



**SALERO**

# **Second Report on SALERO User Group Events**

**SALERO Deliverable D2.2.2**





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## SALERO Deliverable D2.2.2

SALERO identifier: SALERO-D2.2.2-UPF-2ndUserGroupReport-v09-public.doc

Deliverable number: D2.2.2

Author(s) and company: O. Mayor (UPF); P. Stansfield (Wavecrest Systems Ltd.); all SALERO partners

Work package / task: WP02

Document status: Final

Confidentiality: Public (names and photos of User Group members have been removed for privacy reasons)

Version	Date	Reason of change
1	2009-10-26	document created
2	2009-11-20	Second version of the doc with input from MTG-UPF, DLLNI, JRS, URL, AM, LFUI, DFT, FBM-UPF, TAIK
3	2009-11-25	Third version of the doc with input from DIT, UG & PGP
4	2009-11-26	Fourth version of the doc including section 4.5.1 (MTG-UPF)
5	2009-12-01	First unofficial internal review changes (TAIK) & BLITZ input
6	2009-12-07	Added some WaveCrest input
7	2009-12-21	Added remaining WaveCrest input (3.5.1 & 4.4) & formatting
8	2009-12-21	Final version for internal review by TAIK
9	2009-12-22	Final version (public & confidential editions)

The work presented in this document was partially supported by the European Community under the Information Society Technologies (IST) priority of the 6th framework programme for R&D.

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## 1 Executive Summary

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SALERO aims at making cross media production for games, movies and broadcast faster, better and cheaper by combining computer graphics, audio and language technologies, semantic web technologies as well as content based search and retrieval.

During the third year of the project (2008), two User Group Events were organized. One hosted by The Music Technology Group (MTG) of the Universitat Pompeu Fabra in Barcelona coinciding with the 3GSM trade fair, and another User Group event held in Soho, an area of London containing half of the UK's Film Post production, advertising and games companies. Learning from the past and with the help and expertise of WaveCrest Systems, during the final years of the project (2008-2009) we have organized some new User Group Meetings and Events that are explained in detail in this document.

The purpose of the User Group Events is to introduce the project to industry representatives and to gather feedback. During the event the participants get a presentation on the project, hands-on demonstration of the tools as well as future plans. Based on this, a discussion analyzes suitability of tools to the task, usability, comprehensiveness of function set, integration in the workflow process, and requirements from the point of view of attendees.

**In this public version of this report names and photos of User Group Members have been removed for privacy & data protection reasons.**

## **2 Introduction**

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### **2.1 Purpose of this Document**

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This report documents the findings of the User Group so far. Two meetings have been held. The first user group meeting coincided with the IBC 2008 Conference in Amsterdam (September, 2008), and a second one was held coinciding with the International Animation Festival Market (MIFA) in Annecy, France (June, 2009). Moreover, Peter Stansfield from Wavecrest systems contacted and had individual interviews to introduce the SALERO project to VIDM (Very Important Decision Makers) from the audiovisual industry, explained in section 6. Also a dissemination activity of the project was done during the IBC 2009 in Amsterdam where the project SALERO had a booth in the New Technology Campus to give live demos and presentations and have the possibility to meet with Industrial Representatives attending the IBC conference.

### **2.2 Scope of this Document**

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This report currently concentrates on the events explained above and explains what was held in those User Group events/meetings, the presentations and demos done, the discussion that took part in them and the feedback gathered from the attendees. At the end of the document some conclusions and future events are exposed.

### **2.3 Status of this Document**

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This is the final internally revised version of the deliverable. Some parts are removed due to confidential issues.

### **2.4 Related Documents**

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Before reading this document it is recommended to be familiar with the following documents:

- D2.2.1 First Report On SALERO User Group Events

## **3 Third User Group Meeting in Amsterdam (Sept 2008)**

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### **3.1 Location**

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Amsterdam was selected for the third User Group meeting to coincide with the International Broadcasting Congress & Conference (IBC 2008). The idea was to attract media professionals that also were attending the IBC to our SALERO User Group in order to introduce the project to these industry representatives and to gather feedback from them. During the event the participants got a short overview/presentation on the project, hands-on demonstration of the tools and Experimental Productions as well as discussion. Although the first idea was to try to use one room within the IBC exhibition, the logistics made it impossible to manage the room reservation as every meeting room in the exhibition was fully booked. Instead, a decision was made to organize the User Group event at the "Felix Meritis", a well known meeting place in downtown Amsterdam, where we booked audiovisual equipment and a large room with plenty of space to give hands on demonstrations of the SALERO tools and Experimental Productions.

### **3.2 Program**

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The participants of the User Group were invited from 4 p.m. onwards, so they could come after visiting the IBC trade fair. Once they had arrived, we introduced them the SALERO project and then they had the possibility to see demonstrations of the SALERO tools or even test themselves or see results of the Experimental Productions. Georg Thallinger (JRS) and Peter Stansfield (WCR) were in charge of introducing the project to the invitees as well as suggesting them to test the tools and see project results. The live demos were driven by each responsible partners.

The following live demonstrations of tools were available:

- **Audio Transformation** (Oscar Mayor, Universitat Pompeu Fabra)
- **Speech Synthesis** (Carlos Monzo, Universitat Ramon Llull)
- **Bones Dailies** (Reinhard Fach and Henner Steinwede, Grass Valley Germany)
- **Semantic Annotation & Search** (Gert Kienast, JOANNEUM RESEARCH)

The following Experimental Productions results were shown in the event:

- **Turing Machine Opera** (Tea Stolt, University of Art & Design, Helsinki)
- **The i-VJ** (Sonia Miarnau Freixes, Activa Multimedia)

### **3.3 Presentations & Demos**

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First of all, a welcome and an overview of the SALERO project was given by JRS & WCR showing the Experimental Productions and Tools developed during the SALERO project. Then invited participants, were invited/suggested to experiment with tools in order to get more details and discuss about the SALERO project objectives and achievements.

The setup in the meeting room consisted of a projector showing a self explanatory slide presentation of the SALERO project and four additional demo stations with a table surrounded by chairs and big screens with sound to show the live demos and hands-on sessions as well as the results of different Experimental Productions. All demos could be run simultaneously to be given at the same time to individual participants and avoid waiting queues. This allowed giving the opportunity to invitees to test the tools in detail.

#### **3.3.1 UPF "Audio Tools in Automatic Media Production"**

The Audio Tools are a set of VST plug-ins and offline tools including Voice Transformation, Tempo Transformation and Advanced Audio Equalizer.

Voice Transformation allows several singing and speech voice transformations using spectral techniques for modifying the character of the voice. Transformations include: transposition, quantization, vibrato, roughness, breathiness, whisper, timbre mapping and other spectral transformations. This tool is targeted to recording or post-production studios that require voice processing.

Tempo Transformation combines automatic rhythm analysis and time-scaling in order to transform the rhythm of an audio mix. The user can vary the tempo or add/subtract swing by using the GUI controls during the playback.

Advanced Audio Equalizer is aimed for the advanced equalization of commercial music productions. This is a powerful tool able to equalize the audio using energy histogram-based on different criteria. Some of its applications include: Remixing a piece by changing the volume of each instrument independently or removing instruments from the mix and then re-adding them processed by some effects or isolate one or several instruments to perform a musical analysis of a piece.

[http://www.salero.eu/en/showcase/audio\\_transformation.html](http://www.salero.eu/en/showcase/audio_transformation.html)

### **3.3.2 TAIK: "Turing Machine Opera and Turing Enigma Bot"**

TAIK's presentation described how Crucible Studio and Helsinki Skaala Opera (<http://www.oopperaskaala.fi>) had collaborated to produce a "Trilogy of Turing". Turing Machine is a multimedia opera performance, that premiered at Korjaamo, "the Helsinki Cultural Factory" on 28 March 2008; and the Turing Enigma is both a spatial installation and a chatting experience on the Internet and mobile web. Each approach also works independently and provides new points of view to the fascinating life of Alan Turing (1912-1954), a heroic wartime code-breaker and pioneer of computer science. He made a provocative contribution to the debate regarding artificial intelligence: whether it will ever be possible to say that a machine is conscious and can think. As a person he was "an ordinary English homosexual atheist mathematician", which led him, tragically, to commit suicide by eating an apple laced with cyanide.

The Turing Enigma and the 3D scenography for Helsinki Skaala Opera's Turing Machine were realized by the Crucible Studio team as an experimental production for SALERO. Further information can be viewed on: [http://crucible.uiah.fi/crunet.nsf/etofilmpages/Turing\\_Machine\\_Opera](http://crucible.uiah.fi/crunet.nsf/etofilmpages/Turing_Machine_Opera)

Additional production references and samples can be found on:

<http://www.salero.eu/en/showcase/index.html>

### **3.3.3 GVG: "Bones Dailies"**

The Linux-based post-production framework "Bones Dailies" provides a complete digital intermediate solution. With video and data transfer, dust busting, restoration and colour correction features, it can address day-to-day applications and creative tasks.

The Bones framework is a next-generation environment for digital intermediate and post production that lets users create workflows tailored to their needs. The Bones framework has two primary components: a user interface that not only provides a common look, feel, and operation, but also serves as the heart of an end-to-end post-production workflow, and manages the process from data ingest to finished digital master; and a variety of high performance applications from which users can pick and choose.

### **3.3.4 JRS: "Semantic Media Annotation"**

JRS presented an initial version of its tool for semantic media annotation and search. Annotation is done by creating so-called statements built from a given set of concepts from an ontology designed for production of 3D animations. Example statements are "Bing (is related to) smiling" or "Bong (is related to) telescope, handbag" to describe actions/expressions of certain characters.

The user interface allows the creation of statements in three ways: double-clicking in lists of concepts, drag & drop and direct input in a text field with auto-completion. The ontology can be extended by the user during use if new concepts are needed.

### 3.3.5 AM: "i-VJ, an Interactive Video Jockey"

AM has developed an experimental prototype called an i-VJ (interactive Video Jockey). The production is a digital television broadcast over Internet Protocol (IPTV). IPTV is in line with two growing trends in digital content, making the TV experience more interactive and allowing for customization.

