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**TRENDS FOR DEVELOPING SERIOUS GAMES AS A COMPLEMENTARY  
SOLUTION TO TRADITIONAL EDUCATION AND TRAINING**

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**Abstract** *Recently developments in domain of information technology and communications had been generated a fundamental change both in terms of acquisition of knowledge and in the way of approaching education. There is a major concern for developing serious games on global level, being several initiatives at American and European level to outline a common framework and to avoid dispersion of efforts.*

*This paper attempts to define concepts that we considered essential regarding serious games, to identify positive and negative aspects and to highlight elements that are necessary to operate effectively in the knowledge society.*

*Another aspect presented here is an European initiative to create a network of excellence in domain of serious game through a scientific research project and the steps already done.*

**Keywords:** *serious games, games and learning alliance, serious games and virtual worlds*

## **I. INTRODUCTION**

Contemporary society knows an exponential growth in many domains of activity, especially in technology. Progress made in technology during the last few years exceeds far those made in hundreds or even thousands of years in the past. No wonder that in education and training field appeared various forms, different from the traditional system.

Video games become one of the most popular forms of entertainment throughout the world. With such popularity, it is not surprising that experts in education have become interested in using video games as way of learning. As a result, many institutions from Europe and America developed their own strategies for implement serious games in education and training.

Serious games are one of modern and new ways for education based on technology. The design characteristics that conventionally constitute games are driven by theories of play, entertainment, challenge, and fun, but in serious games many of these characteristics also overlap into educational applications. The concept is not a new one, it was launched with many years ago, but was retaken at the beginning of this millennium with a strong accent on education and training domain. First modern approaches started from military domain, where serious games appeared as a complementary solution for simulation and modeling used in military training.

As many other aspects of education and training based on technology, this subject has many different approach even in the same cultural and geographical area.

## **II. ADVANTAGES AND DISADVANTAGES OF SERIOUS GAMES**

One goal of serious games is to supplement current curriculums in school and increase student focus in learning and retention of material.

The most important advantage is that games allow learners to experience situations that are impossible in the real world for reasons of safety, cost or time.

It is important to keep in mind that there is a difference between games and serious games for education. This distinction is important when we take in consideration the advantages and disadvantages of using them. They have both positive and negative effects on the human brain. In the following table are shown a few from serious games positive and negative aspects, and hence why there are advantages to using serious games:

Positive aspects	Negative aspects
<ul style="list-style-type: none"> <li>– It is power tool for acquiring knowledge, training skills and changing behavior</li> <li>– attractiveness</li> <li>– speeding up reaction times</li> <li>– improving visio-motor coordination</li> <li>– improve ability to reason and solve new problems independently of previous acquired knowledge</li> <li>– can improve peripheral vision, way finding skills, hand-eye coordination and mental rotation</li> </ul>	<ul style="list-style-type: none"> <li>– personality could changes towards aggression</li> <li>– the users could become addicted</li> </ul>

To achieve an outcome, there are usually a number of types of skills and knowledge that need to be developed. The positive aspects of serious games show very clear that they could be used for improve a specific set of skill, depending of the final educational aim. From table maybe somebody can conclude that violence is a risk which can outbalance the positive aspects of serious games. But do not forget that not all serious games necessarily include violence.

### III. TRENDS FOR DEVELOPING SERIOUS GAMES

#### 3.1. In USA

USA is very advanced in this domain, especially for using serious games in life long learning, but also they have in attention pedagogical aspects regarding games for children. In a report developed by the U.S. Department of Defense in collaboration with researchers from Indiana University and Florida State University, called Massive Multiplayer Online Gaming: A Research Framework for Military Training and Education, are clearly underlined the interest in this domain: “*with this focus on emerging technologies, the military is clearly interested in exploring the use of online collaborative games to train staff on the modern day intricacies of combat and noncombat operations*”. In fact, in USA started this new trend in education, with the setting up of Serious Games Initiative, in 2002.

In our times, an instrument used by American army for training military personal is so called Virtual Cultural Awareness Trainer (VCAT). VCAT is web-based, game-based training application that teaches cultural awareness using simulated missions. This instrument helps learners to develop operational cultural knowledge and acquire cultural skill in a fun and easy learning way. Trainees receive an automatically tailored program of instruction, according to their country area of responsibility, mission and mission responsibilities such as civil affairs operation and predeployment site surveys.

Another important thing have to be mentioned here is that ADL Initiative, the most important institution in domain of Advanced Distributed Learning started to use a tool named Unity-SCORM Integration Toolkit. There are in the entire world many game engines. Why is so interesting and special this one? Because the toolkit allows content developers to use simulations built in Unity to be imported, launched and tracked in any Learning Management Systems which is compatible with

SCORM standard. Unity allows you to build rich 3D games with animated characters, sizzling graphics and immersive physics.

### **3.2. In Europe**

Until 2010, in Europe was not a coherent and consistent approach for developing serious games. It was fragmented at national or excellence pole level. For this reason a coordinated initiative was necessary. This initiative was materialized in a huge and ambitious project in the FP 7 framework, which started in 2010. The Games and Learning project is awarded under the call objective Technology-Enhanced Learning.

