services needs a community and the management thereof.

5.1.3.3 - Documentation

- Technical Documentation of the Social Network SE [30]

5.1.4 - Content Sharing

5.1.4.1 - What you get

The main functionality of the Content Sharing SE consists of a transparent content synchronization with regards to underlying network connectivity (infra, ad hoc). This allows for instance the synchronization of feeds containing linked content such as comments on images, or images related to one another.

5.1.4.2 - Why to get it

The Content Sharing SE provides mainly the ability to share content in infrastructure-less situations. This is useful to transfer data directly between users or to a server. As an example, downloaded content can directly be shared with other users without requiring additional infrastructure. For mobile devices the service is designed with power efficiency and possible connectivity disruptions in mind.

5.1.4.3 - Documentation

- Technical Documentation of the Content Sharing SE [31]

5.1.5 - Content Enrichment

5.1.5.1 - What you get

The Content Enrichment enabler provides the following capabilities

- **Media & Text Annotation** - allows any type of media (e.g. video, audio, photos or text) to be enriched with user-generated video content, add or edit comments, notes, enrich the media with custom drawings. Also to create custom mash-ups of

media content and enable the retrieval of related information (e.g. via access to external resources, location & content sensitive metadata, object tracking etc.)

- **Object-based Media Discovery** - enriched media content contains metadata information on available objects within the media. Referenced information on available objects can be used to discover other object-related media content
- **Cross-Video Navigation** - Allows user interaction to jump back and forth in-between video content

5.1.5.2 - Why to get it

To create, distribute and play interactive content video content across platforms and devices. It provides interfaces to incorporate web 2.0 capabilities and community functionalities as well. Thus the enabler acts as a common building block in future video and multimedia infrastructures, to allow seamless, platform independent and convenient enrichment of any type of video content using any type of device for a plurality of application cases covering UGC, professional content as well as edutainment.

5.1.5.3 - Documentation

- Technical Documentation of the Content Enrichment SE [32]

5.2 - Fcontent Common Enablers - Upcoming Releases

At the moment there are no further common Specific Enablers planned for upcoming releases of the Fcontent platforms. But it might be the case that additional SEs from a dedicated platform will be promoted to become more generic and thus common Specific Enablers of Fcontent. For instance, the Augmented Reality SEs of the Pervasive Games Platform are good candidates to be utilized within the Smart City Platform as well.

6 - CONCLUSION

In this document, we have presented a brief description of the Enablers for the second release of the FIcontent platforms. In preparation of the Enablers we have made use of established tools and frameworks, specific technical contributions (FIcontent Enablers), and generic Future Internet technology (FI-WARE Generic Enablers). The technical outline consists of the Enablers of the Social Connected TV Platform, Smart City Platform and the Pervasive Games Platform.

First, we have presented a listing of the groups of Enablers that are involved, as well as their significance in delivering new models of Future Internet Content. Additionally, we have indicated further sources of information associated with each enabler to the interested target audience.

Second, we have presented the remaining development roadmap, including a description of what is available in the current platform release and will be in upcoming releases for Enablers as part of each technology area and also those common between content platforms. The high-level description of Enablers is provided in cooperation among all consortium partners.

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