The main objectives of this experimental production are to explore customization, interactivity, automation, re-use of assets, compatibility with different ways of generating audio and automatic and semi-random script modification.

### 3.3.6 URL: "Speech Synthesis"

In this presentation, the Text to Speech system developed by URL was presented. Different issues about the TTS system are showed, for instance, the development of a new corpus in order to be used in a new application using different tools, the possibility of being applied it into a audiovisual production, in others. Different considerations are taken into account according to the domain of utilization.

## 3.4 Attendance

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Every SALERO Partner was asked to select at least two relevant industry representatives to invite them to the User Group Events. Additionally, Wavcrest Systems used its extensive knowledge of the media market to come up with an invite list. The list is included in Annex 4. Everyone in the invite list received the following invitation:

### Third User Group Event during IBC 2008

15 September, 2008, 4 pm - 8 pm

Felix Meritis (downtown Amsterdam)

Keizersgracht 324, 1016 EZ Amsterdam, The Netherlands (map)

Room Teekenzaal

SALERO is an IST project that aims at making cross media production for games, movies and broadcast faster, better and cheaper by combining computer graphics, language technology, semantic web technologies as well as content based search and retrieval.

The purpose of the 3rd User Group meeting is not only to show the latest results from the project in relation to intelligent media production but to gather detailed feedback and ideas based on hands-on sessions during the meeting. Based on a live demonstration of creating a production the participants will have the possibility to try the tools on their own and will be able to judge their applicability in their environments.

There will be time for informal discussions to analyze suitability of tools to the task, usability, comprehensiveness of function set, integration in the workflow process, and requirements and potential improvements from your point of view.

### Registration

Participation in this User Group Event is **free of charge** but we would kindly appreciate confirmation via email. We will **reimburse costs** for user group members (travel and one night of hotel) after submission of the travel ticket and hotel bill:

- Arrival from the Netherlands: up to a maximum amount of €350,- (but not more than real costs)
- Arrival from foreign countries: up to a maximum amount of €500,- (but not more than real costs)

### Contact

If you have any questions, feel free to contact us:

**Peter Stansfield**

Wavecrest Systems

Work phone: +44(1582)849481

As would be expected in the very busy media industry, only a small percentage of invitees actually came to the UG event.

The actual attendee list is as follows:

Name	Country	Company
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		

### 3.5 Feedback

In order to get a better feedback from the experts, they filled in a survey after the Workshop, the survey is included in annex 1.

#### 3.5.1 Analysis of the Survey forms

Whilst the attendance at this event was not large, the quality of attendee was very high. All attendees rated the event overall as 'Very good' or 'excellent'. More importantly, every attendee responded that at least some of the demonstrations were of 'great relevance' to their industrial sector.

The relevance of the SALERO technologies was demonstrated by the fact that anonymous, expressed interest in licensing some of the technologies. However this approach didn't come to anything as due to a commercial restructuring.

Further expressions of interest were received from anonymous, who wanted to use SALERO Technology for a forthcoming production of a musical work, based on the movie '*Ra: Path of the Sun God*'. Unfortunately this production never came to be due to difficulties in raising the finance needed. – a consequence of the world recession.

### 3.6 Discussion

In this section we present the main outputs of the individual discussions between invitees and SALERO partners that presented live demo/presentations, mainly during the hands-on session. The discussion was open and coped with different aspects of the project. We have summarized it into different subsections, and then presented the main contributions and concerns.

Some experts showed their concerns about the usability and GUI of the tools. The most important thing is to be simple and practical. Moreover, having the users in the intermediate development cycles (loops) is a must-have for a useful final product.

Some attendees showed interest in testing the tools at home, and said that having the tools online or implemented as a web service would help in disseminating them and allow easier use for non advanced users. Installing the tools in their own machine would not be required in this case and it also avoids dependencies with other third party software.

Also some invitees commented about the necessity of easy integration of tools if we want to integrate them in bigger systems as a part of these. This implies to have a clear and simple API but with the entire tool's functionality.

## 4 Fourth User Group Meeting in Annecy (June 2009)

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### 4.1 Location

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Annecy, a small village in France hosts the International Animation Festival and Market (MIFA) in June. This event was selected to host a User Group Meeting there. Some reasons for taking the event there and not to other Congresses, Conferences and Trade Fairs previously analyzed were:

- We believe that the Annecy Show is worthwhile for a User group event.
- It accesses the audio-visual sector (as opposed to an audio only or video only sector).
- It is also a way of 'moving' the focus for the UG event from the 'general' media sector to the animation specific sector.
- Some of the present User Group members will want to attend, whilst some will not.
- From our previous experience, Annecy has a lot of Eastern European attendees, thus allowing us to meet the 'Eastern European' industry.
- It has a lot of 'passing traffic', allowing us to poll lots of animation professionals from many countries.

The idea was to attract media professionals that also were attending the Festival or the MIFA Trade Fair to our SALERO User Group in order to introduce the project to these industry representatives and to gather feedback from them. Like in the previous User Group Meeting during IBC 2008, the participants of the event got a short overview/presentation on the project, hands-on demonstration of the tools and Experimental Productions as well as discussion with the SALERO partners. Although the first idea was to try to use one room within the MIFA Market at the Hotel imperial, the logistics made it impossible to manage the room reservation as the meeting rooms at the Hotel were used exclusively for the Festival however we were able to find a room at Novotel Atria, at a walking distance from the MIFA and next to some Festival conferences and film screenings. The room was quite big and we booked audiovisual equipment (42" screens with sound) so we had plenty of space to give hands-on demonstrations of the SALERO tools and Experimental Productions. The participants were invited from 10 p.m to 4 p.m so they could take a break during their busy day at the Festival and come to the User Group event.

### 4.2 Program

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The participants of the User Group were invited from 10 p.m. onwards until 4 p.m, so they could take a break during their busy days at the Animation Festival and come to see the SALERO demonstrations and return back to the Festival. As in the previous User Group meeting at the IBC 2008, once they had arrived, the SALERO project was introduced to them and then they had the possibility to see demonstrations of the SALERO tools or even test themselves or see results of the Experimental Productions. Georg Thallinger (JRS) and Peter Stansfield (WCR) were in charge of introducing the project to the invitees and encouraged to test the tools and see project results. The live demos were given by each responsible partner.

The following live demonstrations of tools were available:

- **Voice & Tempo Transformation** (Oscar Mayor, Universitat Pompeu Fabra)
- **Speech Synthesis** (Carlos Monzo, Universitat Ramon Llull)
- **New Facial Animation Pipeline** (Alun Evans, Fundació Barcelona Media - UPF)
- **New Facial Animation / Character Generation** (Richard Hackett, BLITZ)
- **Semantic Media Annotation** (Georg Thallinger, JOANNEUM RESEARCH)

The following Experimental Productions results were shown at the event:

- **Karaoke Revolution** (Richard Hackett, BLITZ)

## 4.3 Presentations & Demos

---

First of all, a welcome and an overview of the SALERO project was given by JRS & WCR showing the Experimental Productions and Tools developed during the SALERO project. Then invited participants, were encouraged to experiment with tools and got more details and discuss about the SALERO project objectives and achievements.

The setup in the meeting room consisted in a projector showing a self explanatory slide presentation of the SALERO project as well as a big poster showing a general diagram of the project including all the tools and Experimental Productions developed during the project and interrelations between them. There were also five different demo stations with a table surrounded by chairs and big screens (42") with sound to show the live demos and hands-on sessions as well as the results of different Experimental Productions. All demos could be run simultaneously to be given at the same time to individual participants and avoid waiting queues. This allowed giving the opportunity to invitees to test the tools in detail.

### 4.3.1 *UPF "Voice & Tempo Transformation"*

The Audio Tools are a set of VST plug-ins and offline tools including Voice Transformation and Tempo Transformation.

Voice Transformation allows several singing and speech voice transformations using spectral techniques for modifying the character of the voice. Transformations include: transposition, quantization, vibrato, roughness, breathiness, whisper, timbre mapping and other spectral transformations. This tool is targeted to recording or post-production studios that require voice processing.

Tempo Transformation combines automatic rhythm analysis and time-scaling in order to transform the rhythm of an audio mix. The user can vary the tempo or add/subtract swing by using the GUI controls during the playback.

[http://www.salero.eu/en/showcase/audio\\_transformation.html](http://www.salero.eu/en/showcase/audio_transformation.html)

### 4.3.2 *URL "Speech Synthesis"*

In this presentation Text to Speech system developed by URL was presented. Different issues about the TTS system and its usefulness and capabilities in audiovisual productions are showed. In addition, examples related to domain application (open or limited domain) or scenarios, languages (English and Spanish) and genders (female and male) are available, so attendants can see the real possibilities of the TTS system.

Moreover, a web service was developed for using the TTS system together with other technologies in an easy way. A demonstration web is presented in order to test the TTS.

### 4.3.3 *FBM-UPF "New Facial Animation Pipeline"*

Within SALERO, FBM-UPF has developed a new method to allow digital artists and modellers to animate virtual character faces. This model has been dubbed a new "facial animation pipeline" as it involves several sequential steps. Once the artist has modelled their character's face, they can apply the Maskle tool to automatically rig the face and transfer a bone-weight animation system to the face. They can then use the Activation-Evaluation synthetic model for facial animation to rapidly an easily prototype an animation clip. Further information for these methods can be found in SALERO deliverable D7.3.2.

### 4.3.4 *BLITZ "Facial Animation / Character Generation"*

Blitz Games Studios demonstrated the procedural generation of game characters and the facial animation tools that support the creation of believable virtual people.

The procedural generation of game characters is achieved through a combination of re-use of a base mesh and assets with morph blending . The technique creates a game character almost instantly compared to a workload of between a week and a month, depending on the complexity of the art and animation required

New animation techniques shown include scalable animation bones and improved rigs, enabling accurate and rapid animation routines to be created and repeated, whatever the size and appearance of

the game character. Blitz has adopted the hierarchy, movement, behaviour, appearance to underpin work to improve the fidelity and credibility of virtual characters.

