Management of teaching simulations with an authoring tool

Roberta Costantini, Silvia Micarelli, Pierpaolo Sarti, Claudio Vergini

Percorsi S.p.a.

info@xcorsi.it

Keywords:simulation, authoring tool

Abstract

The objective of the present paper is to illustrate, by describing a real case history, the innovative advance, in terms of the design and development of teaching simulations, represented by the use of an authoring tool capable of automating a portion of the process of implementation and the final packaging procedure.

Starting from the establishment of the context of the project, which is helpful when it comes to understanding the nature and complexity of the same, the paper addresses two-faceted questions involving, on the one hand, education and planning, and on the other, engineering and technology. In conclusion, a description is provided of how these two worlds, so distant from each other until now, succeed in collaborating, thanks to the author system

1 Introduction

Increasing attention is being focused on teaching simulations, that is those systems of training whose goal is to transmit to the pupil models of behaviour rather than theoretical concepts.

To date, the major obstacle slowing up their development has been the noteworthy complexity of their planning and development, as well as a certain wariness towards an experimental education technique whose underlying concept more closely resembles that of a video-game than that of traditional educational procedures.

Today, however, we have reached a point where, having confirmed the educational effectiveness of simulations, at the same time observing their growing popularity with students, it is worthwhile to invest not only in the development of individual training tools, but also in the design of an overall system that makes it possible to automate some of the key elements of the process through which simulations are created, meaning that they can be developed even by operators lacking in technical-IT skills.

The resulting author system, BizGame, is thus designed as a useful support for those who intend to undertake the delicate path of play-experiential education, using the vehicle of simulations, though without necessarily having to bring into play massive sums of money or professional skills that are still relatively rare on the market. The goal of the present paper is to convince the reader, by analysing an actual case history, that it is now possible to manage simulations in a simple, automated manner.

2 Context

The educational initiative addressed by this paper is part of a wider-ranging project undertaken by the Regione Lazio for the promotion of the e-government activities to be used by local government bodies in developing, in accordance with national policies, a new awareness of the relationship between citizens and relevant businesses and services.

More specifically, the simulation brought into being is part of the SEREL Project, through which the Regione Lazio intends to pursue the specific objective of contributing to the professional growth of public operators by using innovative tools of online training.

The project reveals its sponsor's clear focus on obtaining recognition of the strategic role played by new technologies in improving the skills of human resources while heightening awareness of the need to raise levels of training and learning.

The process undertaken by the Regione Lazio moves in the same direction

as the broader European Community goal of gaining recognition for the role played by education systems in the development and economic growth of the European Union: such tools are viewed as "key factors in establishing competitiveness", crucial strategic levers for developing a skilled and adjustable labour force while improving social cohesion and integration.

The project is subdivided into two main parts:

- design of an author system that allows the client to create and manage personnel training in independent fashion, by means of simulations;
- the conceptual and practical creation of a specific teaching simulation for the training of social workers.

This last point is definitely the most innovative element of the project: the author system allows any accomplished educational planner to independently create a system of simulations capable of guiding the pupil in the direction of learning a lasting, observable form of behaviour, all without having to possess specialised technical-computer skills.

3 The Author System

In deploying any type of simulation, the technological aspect has always constituted a critical problem and a focus of constant attention; this is a result of the special nature of the algorithms and the software procedures that need to be developed on any given occasion.

The framework of planning and development constitutes a highly relevant and virtuous part of the life-cycle management of any teaching simulation.

The framework consists of a series of web-oriented and platform-independent software applications; these software modules, which are easy to use and self-explanatory, make it possible to manage the entire life cycle of a simulation project, including:

- planning of the educational framework;
- design of the Bayes Network, with elaboration of all the gaming variables;
- management of the multimedia modules;
- management of the graphic configuration (coordinated image) of the user interface;
- management of the detailed reporting;
- management of the support material for the learning process (in-depth asides, array of links etc.).

The Author System can be used to draw up the operating and planning guidelines during the creation of the simulation, facilitating and reinforcing the work of a project team that could include a range of different professional figures: designers, methodological experts, micro-designers, programmers,

graphic designers, tutors. The system essentially facilitates the work but, even more importantly, it helps with the creation of a working method that is shared, or can be shared, making available an ordered repository of knowledge that can be replicated.

The Framework manages the user profiles, activating the available micro-options; as a rule, the profiles used are: Administrator, Author, Designer and Developer. Using these profiles, the entire life cycle of the multimedia project can be managed, starting from the phase of Analysis and Design, up to the exportation of the complete program as a learning object in the SCORM format. Exportation guarantees that the Business Game can be utilised, as formulated, on any type of Learning Management System platform in the SCORM 1.2 format, or a more advanced version.

3.1 Potential and strong points

The Author system described in this paper can point to some important strengths, both in corporate terms and from a purely methodological-productive standpoint. The use of Bayes networks makes possible the application of a calculation methodology that is extremely rapid and easy to manage online. This is one of the reasons why the solution in question is meeting with success as a teaching tool in financial and technological sectors.

A Bayes network can normally be codified in terms of XML files. This facilitates the revision and updating of the network, even on the part of non-expert users.

The use of Bayes networks has come to represent one of the standard practices in the management of simulations connected to complex scenarios, denoting an elevated degree of methodological rigour and scientific objectivity as regards the model of calculation.

