



**Leonardo da Vinci Transfer of Innovation**  
**VITA - Virtual learning for the management of successful SMEs in Europe**  
**Ref. nr. 2008-I-PTI-LEO05-0041 I**

## Connecting LMS and Virtual Worlds: an example of SITOS and Open Simulator

Nelson Silva, Ana Sá, Leonel Morgado  
Departamento de Engenharias  
Escola das Ciências e Tecnologias  
UTAD-Universidade de Trás-os-Montes e Alto  
Douro,  
Vila Real, Portugal

Stefan Roth, Gerhard Doppler, Harald Dunst  
Bit media e-Learning solution GmbH & Co KG  
Kärntner Straße 311, A- 8054 Graz

### **Abstract:**

Integrating an existing Learning Management System (LMS) with virtual worlds aims to enable managing learning content in the virtual world through an LMS platform. The existing features of the LMS are enriched by a module for teaching in virtual worlds (Second Life, Open Simulator, etc.).

With that system it is possible to manage both platforms with the same management interface.

This paper provides an overview of how to integrate virtual worlds into a common LMS, how to maintain and add new features in order to manage specific content to virtual environments.

Keywords: Education, E-Learning, LMS, Open Simulator, Virtual Environments

## **I. Introduction:**

Distance learning has suffered numerous changes and evolutions over the years. In the past, this form of education emerged as a postal mail. Years later with the internet distance learning has become online, synchronous or asynchronous.

Years ago, with globalization and fast developments of information technology, Learning Management Systems (LMS) got developed, These systems allow easy management of learners and learning content modules for students that are in distance learning.

The emergence of virtual worlds revolutionized the way of distance learning, providing a richer learning environment closer to reality, with interaction between participants through their avatars.

The following article proposes integrating these two platforms in order to create a new experience in content management in virtual environments. The system of e-learning that was chosen was SITOS, which is a product of Bitmedia. This company is expert in solutions for distance learning based in Austria.

([http://www.bitmedia.cc/inforum/contentview.php/en/default.ihtml?itk\\_sid=556acf51540e8132ffdaeb1ff18774a9](http://www.bitmedia.cc/inforum/contentview.php/en/default.ihtml?itk_sid=556acf51540e8132ffdaeb1ff18774a9)).

The idea of this development is based on the experiences in the first turn of training sessions in VITA project (<http://vita.bitmedia.cc> ). For VITA both systems, LMS and Second Life, are in use, but the connecting interface was missing.

VITA trainings use Second Life as virtual environment; nevertheless, this development used Open Simulator in standalone mode, installed on one of the bitmedia servers. These virtual environments are similar in their technical approach. Development and testing is preferable in Open Simulator as it does not cause running costs aside the server maintenance.

## **II. Learning Management System (LMS)**

A Learning Management System (LMS) is described as a web application to manage and administer learning content for online training. Features of LMS are typically: provision of online courses, learner management, learner-content allocation, and publication of news, reporting, examination and sometimes even virtual classrooms (not 3D). For this development SITOS from Bitmedia was chosen as platform. The VITA project partner bitmedia has developed SITOS, has access to all source codes and database models, allowing an easy integration of interface code to external applications. Furthermore the backbone of the VITA project website is a SITOS framework.

## **III. 3D Virtual Environments**

The 3D virtual environments, also known as virtual worlds are a representation of reality. Each user is represented by an avatar. Through their avatar participants can perform tasks such as moving around by walking or flying, interacting with objects (by clicking on them), creating objects and interacting with other avatars. For these reasons, virtual worlds are good environments for learning activities in several areas.

The most common virtual worlds used are Second Life and Open Simulator. The platforms are sufficient similar in their technical structure to keep any development able to be transferred to the other system with just minor adaptations. In Second Life land ownership, uploading patterns or sound sequences cost Linden\$ which are converted real money. Open Simulator can be installed on a local server. Any other interaction does not cause costs. For saving running costs during the development Open Simulator was chosen as 3D environment.

#### IV. Systems Integration

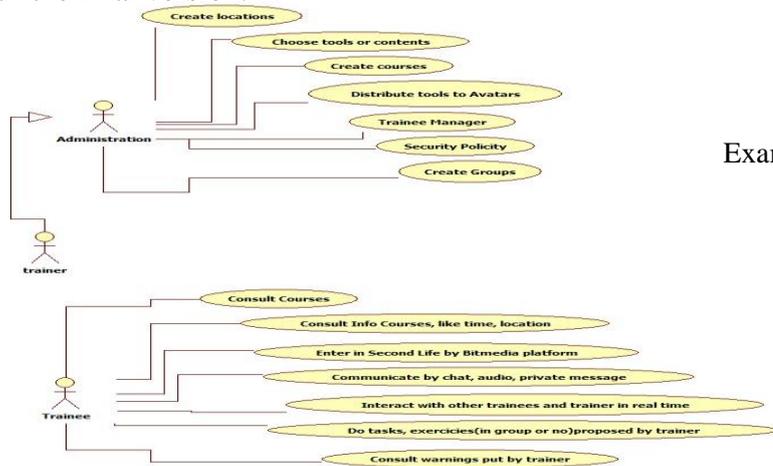
Systems integration in any situations means putting two or more separate systems to work together to fulfil a specific purpose. This development integrates the LMS SITOS with the virtual world Open Simulator in order to work together towards a common goal: managing educational content on the web as well as in virtual environments.