#### 4.3.5 JRS "Semantic Media Annotation"

JRS presented the IMAS Tool (Intelligent Media Annotation & Search) as described in section **Fehler! Verweisquelle konnte nicht gefunden werden.** Additional features were a revised user interface and the possibility to model relationships between assets, e.g. "AssetA (is a part of ) AssetB".

#### 4.3.6 BLITZ "Karaoke Revolution"

Karaoke Revolution is a singing game published by Konami Digital Entertainment Inc. Blitz Games Studios demonstrated the initial stages of work to integrate the procedural generation of characters into a commercial game. Players are able to select and customise almost every element of their chosen character, including ethnicity, age, weight, as well as the size, shape and placing of facial features.

## 4.4 Attendance

Wavecrest used its extensive knowledge of the media market to come up with an invite list. This is included in Appendix 4. Everyone in the invite list received the following invitation:

### Fourth User Group Event

10 June, 2009, 12 noon

Hotel Novotel Annecy Centre Atria

1 Place Marie Curie, 74000 Annecy, France

SALERO is an IST project that aims at making cross media-production for games, movies and broadcast faster, better and cheaper by combining computer graphics, language technology, semantic web technologies as well as content based search and retrieval.

The purpose of the 4th User Group meeting was not only to show the latest results from the project in relation to intelligent media production but to gather detailed feedback and ideas based on hands-on sessions during the meeting. Based on a live demonstration of creating a production the participants had the possibility to try the tools on their own to be able to judge their applicability in their environments.

There will be time for informal discussions to analyze suitability of tools to the task, usability, comprehensiveness of function set, integration in the workflow process, and requirements and potential improvements from your point of view.

### Program

**Welcome & Introduction** (Georg Thallinger, JOANNEUM RESEARCH and Peter Stansfield, Wavecrest Systems)

#### Live Demonstrations of Tools & Experimental Productions

- **Audio Transformation** (Oscar Mayor, Universitat Pompeu Fabra)
- **Speech Synthesis** (Carlos Monzo, Universitat Ramon Llull)
- **Semantic Annotation & Search** (Georg Thallinger, JOANNEUM RESEARCH)
- **Facial animation, Character Generator, Karaoke Revolution** (Richard Hackett, Blitz Games Studios)
- **New Facial Animation Pipeline** (Alun Evans, Fundació Barcelona Media)

A small buffet lunch will be provided.

## Registration

Participation in this User Group Event is **free of charge** but we would kindly appreciate confirmation via email. We will **reimburse costs** for user group members (travel and one night of hotel) after submission of the travel ticket and hotel bill:

- Arrival from France: up to a maximum amount of €350,- (but not more than real costs)
- Arrival from foreign countries: up to a maximum amount of €500,- (but not more than real costs)

## Contact

If you have any questions, feel free to contact us:

### **Peter Stansfield**

Wavecrest Sytems

Work phone: +44(1582)849481

As would be expected in the very busy media industry, only a small percentage of invitees actually came.

The actual attendee list is as follows:

Name	Country	Company
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		
anonymous		

## 4.5 Feedback

In order to get a better feedback from the experts, they filled in a survey after the Workshop. The survey is included in annex 2.

### 4.5.1 Analysis of the Survey forms

#### General Questions:

The first questions were related to the business areas and size of companies of the User Group attendants. A quite broad business area was covered mainly with content providers/aggregators and multimedia, audiovisual and mobile productions, but also some participants were related to film industry and 3D & VR solutions. Mainly small companies (1-50 employees) came to the event with some small representation of big companies (100-500 employees).

## Audio Transformation Tools Demonstration

Despite the fact that audio was not the business area of many of the attendees, most of them found the real-time capabilities and the clear interface very important for success, not giving too much relevance to the offline rendering mode. They also pointed that using this technologies would in most of the cases decrease production costs, at least for the voice transformation technology.

Here are some comments from the attendees:

*From anonymous:* For us it is not immediately relevant. This may be relevant in some areas. I thought the tool may be useful in realtime customer service situations. The ability for an e-commerce company to modify the voice of a service assistant to match the profile of a given online customer may be useful. We know that we tend to respond and trust “people like us”. This is in the context of user reviews. We also know users find it easier to talk to someone like himself or herself. In some situations a male voice is perceived as more authoritarian and in other more threatening etc. If a single service assistant could modify their voice to match the potential concerns, demographics, age of a caller they may have a more successful engagement.

*From anonymous:* Visual feedback of the waveform is also very useful and was demonstrated in the current application. I would need to access the tool in Motionbuilder if possible. The realtime aspect is of prime importance. As a part of our live avatar system, I would look forward to integrating the code or accessing it to transform the user’s voice to match the avatar being shown. This is a software currently in development. It could also be useful for our AR software, MagicSymbol, to allow users to add characterized voices to their 3D models. The cost to integrate the tool within our system would just be the additional development to integrate and tweak the code, then we could charge extra for the added functionality and appeal. Otherwise, if we would use the software for generating additional voices from one actor session, it would be a saving. We think as a scenario for using your tools in interactive events where the public use the tool (VR karaoke, interactive museums, high tech store installs, public events and launches). The ability to mimic a well-known voice with a target filter is very useful as well, and could be used in conjunction with our LILA software (realtime avatar and motion capture)

*From anonymous:* For us this technology would be expected to be within the service provided by a sound Mastering-House, in this case presumably, the service would add time. For us would be useful the application to convert Adult voices to children.

*From anonymous:* We think that a clear interface, real-time processing and integration in other software are factors which are a must for a plug in of its kind, same as their effectiveness and competitive sound quality which would make these tools attractive in any recording and post production studio. Voice and tempo transformation tools are used often in the post-production process. Having a variety of similarly functioning plug ins produced by different companies will add value and competitive edge to a recording or post-production studio, while enabling to offer more choices for a client in the production process (every audio transformation tool has its unique audio characteristics). As a result, the added value and competitive edge would balance the cost. We would use your technology for the next cases:

Voice transformation – special effects for vocals (doubling, pitch shifting/correcting, creating desired natural choir effects by pasting differently transformed voices to multitude of tracks;

Tempo transformation – it is often hard to determine the right tempo/feel for a musical composition or a section of a composition in an early stage of recording. High quality tempo transformation can solve many problems in the given context in the post-production process.

*From anonymous:* An easy and clear interface, real-time processing and integration in other software are the factors that would enlarge the amount of customers who use the tool be it using in professional or home studio. In our business – music recording - would use it to get more options as follows:

1. playing a melody, it can be transformed into a many vocal chorus in an instant.
2. playing a melody, it can be tested if the performance would be better for male or female vocal (etc, continues calmer or more powerful performing, different moods can be tested, or specific timbre
3. playing the melody, it can be then transformed an octave up or down. All these are abilities that a sole singer would not have.

Considering the work involved in the comments made earlier both time and money will be saved if such work with melody is desired. After playing around many options the result chosen to present the music, will be the best. Both voice transformation and Tempo Transformation technologies give more options to

choose the best performance for the composed piece of music. Editing work is made a lot easier as well. Therefore it is useful to both the composer and the studio engineer.

### **Semantic Annotation Tools**

Most of the participants found the approach of annotating media resources rather easy and comprehensive, while a few found it rather difficult. Most of them appreciated more the factors of finding again resources previously created in previous projects as well as the possibility to integrate the system inside other authoring applications. As the semantic annotation tools were not relevant to the areas of business of some of the attendees, in these cases the cost of using them would be increased but it would be compensated with a better quality of service.

Here are some comments from the attendees:

*From anonymous:* This was an application that would be very useful for larger projects with many artists working on a series. I found the presenter very open to ideas for making it more intuitive for artists. It might be more useful to have thumbnails and a glossary to help the artist find assets more easily. It would be useful in the case of series work, after the initial pilot were sold. If some of the changes we suggested were implemented (and tags could be created for specific individual needs) it would be very useful in organizing re-use of assets after the original pilot scenes were completed, and then added to as the project continued.

*From anonymous:* Text input is fine for most, but drag and drop would be very useful on the menus. It would be useful in making filming and production notes especially. We could organise thoughts on camera settings for stereo and the like, as long as it was fairly seamless to use. It is likely one of the things that would need to be used for a few months before its true value is recognized, but the ability to amass stereo filming knowledge and stream that out in near real-time to a database or website would be excellent. There could be an increase in efficiency in regards to analyzing filming techniques after and before jobs.

*From anonymous:* This seemed like a lot of work for not much return.

*From anonymous:* The tool is clear and well structured, will help to save time in the process. A well organized and detailed data bank is important factor in all projects where previously used data could be reused, by having an easy access to all information needed.

*From anonymous:* Creating the list of materials is being the most precise and time consuming work. Probably there would be time when musicians would look for specific material they recorded some time ago... but nonetheless they would not start filing all the material for that purpose. Would the material be listed automatically like, all Shakespeare books scanned in and then it would be easy to look up a specific quote or thought... But to make specific filing a day to day job in order to find a part in years to come, this sounds more like a job for libraries than everyday other business. Too work consuming therefore costly for my use.

### **Text to Speech Synthesis**

Some of the attendees didn't know about any commercial tts system to compare with whilst other have tried some systems and compared results with the SALERO tool, although only two of them had used them in their business. Naturalness and intelligibility are the most appreciated factors in the synthetic voice, rather than expression. About the cost impact of using the technology in their business there were different opinions, some thought that costs will be decremented or remain the same while others though that will be an increase.

Here are some comments from the attendees:

*From anonymous:* There are some commercial TTS systems like Kindle, and also OSX and other operating systems have the capability of turning text into speech. I believe the way we do it now (ie: create a scratch track reading the text into the computer directly) most correlates to the timing of the performances actors give, which comprises the final voice track. Unless one wanted robotic voices, I see no sense in this application.

*From anonymous:* I find it hard to see examples of TTS, beyond the established ones such as GPS navigation, automated help systems etc.

*From anonymous:* TTS systems can be found in Transport messages, public space messages. sat nav. The technology could be applied possibly in a read out of an interactive display (text messages from

mobile). We could use it for media/art/technology installations and screens where a certain interaction is required.

*From anonymous:* The technologies have to be perfect to be used in our business.