#### **Games and Learning Alliance (GaLA) project vision**

The need for GaLA project comes from the phenomenon of fragmentation of activities undertaken by all participants in developing the concept of Serious Games (SG), from European Union countries. The network of excellence realized through the project cover 31 universities, public institution and companies from Europe, the task leader role being assumed by University of Genoa.

#### **Objectives:**

The main objectives of GaLA network of excellence is to shape a scientific community and to build a European Virtual Research Centre aimed to gathering, integrating, harmonizing and coordinating research on Serious Games and disseminating knowledge, best practice and tools as a reference point at an international level.

From these objectives results major axes for GaLA activities:

- research integration and harmonization;
- joint research activities;
- spreading of excellence in domain of Serious Games.

#### **Potential users:**

- universities;
- research institutes;
- schools;
- local and interest communities;
- companies;
- military institutions.

#### **Steps already done**

The project entered in the second year. The activities carried out by GaLA in the first year have been aimed at integrating the knowledge and data on serious games that are currently spread across various disciplines and business. The first year objectives mainly consist in the set-up of the relationships and of the infrastructure needed to achieve the long-term and high-level goals. According with this aim and in order to establish a common background among partners, so that they become aware of all issues related to the whole serious games life-cycle (from requirements and design to marketing, deployment and assessment), sharing knowledge, methodologies and tools, was organized a competence alignment school on serious games. Since education and training is the real objective of the GaLA project, a strong focus will be on the pedagogy. As a result were realized a common taxonomy and evaluation metrics on serious games research topics.

Another task for first year was the establishment of a set of observables for assessing the advancement of the network of excellence and of the overall serious games research area in terms of quality assurance mechanisms. Also in this year was the start of the multidisciplinary, area-specific and application Special Interest Group activities (e.g. game mechanics, Artificial intelligence, psychology, Human-Computer Interaction, Neuroscience).

One of the first year achievements was the release of GaLA website. Realized with the scope to provide all necessary information about project and also as a tool for consortium member, the website has a public area and a private one (Figure 1). The site is thought of as one the main means of

dissemination. In the public area there are information about project, about partners and it provides continuously updated news and external feeds about calls for papers, conferences and events. In the private area, the project coordinator and partners have the possibility to share project-related documents and they can manage work packages and tasks, realize collaborative work in writing reports, papers and deliverables. Of course, here is a restricted access area. After the login in the private area, a GALA user can access the specific set of features from the main menu under the Private Area sub-menu:

- project management
- mailing list
- events.

From the private section it is possible to access information about meetings and events, manage the user profile and go to the wiki and project management functionalities.