#### V. Methodology

The first step of our development was requirements analysis in the company based on the findings of the first turn of training sessions in VITA. This analysis results to show the needs of the partners such as which features should be implemented.

As tool for recording the analysis findings we used StarUML and later we translated the specification to a company’s proprietary specification.

This entire step was being validated by partners in order to improve the specification until the final version.



Example of Use case

#### VI. Integration of SITOS with Open Simulator

The e-learning platform SITOS in addition to other features, allows the creation of exams, courses and even classrooms. These management functions are traditionally web based using a thin client (web browser).

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The next step of this development was to install an Open Simulator server for the company. At this stage, we chose to create a server in StandAlone mode. That means that the virtual world server supports exactly one “island”. The alternative would have been to setup a Grid mode server, which would allow scalability to more than one island, like Second Life for example.

Aside the cost saving the main reason for installing an own Open Simulator server is the fact that the owner has total control of the virtual world, not being dependent of others. As next step 3D virtual classrooms as well as educational tools useful for training sessions have been created or transferred from the VITA environment.



Figure 1: 3D classroom

All the objects developed in Open Simulator are stored in the inventory of an “avatar bot” that functions as a database or repository of 3D objects.

In principle the integration of these two different platforms is not difficult to understand.

The LMS needed to be enriched with a few extra options such as the choice of objects to be distributed to students. Some functionality could be kept quite similar to the original approach of the LMS, e.g. the creation of a virtual classroom. While originally this feature created a virtual classroom as online-conferencing session now it should create a virtual classroom in the virtual world.

The interface application (LMS – TRANSLATOR) receives the parameters from the LMS, interprets these parameters and performs the necessary work in the virtual world.

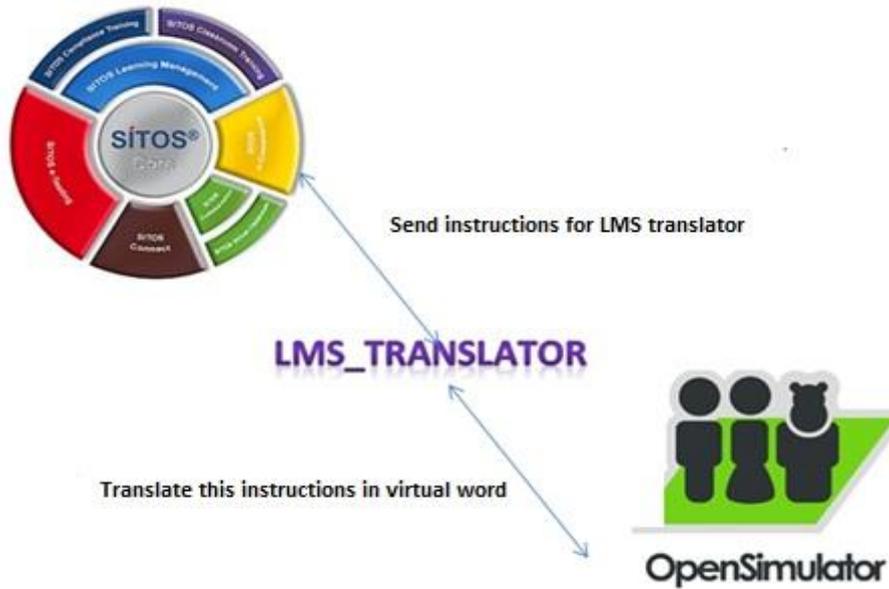


Figure 2: How works SITOS – Open Simulator

**Practical Example:**

A trainer wants to put a classroom in the virtual world for a particular training. He has to select the “Virtual Classroom” to access the options for the classroom in the virtual world.



Figure 3: Interface Choose virtual module

Then the trainer is asked to choose the 3D class that he wants to start in the virtual world, as well as the duration.



Figure 4: Interface choose 3D classroom

After this tasks, clicking in the save button on the SITOS platform calls the LMS\_TRANSLATOR that receives the parameters as the name of the room and the duration. The application LMS\_TRANSLATOR written in C# is responsible for interpreting these commands, for establishing a connection to the server of the virtual world and for performing the necessary functions. In this case this is the creation of the 3D classroom.