*From anonymous:* We know some examples of TTS like Apple PlainTalk, Festival Speech Synthesis System, FreeTTS, Kurzweil 3000. We have also used Vocoder in music productions.

*From anonymous:* I have seen-heard TTS used in study areas and artificial teachers. I have listened to them in museum prerecorded presentations and recorded phone info messages. The technology can be used both professionally, especially if the quality of the result is high (professional recording studios) or regular studios (for example, making audio guides) where easy understanding and easy using are the keys. We have used or see future usage of TTS technologies in some scenarios:

1. Have used "cruel" or "devil's" voice saying some sentences at the beginning of a song (recorded a metal band).
2. Typing in a text and to get it read out loud for a live performance – this is a fantastic tool.
3. Using the tool instead of real actor, there could definitely be some possibilities where there is spoken text within a song or between the music pieces, where a different character voices (angry, happy, sad etc... could be used instead of hiring an actor. OR even if the end product will have a real actor to speak the part anyway, then as a working tool it is still very helpful.

Depending of course what the cost of the tool would be it still seems like saving could be made by using it in long term. The longer the speech or the more often the speech is needed , especially instead of the real actor, the more practical purchase it is.

### **Facial Animation Tools**

Although the facial animation tool was not very relevant to the business of some of the invitees, all the features of the tools that the attendees were asked about appear to be very important to the participants such is a clear interface, real-time processing, expression, and embedding of the tool in other applications.

Here are some comments from the attendees:

*From anonymous:* Speed of and naturalness of transformation from one expression to another is very important. Systems which just transform through global keyframes are less convincing as those which transform in a fluid movement between any two states. If these can be delivered realtime via a browser and at a speed and rendering quality to deliver convincing results then they could be used. But while they are just for high quality rendered final output then they have no application in an online environment

*From anonymous:* It is obviously important to have the facial expressions on the circle be actual useful expressions, so I wonder if some tweaks or weighting can be done so that more faces sitting within the circle are instantly recognisable. I like the automatic nature and especially the chance of having it being driven by text or speech. I wonder what kind of useful input can be made to motion builder in order to facilitate my preferred use of it. Other than that, perhaps a waveform analysis could recognise words and feed these to the face animation tool in use in our AR program for live interaction. Again, we would spend time integrating it into our present programs (with luck) to offer added features. It would not be so much facilitating workflow as adding to the Live VR, AR capabilities of our work by being small footprint, real-time, and semi-automated in creating /producing content (Maskle). As long as we could get this to work in OSG or otherwise integrate it with our Magic Symbol AR technology, I would anticipate a very fruitful use for the technology in making faces in our character models interactive to typing, emails or voice. This would be a very exciting use of the technology, and one that would help set our AR tech apart.

*From anonymous:* The technology would have to be very good to be actually usable. The tools can be used to speed up the animation process, therefore reducing its costs.

*From anonymous:* In the production of an animated series these tools could be used for distant background characters...but wouldn't be quite good enough for full screen characters yet. The system needs non-symmetrical expressions.

*From anonymous:* The most important issue here is the emotional impact. In some cases there is no need to spend time on a fine detail, yet sometimes it may be necessary. In that case it would be important to have also the possibility to embed the tool in external applications such as Maya. For our

business, the reason to use the tools would be because it is fast, user friendly and easy to use and could be used in the pre-production phase while working on dynamic and emotional aspects of a production where 3d projected animations are incorporated into live theatrical show.

*From anonymous:* In general, a clear and easy to use interface should have the tick “very important”, but a “good” interface, supporting more functionality is preferred to a ‘very good’ interface if it supports less functionality. Real-time feedback is an absolute must. In our case, the possibility to embed the tool in our own real-time applications is a necessity. In its activities on virtual interactive communities, Androme is increasingly more confronted with a need to animate avatars, especially with respect to facial animation (currently only basic motion and no facial animation is provided). Automated Facial Animation Tools such as presented at the Event can provide a solution. As facial animation is currently not provided in the Androme virtual interactive community applications, adding facial animation would clearly increase the cost. However, using the automated SALERO tools would decrement the additional cost. As a single parameter can already generate a whole spectrum of facial expressions as demonstrated in the “Wheel” tool, we anticipate this would be our first approach towards integrating facial expressions.

*From anonymous:* If it is not the main character then it becomes important how simple and fast the way of creating the character or creating a character for a specific situation is, The main character would obviously need more specific work but as much work is not needed for background character, mass scenes etc.

### **Assisted Program Generation/Prototyping**

When asked about what is more important between lipsync and body/face animation, most attendees answered that both are equally important. Although the assisted program generation tool was not very relevant to the business of some of the invitees, all the tools features that the attendees were asked about appear to be very important to the participants, a clear interface, real-time processing, speed of implementation, and ability to use/move virtual characters. The importance of dealing with audio within the tool was considered as relatively low. About the cost impact of using the technology in their business there were different opinions, some thought that costs will be decremented or remain the same while others thought that will be an increase.

Here are some comments from the attendees:

*From anonymous:* Although I do not create games, or use 3D animation, I found the avatar builder very interesting and would remember this if should I ever need it!

*From anonymous:* The tool is not immediately relevant for us as we concentrate on online delivery, and we need real-time solutions which can be delivered via a browser and modified either by the host system in response to user interaction or directly by user interaction. This work is interesting as it shows what will be coming to the web in the near future.

*From anonymous:* Obviously, for AR and VR the quality of real-time is of paramount importance. The ability to integrate it into our applications LILA, Motionbuilder and MagicSymbol would determine how much we could use it. As for the applications, they are certainly additions to what we could offer clients, and certain elements could over time make savings. I believe the initial purpose to use the system would be to offer more functionality to clients above saving time. As the system is integrated and used we would make a time savings in offering more products and increasing revenue coming in.

*From anonymous:* The most important factor of the tool would be an easy to use interface, but also how large is the variety of prototypes that could be generated and the speed of implementation.

*From anonymous:* In some of our virtual interactive community applications, we use a combination of video-based and 3D representations; as such, lip-sync is not vital for us. Our virtual interactive community applications would certainly benefit a lot from the demonstrated SALERO tools for animating virtual characters, as our animation capabilities for avatars are currently limited. Existing media applications exhibit an increasing level of realism with respect to avatar animation; in our own virtual interactive community applications, we will have to follow this trend, and tools such as demonstrated at the Event could clearly support us. Increased animation capabilities in our virtual interactive community applications will clearly increase production costs, but using the SALERO tools would decrement the additional costs.

*From anonymous:* To be able to create many different fun characters, playfulness that is easily achieved will catch the audience.

## Feedback Comments

At the end of the questionnaire, invitees were asked to add some feedback comments about the SALERO project. Here you can read some of them:

*From anonymous:* As a consultant working with clients in the audiovisual industry I am always on the lookout for new technologies or products that will be of interest to them. Although the facial and animation demonstrations were of most interest I think an integration of the technologies would be of greater interest. To do this there needs to be a closer appreciation of practical workflows and how the tools would work within them. For example the semantic annotation tool appeared not to have taken into account the fact that there would probably have been a written script associated with the images and that using that automatically would have changed it into a more interesting and practical application.

*From anonymous:* Impressed to see progress again. Certain tools have evolved to the stage where they would benefit greatly from serious end-user testing in order to become candidates for commercial release. Others appear less evolved than technologies that are already commercially available, against which they might struggle to compete.

*From anonymous:* The tools available had the right goal in mind, but coming from a high end film background, as opposed to TV, I found some of the tools lacking in features. However, most of these tools were in early stages of development so I can see them becoming more useful as their development progresses. It is a great idea to bring all these tools together in one place, and I can see these technologies greatly speeding up productions on a tight schedule in the future.

*From anonymous:* Although none of the applications I saw were particularly relevant to the work I am doing now, it was very interesting seeing what is being developed right now. It had been my experience that one never knows what might spark future projects and needs. Thank you for inviting me and I hope the developers found the comments of a traditional animator useful!

*From anonymous:* I found the project to be interesting, well presented and organised. We did come across some technical issues with one of the demonstrations which was unfortunate however we still managed to understand the use of the tool and how it could benefit us. It is good to know that these tools are in development if we required something of this nature in our future projects.

*From anonymous:* I found the work very interesting. Although not all areas were immediately applicable to online some may be in the near future. I would like to know more about the semantic annotation tools as I see the benefits of applying semantic metadata to content as an area where there will be online and general benefits in areas of data exchange.

*From anonymous:* There were certainly many elements that we would find useful, and I like the idea of an overriding vision for improving the ease and time involved in production of assets. Where this would be most useful for us is if it can be applied to realtime VR and AR such as in LILA our markerless motion capture system or MagicSymbol AR, our implementation of ARToolkit. If it were to be targeted for mainstream offline production, I think it would run up against the heavyweights on one side (Autodesk) who would seek to implement any ideas found in the public realm, and the people who necessarily must do their code bespoke (Games Programmers) who would always try to do things themselves anyway.....Unless somehow you target this as games middleware, which of course is a booming business. I certainly welcome the flexible and friendly approach to trying to tie the whole process together.

*From anonymous:* These projects were interesting, but some appeared to be long way off being professionally useable. The altering of voices could be very useful. Voice artists are expensive and we try to use the same artist to do several voices. Helping to alter the sounds would be a handy tool. The Text-to-Speech tool seemed to have a way to go... and the storage/labelling of images appeared to us a lot of work for little reward.

*From anonymous:* It was great to see a variety of tools that all were related and could be used in conjunction with each other all in one room. The demonstrations that we heard were clear and well executed bar a technical difficulty experienced with one presentation. We were still able to determine the usefulness of the tool though. It's good to see that there are people taking a vested interest in the technologies that aid the production of games and animated shows in the UK. The more help companies can get with understanding and using new technologies that actually help the better.

*From anonymous:* The project that has been developed and presented by SALERO not only increases the competitiveness of European multimedia scene with regards to similar developments in US and Asia but can also be regarded as a great contribution in terms of new technology based solutions in creative and interactive environments.

*From anonymous:* I found it interesting to see how many of the tools researched upon can be applied in a relatively broad range of media applications.