### The GaLa project website: <http://www.galanoe.eu>

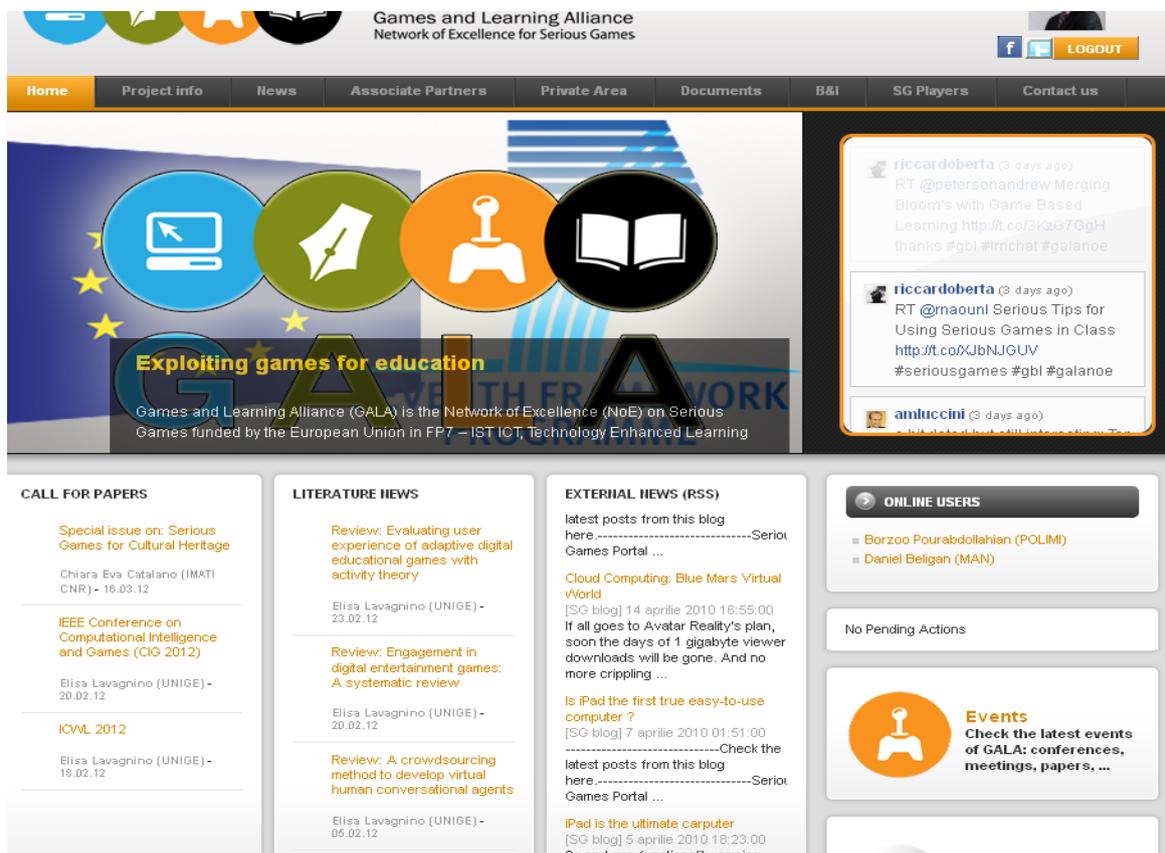


Figure 1

### Perspectives

Until the project finishing, in september 2014, are planned to be realized at least:

- a conference in domain of serious games, first edition being planed for October 2012;
- the constitution of the European Society on Serious Gaming;
- the start of shared Master Course on Serious Gaming from the first universities;
- the establishment of the common PhD course;
- the publication of high-quality scientific and didactic books covering SG research topics;
- scientific journals' special issues on SG;
- the start of the first European Serious Games Living Lab Network.

### **Role of Romanian partner**

Romanian Ministry of National Defense is implicated in this project through „Carol I” National Defense University and has three major responsibilities in this project:

- 1) Coordinating the activity of framework identification for performance indicators for education through serious games;
- 2) Coordination of research activities in order to identify interoperability and semantically issues;
- 3) Participation in activities dedicated to serious games in domain of security and crisis management.

In addition to these responsibilities, we cooperate with other partners involved in the consortium for research in the fields of pedagogy, game mechanics and evaluation criteria for dissemination, dissemination plan, creating national networking in serious game domain and reasoning application of serious game in domain of life long learning.

## **IV. CONCLUSIONS**

The technology will continue to evolve rapidly. Education will have to keep pace, so as not to lag behind. It is obviously that games are a common aspect of our society, so they could be applied in new and creative ways for increasing ability to transfer the knowledge to the real world. The effect of games on society should not be ignored; instead such knowledge should be used to help channel appropriate energy and resources to promote learning adaptable to the learning styles of today’s entertainment-generation. The attractiveness, the operating principles, the diversity of coverage area could transform serious games in a different and intelligently approach of education and training in the knowledge society. It does not intend to replace traditional way to learn, but as another forms of education based on technology could be a complementary solution to the classical system of education and training.

Taken in consideration the advantages, the fact that more and more modern armies consider useful and appropriate this form of education and that a performing military person needs a different set of skills made mandatory by the complexity and pace of life and work in the face of amazing new communications technologies we consider that serious games have to be extended to the whole Romanian military system of education and training.

## **References**

- [1]. Marlow, C. - Games and Learning in Landscape Architecture, 2009
- [2]. Sawyer, B & Smith, P- Taxonomy for Serious Games, Digitalmil, Inc& Serious Games Initiative/ Univ. of Central Florida, RETRO Lab
- [3]. Sara de Freitas, (2006) Learning in immersive worlds: a review of game-based learning
- [4]. Riccardo Berta, Francesco Bellotti, Alessandro De Gloria, Sandro Ridella - GALA Website Release, 2011
- [5]. Stanescu, I.A., Roceanu, I., Stefan, A., Martinez-Ortiz, I.- Principles of Serious Games Interoperability. Proceedings of ICVL Conference. October, 28-28, 2011, Cluj, Romania.
- [6]. W. Bösche , F. Kattner - Fear of (Serious) Digital Games and Game-Based Learning?: Causes, Consequences and a Possible Countermeasure, International Journal of Game-Based Learning, 2011
- [7]. T Susi, M. Johannesson, P. Backlund - Serious Games – An overview, 2007
- [8]. Alicia Sanchez, Jan Cannon-Bowers, Clint Bowers - Establishing a Science of Game Based Learning, 2010
- [9]. Stephen Tang, Martin Hanneghan - Designing Educational Games: A Pedagogical Approach, 2010
- [10]. De Gloria A, Bellotti F., Berta R., Lavagnino E. - GaLA–Annual Activity Report 1, 2010
- [11]. T. Connolly, M. Stansfeld, L. Boyle - Games–Based Learning Advancements for Multi-Sensory Human Computer Interfaces: Techniques and Effective Practices, 2009
- [12]. <http://www.punto geek.com/wp-content/uploads/2012/03/Optimized-Neurology-of-Gaming-800.jpg>
- [13]. <http://unity3d.com>
- [14]. <http://jko.jfcom.mil/>
- [15]. <http://www.galano e.eu>