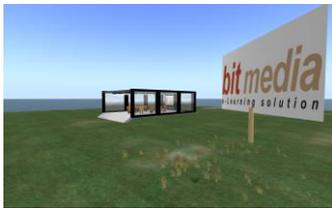


Figure 5: Outside of classroom



Figure 6: Inside of classroom

## VI. Features

In SITOS the administrator has the ability to manage system users. When a learner is allocated for the first time to a course which includes at least one session in the virtual world, the interface needs to create an avatar for the learner in the connected 3D environment. For this the interface application performs a query to the SITOS database for getting first name, last name and system-id, creates the avatar and sends the avatar's account-data to the e-mails account of the learner.

In this way, the trainees that are registered in virtual training session receive their login information for the virtual world automatically per email.

The trainee can login in the virtual world for the next session training.

The next request was to be able to send announcements and other messages to trainees of a specific session. The solution for this problem is a service that notifies the students sending instant messages for avatars in the virtual world using SITOS as entry point for the message.

With these services, it is possible send with instant messages also to other web 2.0 technologies like twitter and Facebook.

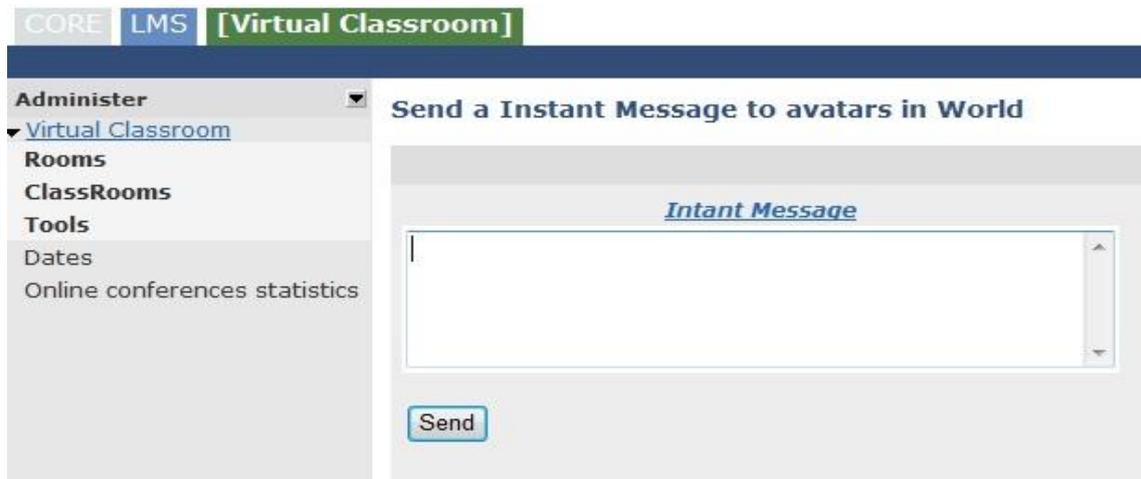


Figure 7: Interface Send IM's for virtual world, twitter, Facebook

The application LMS\_TRANSLATOR receives the message and sends the message to avatars, twitter and Facebook according to the configuration data.

The next feature available is the **Help Bot**. This bot is responsible for providing services of the classroom in the virtual world. With this service, the trainees can browse news, FAQs and other information from the SITOS database in the virtual world.

To use this service, the trainee requests information by sending a command message to the Help Bot. After the bot receives and interprets the command, it returns and displays

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the according information. This includes news, FAQs, and contacts, sending e-mails to learning groups or administrators and to see which learners are online.



Figure 8: Visualizing the news in SITOS database in virtual world

The last required option allows a SITOS administrator to see and export statistics about the use of the virtual world, such as the number of avatars online, number of objects, etc.

### ADMINISTRATION

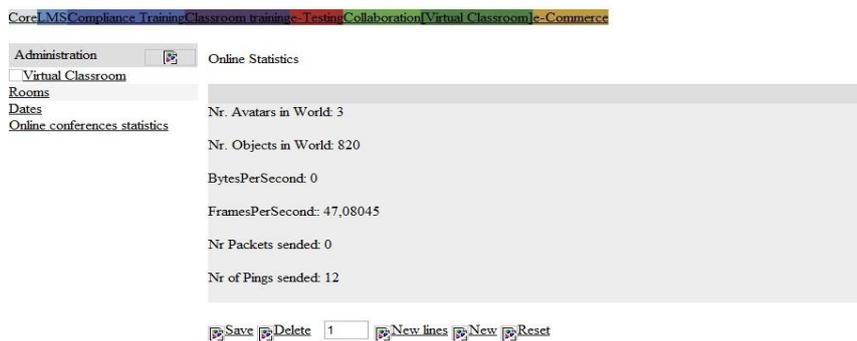


Figure 9: Statistics about virtual world in SITOS