*From anonymous:* All presented tools have a variety of possibilities both in multimedia business and home entertainment. It gets even more interesting when combining the use of different tools will be possible. It's a whole new world out there and Salero has big part in creating it!

## 4.6 Discussion

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During the presentations of each of the production tools, participants of the User Group had the opportunity to raise particular questions to the speakers. Most of the questions referred to software availability issues, i.e. minimum requirements, maturity of the software for real-world use, and licensing.

Several attendees were particularly interested in the activation-evaluation model for facial animation (presented by FBM-UPF). *Anonymous* complemented the approach and wondered whether we could extend it to use facial motion capture from human actors, which would complement the approach taken by his company for other animation issues. *Anonymous* thought the system would be particularly useful in virtual worlds where there are many different virtual characters, and the system needs a way of rapidly and intuitively setting facial expressions.

Feedback concerning Semantic Annotation and Search has been documented in D3.1.7 (section 6.8). Attendees generally expressed positive thoughts about using the tool for search & retrieval in production workflows and suggested smaller improvements of the user interface.

## 5 Fifth User Group Event in Amsterdam (Sept 2009)

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### 5.1 Location

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Amsterdam was selected again for the fifth User Group event to coincide with the International Broadcasting Congress & Conference (IBC 2008). The idea was to attract media professionals that also were attending the IBC to our SALERO User Group in order to introduce the project to these industry representatives and to gather feedback from them. In this case, we had the opportunity to have a booth within the Trade Fair during the whole week that the exhibition took place; the SALERO booth was located in the “New Technology Campus” area where some research centres have the opportunity to showcase their research and achievements. The New Technology Corridor provided the project SALERO the opportunity to present their productions to the IBC visitors and have representatives from the project partners on hand to provide more detailed technical explanations and demonstrations of specific tools as appropriate. The demonstrations were in the context of an integrated set of tools and this made them an interesting set of exhibits for all visitors to the New Technology Corridor.

The SALERO project had also a paper accepted for the IBC conference; Georg Thallinger presented “SALERO: Semantic Audiovisual Entertainment Reusable Objects” in the session: *Future technologies - Technological developments and their impact*. Visitors that attended the conference were invited to come to the SALERO booth to learn more details about the project as well as to watch live demos.

The IBC show in Amsterdam provided the opportunity for all the partners to work together to demonstrate our developments and how they had been used in the various experimental productions.

### 5.2 Presentations & Demos

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All four Experimental Productions developed during the final year of the project as well as the tools used by them were represented and available to showcase in the IBC booth. Also a poster with a general diagram about the whole project and two posters about the Experimental Productions with more details were displayed/mounted on the walls.

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SIXTH FRAMEWORK PROGRAMME

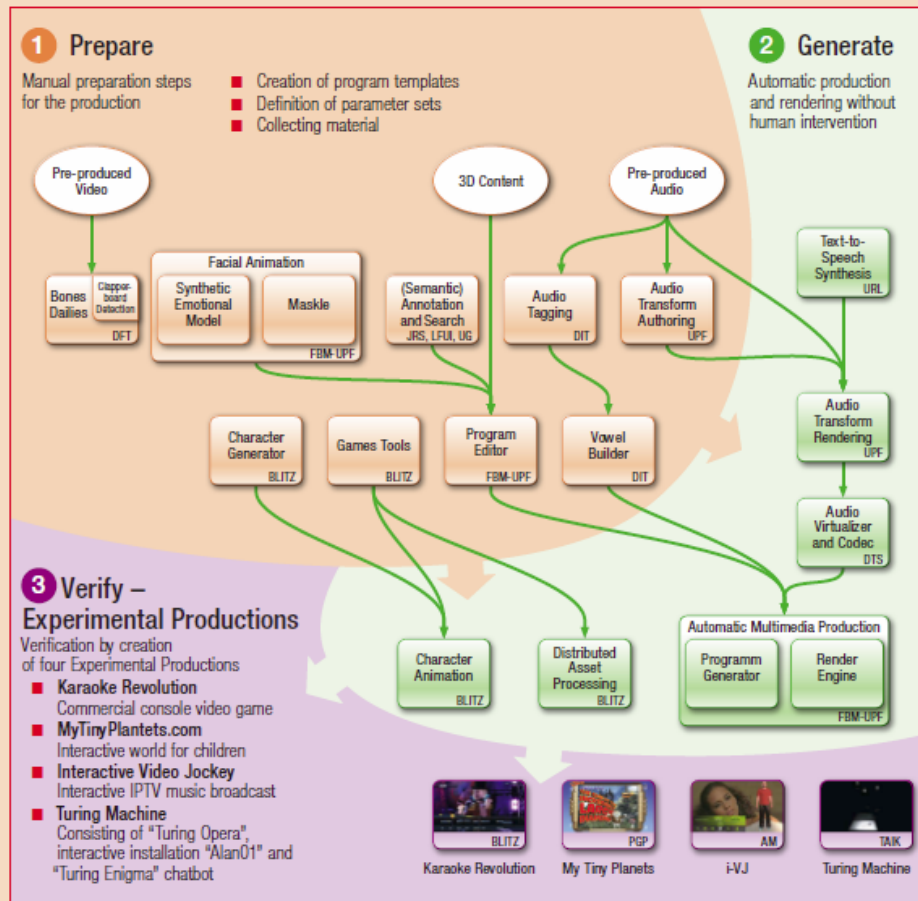
The R&D work carried out for the IP SALERO is partially funded under FP 6 of the European Commission within the IST Workprogramme 2004 (IST FP6-2004-027122)

# Semantic Audiovisual Entertainment Reusable Objects

## Vision & Objectives of SALERO

- Define and develop 'Intelligent Content' for media production
  - consisting of multimedia objects
  - with context-aware behaviour
  - for self-adaptive use and delivery across platforms
- 'Intelligent Content' enables the creation and re-use of complex, compelling media
  - artists need to know little of the technical aspects of the tools

## Workflow Possibilities



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General Diagram Poster of SALERO tools and EPs for the IBC 2009 Booth

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SIXTH FRAMEWORK PROGRAMME

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ISO 9001:2008 certified

# Semantic Audiovisual Entertainment Reusable Objects

## MyTinyPlanets



Experimental interactive on-line game uses techniques and tools from SALERO in a practical demonstration of reusable, cross-media content.

- Voice transformation
  - Music pitch transformation
  - Automated animation
  - Asset reuse
  - Audio and stress analysis
  - Audio virtualisation
  - Text-to-Speech Synthesis
- The tools allow designers to:
- Distort performers voices to match stylised characters
  - Transform music to suit context
  - Animate characters using automation tools
  - Animate characters using audio analysis
  - Affect audio for better performance on headphones



The game is part of the My Tiny Planets online universe which allows users to create a planet, customise it, play games and quizzes, chat with friends, and watch videos.

## Turing Machine Cross Media Production



The *Turing Machine* Cross Media Experimental Production is made up of the physical space installation *Alan01*, Turing Impact digital High Definition short films and the online service *Alan Online*, that combines the productions and reuses their media assets.

SALERO tools were integrated into the production of *Turing Machine*:

- Animations were created using Facial Animation Toolset
- Aspect Browser was used to retrieve a symbol from a pre-selected set of fifty
- The voice of *Alan Turing* was created using Text-to-Speech Synthesis. The voice was manipulated using Voice Transformation
- Sounds in *Alan Online* were manipulated using Surround Sound Virtualization
- Bones Dailies was used as primary colour correction tool, media server (SAN) and ingest/ output platform in the production of *Turing Impact* HD short films.



Turing Machine investigates associational storytelling and interaction structures, while making the patterns of human-machine communication more visible.

<http://mlab.taik.fi/alanonline>

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First Experimental Productions Poster for the IBC 2009 Booth



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SIXTH FRAMEWORK PROGRAMME

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## Semantic Audiovisual Entertainment Reusable Objects

### i-VJ (interactive Video Jockey)



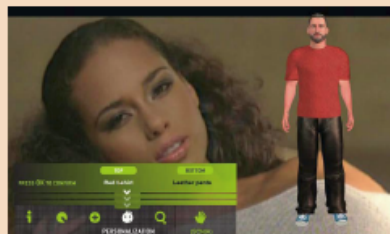
The experimental i-VJ production uses concepts which are of great importance in the context of SALERO and the development of the industry.

These concepts are:

- Automation
- Assets reuse
- Text-to-Speech Synthesis
- Voice transformation
- Contextual retrieval

That service allows users to:

- Search for music videos.
- Decide the virtual VJ's appearance.
- Create and manage their own playlists.
- Activate and deactivate music news headlines.
- Manage their user account.



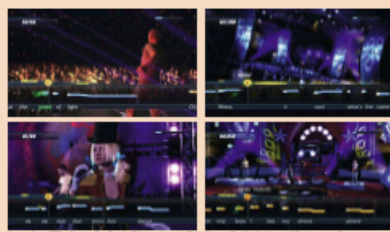
This experimental production is an Internet TV music channel presented by an interactive virtual character and based on a 24/7 automatic broadcast and VoD (Video-on-Demand) service. Internet TV is in line with two growing trends in digital content, making the TV experience more interactive and allowing for customization.

### Karaoke Revolution



The Karaoke Revolution Experimental Production is a commercial console video game due for release on Xbox 360, PlayStation 3 and Wii in Q4 2009.

- Procedural character generation demonstrates use of adaptive content to create varied realistic characters from minimal art assets.
- Visual shader editor enables artists to automatically generate program code for complex surface effects.
- Visual animation tool allows animators to visually combine base animations to create unique movements.
- Visual scripting tool provides a designer interface to generate scripted and logic sequences.
- Distributed asset processing accelerates game data generation using the power of multiple client machines.



Karaoke Revolution is developed by Blitz Games Studios Ltd. and published in the North America and Europe by Konami Digital Entertainment Inc.

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Second Experimental Productions Poster for the IBC 2009 Booth

Apart from the posters, the setup in the booth consisted of three big screens connected to laptops to showcase the tools and Experimental Productions as requested by visitors. At times, when no demos were being presented, we also had a slide presentation of the whole project going on and some self explaining videos about the tools and EPs.

Here is a list of the SALERO tools available in the booth:

- **Audio Transformation Authoring and Rendering Tools** (Oscar Mayor, UPF)
- **Audio Virtualizer and Codec** (Simon Cheung, DLLNI)
- **Text-to-Speech Synthesis** (Ignasi Iriundo, Jordi Adell, URL)
- **Audio tagging / Vowel Builder** (Charlie Cullen, DIT)
- **Intelligent Media Annotation and Search** (Georg Thallinger, Gert Kienast, JRS) (Tobias Bürger, LFUI)
- **Image Search & Retrieval** (Robert Villa, Vasilios Stathopoulos, UG)
- **Facial Animation / Program Editor** (Alun Evans, Marco Romeo, FBM-UPF)
- **Bones Dailies** (Fach Reinhard, DFT)

And the list of available Experimental Productions:

- **MyTinyPlanets** (Carl Goodman, PGP)
- **Turing Machine Cross Media Production** (Tea Stolt, TAIK)
- **Interactive Video Jockey** (Sonia Miarnau, AM)
- **Karaoke Revolution** (Mary Matthews, BLITZ)

### **5.2.1 UPF: Audio Transformation Authoring and Rendering Tools**

The Audio Transformation Authoring Tools are a set of VST plug-ins and online tools including Voice Transformation, Tempo Transformation and Pitch Transformation.

Voice Transformation allows several singing and speech voice transformations in real-time using spectral techniques for modifying the character of the voice. Transformations include: transposition, quantization, vibrato, roughness, breathiness, whisper, timbre mapping and other spectral transformations. This tool is targeted to recording or post-production studios that require voice processing. Another version of the tool implemented as a webservice allows the rendering process of converting many input voices using a transformation preset created with the authoring tool in a batch process.

Tempo and Pitch Transformation combines automatic rhythm analysis and time-scaling in order to transform the rhythm of an audio mix. The user can vary the tempo or add/subtract swing by using the GUI controls during the playback. Also an online version of the tools allows to change the pitch of polyphonic music maintaining the quality of the original.

[http://www.salero.eu/en/showcase/audio\\_transformation.html](http://www.salero.eu/en/showcase/audio_transformation.html)

### **5.2.2 DLLNI: Audio Virtualizer and Codec**

The DLLNI Surround Sound Virtualization tool allows a sound designer to enhance stereo and multi-channel materials, providing richer spatial perception and better dialogue clarity with 2-channel playback devices. With this tool, audio contents can be optimized for different target speaker devices, such as headphones, laptop and other types of speakers with different frequency responses/design characteristics. The virtualization engine can be configured to match current sound files for optimum effects. The tool also includes a common down-mix processing mode for comparison. This provides a real-time comparison and should clearly show the benefits of DLLNI surround processing over conventional down-mix approach. The virtualized output can be directed to the computer's default playback device or to a file for later use. As input and output are both in WAVE formats, the tool can work directly with common WAVE sound files and the virtualized file can be played back using standard WAVE player.

The Scalable Codec tool allows audio producers to quickly evaluate coding quality versus their bandwidth requirement by directly playing back encoded files to a sound device on Windows PC platforms. As an alternative, the decoded output can also be saved to a file for later comparison to other bit rates. Available channel configurations include Mono, Stereo and 5.1 multi-channel layouts, in a range of common bit rates.

### **5.2.3 URL: Text-to-Speech Synthesis**

In this presentation Text to Speech system developed by URL was presented. The last improvements and new voices are available, showing the TTS technology's usefulness in audiovisual productions. In addition, a complete demonstration of the TTS capabilities, working with different scenarios (or domains), speaker gender (female and male) and language (English and Spanish) were presented by means of a web page where everybody can create its own example.

### **5.2.4 DIT: Audio tagging / Vowel Builder**

The Vowel Builder and Vowel Player applications were presented by DIT. These applications consist of online character animation tools providing a cross platform authoring and delivery mechanism for interactive, reusable and multilingual content. The system is designed to work with any reusable avatar, and thus separates the authoring and rendering processes. Interactivity is provided by means of simple scripted narratives, and real-time configuration of an avatar is possible. In addition, the system allows multiple characters to be authored and rendered in a single pass, providing means for animation of dialogue speech using one asset.

### **5.2.5 JRS/LFUI: Semantic Annotation**

The Intelligent Media Annotation and Search (IMAS) tool allows easy annotation of media assets for later retrieval and reuse by users in media production. In order to support this, it has been built based on the following design principles:

- Designed for content creators: The target users of the system are nontechnically experienced content creators in the domain of media production.
- Easy to use: The interface provides Web 2.0-based interaction mechanisms to make the annotation process as easy as possible.
- Global annotations: To facilitate the annotation process, we only allow global annotation of media resources instead of annotating parts of it.
- Statement-based annotation process: We allow creating statements, which use ontological elements, to describe the content of media resources.
- Ontology extension during use: We allow users to easily extend the ontology.
- Portability of the system: In order to port the systems to other domains, only the underlying annotation ontology has to be adapted.
- Integration of semantic and content-based search: The system provides an integrative view onto results from different search engines and by that provides a fallback solution which is able to retrieve objects without annotations, too.

### **5.2.6 UG: Image Search & Retrieval**

The main demo presented at the IBC User Group event was the AspectBrowser search system, which allows a user to search image, video and text collections which can be local or remote. The system has been designed for end users, and provides facilities tailored to needs of the creative industry, including:

- The ability to carry out multiple searches and store the results of the searches in 'aspects'. Material can be re-organised between the different aspects in a flexible manner
- Support for multiple collections, which can be internal (e.g. image or video collections indexed using the SALERO indexing interface) or external (e.g. YouTube, Flickr, etc.)
- The first two points together enables a user to easily search and compare the results from multiple collections, and also enables a user to take advantage of search results from one

collection to search a different collection. This is particularly useful for searching collections without text.

- External example images can be uploaded and used to search
- For collections which can be annotated, the annotation interface can be automatically linked to directly from the AspectBrowser search results

Taken together, these facilities provide a user with a powerful searching environment in which to carry out content-based searches. The demo during IBC demonstrated some of these facilities with the TAIK collection of images which are used in TAIK's Turing Machine/Alan Online Experimental Production.

### **5.2.7 FBM-UPF: Facial Animation / Program Editor**

As well as the facial animation software (demonstrated in Annecy, see section 4.3.3 of this document), FBM-UPF demonstrated the Programme Editor and the associated framework and suite of tools for automatic programme generation. IBC attendees were shown live demos of using Programme Editor to create an animated clip from scratch, and then export it to a video format of their choice using the Programme Generator.

In addition, several delegates who expressed interest in animation were shown the facial animation technology (see 4.3.3).

### **5.2.8 DFT: Bones Dailies**

Digital Film Technology showed the Bones Dailies system in the DFT Booth in hall 7 during the entire show. The system was configured with a dual screen setup and a high speed fibre channel disk array to show the realtime capability of the 2K workflow used in the film industry today.

<http://www.ibc.org/page.cfm/Action=Exhib/ExhibID=1886>

In order to give a professional presentation of the system capabilities an operator from a post production house had been hired. The operator had daily face to face meetings with other professionals out of the post production industry and was able to show convincingly the benefits of Bones Dailies in a working environment. Demonstrations at the exhibition have been done partly with film material which was generated during TAIK's post production workshop in May 2009.

The review team received a presentation during an "after hour" session on 14<sup>th</sup> September.

### **5.2.9 PGP: MyTinyPlanets**

Pepper's Ghost Productions demonstrated the interactive adventure, 'The Case of the Incredibly Large Diamond' on the stand at IBC. The experimental production included the use of voice transformation and pitch transformation, automatic animation tools, text to speech, animation methodologies from DIT, and re-use of assets from broadcast animations. In addition PGP previewed the 'Mission to Blizzard Valley' adventure which included various new animation approaches and Flash based games and puzzles. 'The Case of the Incredibly Large Diamond' built on video sprite techniques developed during the previous experimental production in which the 'Klaatu' interactive help system was prototyped.

### **5.2.10 TAIK: Turing Machine Cross Media Production**

TAIK presented the *Turing Machine Cross Media Experimental Production*, which integrated SALERO tools into a research project that investigates associational storytelling and interaction structures, while making the patterns of human-machine communication more visible. It is made up of the physical space interactive installation *Alan01*, *Turing Impact* digital High Definition short films and the online service *Alan Online*.

Two videos by TAIK played on a loop on one of the HD monitors at the SALERO IBC booth, using the VLC player application. Videos were also shown by request to interested IBC visitors during face-to-face personalized project presentations. The first demo was a HD resolution video (1920 x 1080 pixels) with a duration of 6 minutes, describing the *Making of Alan01, Alan Online & Turing Impact*. This video included artist interviews and footage from the installation exhibition. The second demo, the short film *A Bite*, also in HD, was selected from among the Turing Impact short films. A Powerpoint presentation with information on the TAIK 3<sup>rd</sup> EP was included in the slideshow that was presented on another monitor in the booth. Visitors could also try out the browser-based flash application interface of Alan Online

(<http://mlab.taik.fi/alanonline>), that demonstrates the use of UG's Aspect Browser for content-based search and retrieval in the production.

### **5.2.11 AM: Interactive Video Jockey**

Activa Multimèdia presented the application Interactive Video Jockey at IBC. Visitors could watch the music channel and could access the interactive service related to it. They had to log in and then they could search for video clips of their favourite artists. They were able to create playlists with the music videos they had chosen previously so they could play them later. As the presenter of the channel is configurable, the visitors could select if they wanted a male or a female character, his physical aspect and also his clothes. Another functionality visitors could try is the search for videos similar to the one they were watching. Furthermore, all other features of the application were explained to the SALERO booth visitors as well as how the intelligent engine AM uses in the IPTV service could easily be integrated into television environments.

### **5.2.12 BLITZ: Karaoke Revolution**

Blitz Games Studios demonstrated the procedural generation of game characters integrated into the Experimental Production Karaoke Revolution , as well as the visual game creation tools that improve the production pipeline.

The procedural generation of game characters is achieved through a combination of re-use of base assets, morph blending and scalable animation bones and enables the automatic creation of a game character almost instantly compared to a workload of between a week and a month, depending on the complexity of the art and animation required.

The visual game creation tools use a web page like interface to allow the user to select the desired element from menus and then apply them in the game editor. The visual shader editor enables artists to manipulate and add post production effects and see the impact of their work immediately, rather than having to ask for programmer input. The visual scripting editor or state machine editor supports designers to link complex sequences, add behaviours and Artificial Intelligence routines, again without programmer input and again enabling them to instantly assess the effect of new sequences or changes. This approach frees programmers for core coding and problem solving, ensures artists and designers achieve their vision for the game and allow many more iterations than would have been possible in the past, which leads to better games.

## **5.3 Attendance**

Using the current invite list we had been gathering during previous User Group meetings, included in Appendix 4, the SALERO consortium invited all the members in the list to come to our booth to see live demos of the SALERO tools and Experimental Productions as well as discuss about the new project achievements. Everyone in the invite list received the following invitation:

### **SALERO Exhibiting at IBC 2009**

**11-14 September, 2009**  
**RAI Center, Booth 3.D08**  
**Europaplein, Amsterdam**

SALERO will present its results at IBC 2009 in Amsterdam (11-14 September 2009, RAI Center). The SALERO booth (3.D08) is located in the New Technology Campus in Hall 3 of the RAI convention center.

Dear Members of the SALERO User Group,

herewith we cordially invite you to visit us at IBC in Amsterdam (11-14 September 2009, RAI Center). On our booth we are giving you an overview on the results of the project:

- We will demonstrate parts of the experimental productions
- Show how SALERO tools may automate parts of your media production workflow and

- Demonstrate a wide selection of SALERO tools.

We are located in the "New Technology Campus" - Booth 3.D08. Please drop by!

For those who are early in Amsterdam there is also the possibility to join the very first session of the IBC conference: There will be a presentation giving an overview on SALERO results during the "Future technologies: Technological developments and their impact" session, 8:30-10:15, Thursday, September 10th 2009 (see <http://www.ibc.org/page.cfm/action=Seminars/SeminarID=77>).

For further information on the SALERO project itself please visit: <http://www.salero.eu>

Looking forward to meeting you at IBC!

Georg Thallinger

## Contact

**Georg Thallinger**

JOANNEUM RESEARCH Forschungsgesellschaft mbH  
Work phone: +43(316)876-1240

Numerous people visited the SALERO booth as it was located in a corridor between two halls of the IBC exhibition and had a lot of passing traffic, many people stopped by interested about the project and after a small introductory presentation of the project, many of them were interested in watching real demos of the tools. As the SALERO project covers a wide range of technologies including computer graphics, audio and language technologies, semantic web technologies as well as content based search and retrieval, usually the visitors were interested in some of the live demos and after the demo they were usually satisfied.

It became obvious that no one visitor had the requirements for ALL of the SALERO demonstrated technologies. However everyone found one or more technologies that were applicable to their field. Usually, following a discussion after the demonstration, they went away impressed.

## 5.4 Feedback

Currently, all partners are analysing the feedback gathered from the visitors to the stand at IBC and the different aspects of the work which was of most interest to them. We would also analyse the SALERO output against other products/projects being demonstrated at the exhibition. With that, we would develop a methodology for extending the interaction of the project with particular IBC visitors and also to some attendees at the various User Group meetings. As part of the final dissemination deliverable we will provide all this added to a plan for continued interaction with key industry representatives (from IBC show visitors and User Group meetings).

In general, everyone we talked to that had attended SALERO demonstrations were most impressed. The location of the stand was deemed to be "ideal" and regular attendees at IBC found it without even needing to look at a map, the new technology corridor was easy to find. It was thought that the stand was well manned, with a differing range of skilled personnel (technical, artistic, managerial, etc).

## 5.5 Discussion

Given that the IBC tradeshow has a certain focus on production, it was no surprise to see several delegates expressing interest in the Programme Editor and automatic programme generation tools from FBM-UPF. Those delegates who saw the live demos praised the ability to rapidly prototype a

programme, and furthermore liked the ability to create templates form automatic generation, although this was slightly more difficult to demonstrate as a live demo.

Although audio transformation was not much relevant to the attendees at the IBC trade fair, many of the visitors where quite impressed with the real-time voice transformation demo and expressed satisfaction with the sound quality and naturalness.

## **6 VIDM Visits / Interviews (2009)**

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Peter Stansfield from Wavecrest systems contacted and had individual interviews to introduce the SALERO project to VIDM (Very Important Decision Makers) from the audiovisual industry. VIDM is the sort of people that cannot be drawn to user Group Events. Three 'One on one' interviews / demonstrations of SALERO technology were held.

### **6.1 First VIDM Visit (Anonymous)**

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Removed due to confidentiality issues.

### **6.2 Second VIDM Visit (Anonymous)**

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Removed due to confidentiality issues.

### **6.3 Third VIDM Visit (Anonymous)**

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Removed due to confidentiality issues.

## 7 Future Dissemination Events

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### 7.1 SAMT 2009

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Within the SALERO project JRS will organise the 4<sup>th</sup> international Conference on Semantic and Digital Media Technologies (SAMT 2009) in Graz from 2-4 December 2009. For detailed information on the conference see the conference's website <http://www.samt2009.org/>

During the industry day several SALERO industrial partners will present their research results and experimental productions.

## 8 Conclusions

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We believe that the user group meetings are a success. Whilst we acknowledge the difficulties of getting large attendance, we believe quality of attendees is important rather than quantity. The other part of the User group subcontract contains measures to 'stalk' very important decision makers in the media business, which would not normally come to public events.

We believe that the feedback from attendees is in general very supportive of the aims of the project. The only factor that may cause some concern relates to rendering quality. It seems important that the project teams concentrate on the improvement of this.

Overall, the user group meetings were as good as they can be. It's impossible to get an 'ideal' attendance, as if the events are organised in line with other major events, then these events can distract attendees. If they are NOT organised in line with major events (such as trade shows) then there is the difficulty in getting users to make a special trip.

## 9 Glossary

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### Partner Acronyms

AM	Activa Multimedia, ES
BLITZ	Blitz Games, UK
DFT	Digital Film Technology, DE
DIT	Dublin Institute of Technology, IE
DLLNI	DTS Licensing Ltd. Northern Ireland, UK
FBM-UPF	Fundació Universitat Pompeu Fabra, ES
JRS	JOANNEUM RESEARCH Forschungsgesellschaft mbH, AT
LFUI	Leopold-Franzens Universität Innsbruck, AT
PGP	Pepper's Ghost Productions Ltd., UK
TAIK	Taideteollinen Korkeakoulu, FI
UG	University of Glasgow, UK
UPF	Universitat Pompeu Fabra, ES
URL	Universitat Ramon Llull, ES

## 10 Annex 1: 3<sup>rd</sup> UG Questionnaire (Amsterdam 2008)

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### 3<sup>rd</sup> SALERO USER GROUP EVENT

Felix Meritis, Keizersgracht 324 1016 EZ

Amsterdam, The Netherlands

September 15th 2008

#### ***Introduction***

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This form is intended to provide feedback on the tools demonstrated during the second SALERO User Group Event in Amsterdam on September 15<sup>th</sup> 2008. All provided information is anonymous and will be kept confidential within the SALERO Project Consortium.

During the event, some tools are demonstrated: **Audio Transformation Tools**, **Semantic Annotation via the “Statement Based Tagging (StaBTag)” Approach**, **Text to Speech Synthesis** and **Post Production Workflow Tool for Rushes or Dailies** as well as some experimental productions: **Turing Enigma Opera** and **Turing Enigma Bot** and **Interactive Video Jockey**.

#### ***General Questions***

---

1) Could you please select the areas where your business is related with?

- content provider
- content aggregator
- audio tools for production
- music recommendation
- multimedia productions
- mobile entertainment (including games)
- games (PC or consoles)

2) Could you please indicate the size of your company?

- 1-10
- 11-50
- 51-100
- 101-250
- 251-500
- > 500

#### ***About the Demonstrations***

---

##### **Audio Transformation Tools**

**3) Could you please tell us how important are the following factors for an audio production tool?**

A clear and easy to use interface:

very important       important       marginally important       not important

Real-time transformations:

very important       important       marginally important       not important

Offline transformations (rendering mode with higher quality):

very important       important       marginally important       not important

Possibility to embed the tool in external applications (Adobe Premiere, Protools, VST plugin, etc.)

very important       important       marginally important       not important

Comments:

.....

**4) Could you please tell us how relevant to your business are the tools demonstrated?**

very relevant       relevant       marginally relevant       not relevant

Comments:

.....

**5) Please, score the cost impact in your business if using some of these tools:**

Costs would be decremented

Costs would be the same

Costs would be increased

Costs would be increased, although it would be compensated for a better quality of service

Comments:

.....

**6) In case your company would be interested in any of the tools, which ones are more relevant for you?**

Voice Transformation       Tempo Transformation       Advanced Audio Equalizer

Please specify for what you would use the tools:

.....

**Semantic Annotation via the “Statement Based Tagging (StaBTag)” Approach**

**7) Could you please tell us how important are the following factors for a semantic annotation tool?**

A clear and easy to use interface:

very important     important     marginally important     not important

Possibility to view any type of media object (image video, mesh, movement) during annotation

very important     important     marginally important     not important

The possibility to adapt the collection of words used for annotation

very important     important     marginally important     not important

Automatic suggestion of related words (e.g. synonyms)

very important     important     marginally important     not important

Possibility to select one of several meanings in case of homonyms (e.g. bank (financial institution) vs. bank(seating))

very important     important     marginally important     not important

Comments:

.....

**8) Could you please tell us how relevant to your business the tools demonstrated is?**

very relevant     relevant     marginally relevant     not relevant

Comments:

.....

**9) Please, score the cost impact in your business if using this tool:**

Costs would be decremented

Costs would be the same

Costs would be increased

Costs would be increased, although it would be compensated for a better quality of service

Comments:

.....

**Text to Speech Synthesis**

**10) Do you know any application where an artificial speech technology (speech synthesis) is applied?**

Yes

Could you give some examples?

.....

No

**11) Do you use or have used artificial speech technologies in your business?**

Yes

Could you give some examples?

.....

No

Do you think that could be applied in your business in the future? Could you give some examples?

.....

**12) What do you appreciate most of a synthetic speech? Please, use a number between 1 and 3 to indicate your preference (1 is the preferred)**

Intelligibility (the message can be understood)

Naturalness (the synthetic voice sounds are like a human voice)

Expressiveness (the synthetic voice changes are very human)

**13) Score the artificial speech technologies impact in your business costs?**

Costs would be decremented

Costs would be the same

Costs would be increased

Costs would be increased, although it would be compensated for a better quality of service

**Post Production Workflow Tool for Rushes or Dailies**

**14) Could you please tell us how important are the following factors for a post production tool?**

A clear and easy to use interface:

very important       important       marginally important       not important

Possibility to view any type of image file format (container formats, compressed images, uncompressed images)

very important       important       marginally important       not important

The possibility to incorporate 3<sup>rd</sup> party tools

very important       important       marginally important       not important

The possibility to share the media and metadata in collaborative work

very important     important     marginally important     not important

Possibility to generate multiple TV Video streams with different resolutions at the same time

very important     important     marginally important     not important

Possibility to adapt the post production tool to different storage technologies (SANs, etc)

very important     important     marginally important     not important

Possibility to connect render clusters to deliver improved rendering times tailored to a specific project

very important     important     marginally important     not important

Possibility to include image restoration tools for dailies post production

very important     important     marginally important     not important

Possibility to include special purpose keyboards for image manipulation in addition to GUI operation

very important     important     marginally important     not important

Possibility to export metadata to established post production systems

very important     important     marginally important     not important

Comments:

.....

**15) Could you please tell us how relevant to your business the tools demonstrated is?**

very relevant     relevant     marginally relevant     not relevant

Comments:

.....

**16) Please, score the cost impact in your business if using this tool:**

- Costs would be decremented
- Costs would be the same
- Costs would be increased
- Costs would be increased, although it would be compensated for a better quality of service

Comments:

.....

## **About the Experimental Productions**

**17) What is your overall opinion about the quality of the experimental productions?**

- Bad
- Poor
- Normal
- Good
- Excellent

**18) In respect to my potential application the rendering quality is:**

- better than needed
- as needed
- worse than needed

**19) In respect to my potential application the audio quality is:**

- better than needed
- as needed
- worse than needed

### **Turing Machine Opera and Turing Enigma Bot**

**20) How well does this cross-media production concept work as a demonstration of SALERO tools?**

- works very well
- works well
- works to some extent
- does not work at all
- can not tell at this stage

Comments:

.....

**21) How much added value does the animated 3D visuals created by using the UPF morphing tool (Facial Master) Maskle Feature of the Program Editor bring to the Turing Enigma Bot?**

- significant added value
- some added value
- no added value
- can not tell at this stage

Comments:

.....

**22) Does the use of the SALERO concept of emotional/thematic frameworks/grids in this experimental cross media production seem to make it more emotionally engaging?**

- Absolutely yes
- Probably yes
- Probably not
- Absolutely not
- Can not tell

Comments:

.....

**23) Could you find ways to re-use the Turing Enigma Bot for your purposes?**

Absolutely yes  Probably yes  Probably not  Absolutely not  Can not tell

If yes, in what context? If no, why not?

.....

**24) How well can the 3D objects created with SALERO tools be repurposed from one medium to another (eg. on-line bot visuals vs opera scenography)?**

Would you suggest using these 3D objects in any other medium or context?

If yes, what?

.....

### **Interactive Video Jockey (i-VJ)**

**25) Could you please tell us how relevant to your business are the tools demonstrated?**

very relevant  relevant  marginally relevant  not relevant

**26) What impact could it have in your company? Would it change production processes?**

Comments:

.....

**27) Do you think the sale of this type of application is viable?**

Comments:

.....

**28) Please, could give us any feedback about the whole experimental production?**

Comments:

.....

### ***Feedback***

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**29) Please, could give us any feedback about the whole project?**

.....

## 11 Annex 2: 4<sup>th</sup> UG Questionnaire (Annecy 2009)

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### 4<sup>th</sup> SALERO USER GROUP EVENT

Novotel Atria, Annecy, France  
June 10th 2009

#### ***Introduction***

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This form is intended to provide feedback on the tools demonstrated during the fourth SALERO User Group Event in Annecy on June 10<sup>th</sup> 2009. All provided information is anonymous and will be kept confidential within the SALERO Project Consortium.

During the event, some tools are demonstrated: **Audio Transformation Tools** (Voice / Tempo Transformation), **Semantic Annotation Tools**, **Text to Speech Synthesis**, **Facial Animation Tools** and **Assisted Program Generation**.

#### ***General Questions***

---

**1) Could you please select the areas where your business is related with?**

- content provider
- content aggregator
- audiovisual tools for production
- multimedia productions
- mobile entertainment (including games)
- games (PC or consoles)
- other .....

**2) Could you please indicate the size of your company?**

- 1-10
- 11-50
- 51-100
- 101-250
- 251-500
- > 500

#### ***About the Demonstrations***

---

##### **Audio Transformation Tools**

**3) Could you please tell us how important are the following factors for an audio production tool?**

A clear and easy to use interface:

very important     important     marginally important     not important

Real-time transformations:

very important     important     marginally important     not important

Offline transformations (rendering mode with higher quality):

very important     important     marginally important     not important

Possibility to embed the tool in external applications (Adobe Premiere, Protools, VST plugin, etc.)

very important     important     marginally important     not important

Comments:

.....

**4) Could you please tell us how relevant to your business are the tools demonstrated?**

very relevant     relevant     marginally relevant     not relevant

Comments:

.....

**5) Please, score the cost impact in your business if using some of these tools:**

- Costs would be decremented
- Costs would be the same
- Costs would be increased
- Costs would be increased, although it would be compensated for a better quality of service

Comments:

.....

**6) In case your company would be interested in any of the tools, which ones are more relevant for you?**

Voice Transformation     Tempo Transformation

Please specify for what you would use the tools:

.....

**Semantic Annotation tools**

**7) Was the approach of annotating media resources easy and comprehensible?**

very easy                       rather easy                       rather difficult                       very difficult

Comments:

.....

**8) Could you please tell us how important are the following factors for a semantic annotation tool?**

Seamless integration into other (authoring) applications, e.g. 3ds Max, Photoshop, Cinema 4D...

very important                       important                       marginally important                       not important

To find again media resources created in previous projects:

very important                       important                       marginally important                       not important

Possibility to select one of several meanings in case of homonyms (e.g. bank (financial institution) vs. bank(seating))

very important                       important                       marginally important                       not important

Comments:

.....

**9) Could you please tell us how relevant to your business the tools demonstrated is?**

very relevant                       relevant                       marginally relevant                       not relevant

Comments:

.....

**10) Please, score the cost impact in your business if using this tool:**

Costs would be decremented

Costs would be the same

Costs would be increased

Costs would be increased, although it would be compensated for a better quality of service

Comments:

.....

## **Text to Speech Synthesis**

**11) Do you know any application where an artificial speech technology (speech synthesis) is applied?**

Yes

Could you give some examples?

.....

No

12) Do you use or have used artificial speech technologies in your business?

Yes

Could you give some examples?

.....

No

Do you think that could be applied in your business in the future? Could you give some examples?

.....

**13) What do you appreciate most of a synthetic speech? Please, use a number between 1 and 3 to indicate your preference (1 is the preferred)**

Intelligibility (the message can be understood)

Naturalness (the synthetic voice sounds are like a human voice)

Expressiveness (the synthetic voice changes are very human)

**14) Score the artificial speech technologies impact in your business costs?**

Costs would be decremented

Costs would be the same

Costs would be increased

Costs would be increased, although it would be compensated for a better quality of service

## Facial Animation Tools

**15) Could you please tell us how important are the following factors for an facial animation tool?**

A clear and easy to use interface:

very important     important     marginally important     not important

Real-time feedback:

very important     important     marginally important     not important

Speed of implementation (how long it takes to animate a face).

very important     important     marginally important     not important

Ability to generate as wide a range of expressions as possible

very important       important       marginally important       not important

Possibility to embed the tool in external applications (Maya, Max etc.)

very important       important       marginally important       not important

Comments:

.....

**16) Could you please tell us how relevant to your business are the tools demonstrated?**

very relevant       relevant       marginally relevant       not relevant

Comments:

.....

**17) Please, score the cost impact in your business if using some of these tools:**

Costs would be decremented

Costs would be the same

Costs would be increased

Costs would be increased, although it would be compensated for a better quality of service

Comments:

.....

**18) In case your company would be interested in any of the tools, which ones are more relevant for you?**

Facial Animation "Wheel"       Maskle: Automatic facial rigging

Please specify for what you would use the tools:

.....

## Assisted Program Generation/Prototyping

**19) Could you please tell us how important are the following factors for an assisted program generation tool?**

Which is more important to you, accurate lipsync or high quality animation (body/face)?

lipsync more important       animation more important       both equal

A clear and easy to use interface:

very important       important       marginally important       not important

Real-time feedback:

very important     important     marginally important     not important

Speed of implementation (how long it takes to create/prototype a clip).

very important     important     marginally important     not important

Ability to use/move virtual characters

very important     important     marginally important     not important

Ability to use/move background and audio

very important     important     marginally important     not important

Comments:

.....

**20) Could you please tell us how relevant to your business are the tools demonstrated?**

very relevant     relevant     marginally relevant     not relevant

Comments:

.....

**21) Please, score the cost impact in your business if using some of these tools:**

- Costs would be decremented
- Costs would be the same
- Costs would be increased
- Costs would be increased, although it would be compensated for a better quality of service

Comments:

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## ***Feedback***

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**22) Please, could give us any feedback about the whole project?**

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## **12 Annex 4: List of Invitees**

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Removed for confidentiality reasons.