The Author System and the related teaching methodology possess potential that, quite often, is limited only by the creativity brought to bear and the context in which it is being used. Viewed in purely corporate terms, there is the possibility of a resource that can be capitalised and extended to all the various rungs of the production procedure and the life cycle.

As for the stock of knowledge, the products created (which constitute "deposits" of knowledge) include within their functional architecture an expression of the culture and the specific knowledge that the company is interested in capitalising on.

4 The process and the structure of the simulation

The objective of the simulation created under the title "Management of

Services of Social Assistance" is:

- to reinforce different areas of theoretical knowledge;
- to provide the participant and the teaching staff with a tool for learning, measuring, confirming and evaluating learning in what constitutes a meaningful experience for the various participants in the process;
- to stimulate the professional growth of the operators, who are actively engaged in the training procedure, doing so through a system that makes it possible to reproduce situations and events as similar as possible to those that arise in the real professional experience of the operators, thus allowing them to act in a protected environment, where they can learn the consequences of their actions.

The design and development of the Business Game proved extremely complex, being divided into a number of different phases:

- Analysis of the materials collected and production of the contents;
- Mapping of the areas of intervention;
- Mapping of the procedures and conceptual formulation of the structure;
- Creation of the general story and of the individual storyboards for the procedures;
- Graphics and development.

4.1 Analysis, collection of materials and production of contents

This initial phase constitutes one of the interesting aspects of the entire process, seeing that the contents, which provide the underpinnings for all the design activities, are created and produced in a manner custom-tailored to the real experience of the social workers.

The contents were formulated following an analysis of social-worker activities and the collection of data in the field by means of semi-structured interviews, focus groups and encounters with managers of social services and social workers.

The different municipalities selected included Genzano di Roma, Nemi and Pomezia, which are small, medium and large size communities.

4.2 Mapping of the areas of intervention

The research pointed to seven primary areas for the social workers to intervene:

- Social affairs, administrative office for information and advisory services to individuals and families;
- Professional social service;

- Social emergency intervention service for personal and family situations;
- Home assistance;
- Residential structures;
- Semi-residential structures;
- Residential or daytime shelters organised around a community model.

Within each area, a number of procedures regulating the services (support of families and social groups, foster care, job placement, home assistance for parents and children etc.) have been defined.

The intent was to include inside the Business Game the full set of actions, practices and assessments that social workers must perform in carrying out each of these procedures, with the end goal of allowing users to see how they appear within an environment that, although protected, is very similar to the real one, in terms of the different facets of their professional profile.

4.3 Mapping of the procedures and conceptual formulation of the structure

For each of the procedures taken into consideration, a conceptual map was drawn up, providing a graphic illustration of the path followed by the application.

The use of this tool made it possible to highlight the relationship between the various steps of each procedure and create a precise hierarchy of the actions to be carried out, based on a criterion that ranges from the general to the specific.

Having examined all the procedures, from activation up to the monitoring and evaluation phases, the next step was to select the procedures to be addressed in the Business Game. The following services were chosen:

- Foster care;
- Home assistance for parents and children;
- Family or community type residential structures for minors: family homes, group apartments;
- Semi-residential structures for the elderly, operating either independently or together with residential structures.

In applying these procedures, the social worker pursues different objectives, though always for the purpose of safeguarding the psycho-physical well-being of the individual to be assisted.

In the first case (foster care), the social worker's goal is to safeguard minors who come from families with serious social and/or educational difficulties for the period of time strictly necessary to solve the problems underlying the negative situation through care in a foster family, or through hands-on assistance

in the family of origin.

In the second case (home assistance for parents and children), the social worker attempts to facilitate the social integration of minors and adults through adequate educational support regarding the tasks and duties of the parents, together with the activation of home shelter solutions for infants.

In the third case (residential structures for minors), the efforts of the social worker focus on sheltering the minor – including disabled children - in family homes or group apartments, in cases where the need to remove them from their family of origin cannot be resolved with foster care.

In the fourth ad last case (semi-residential structures for the elderly), the task of the social worker is both to provide services in the homes of the elderly and to ensure that individuals who are only partially self-sufficient receive daytime shelter and social and medical assistance, as well as support for the family.

4.4 Creation of trees of objectives and formulation of storyboards

The plotting of the maps makes it possible to draw up patterns of observable behaviour, with respect to the procedures researched, doing so by constructing trees of teaching objectives that, by illustrating the elaboration of the general objective into specific sub-objectives, provide a key tool for the creation of storyboards.

The teaching objective sets the result that the process of training intends to achieve, regardless of the specific teaching method, with that goal corresponding to a description of the behaviour that the user must be capable of demonstrating at the end of the training course in order to be considered competent.

The mapping of the objectives thus plays a fundamentally important role, seeing that it describes the individual "modes of behaviour" that the user must learn in order to reach the general objective, ensuring that is possible to evaluate the learning and to intervene at the different levels of the training process, in order to improve its effectiveness.

In the version in Excel format, the tree of objectives has been defined for each of the following:

- the level of complexity;
- the type of assessment;
- consistency with the Bayes variables.

4.5 Graphics and development

Once the storyboards have been completed, the next step is the graphic creation of all the possible characters and scenarios, followed by their development and animation.

Fig. 1 Example of decision-making moments, based on a questionnaire

5 Management of the simulation with the Author System

Once all the elements of the simulation have been designed, defined and "constructed", both in educational-project terms and with regard to development, it is possible to amalgamate all of them, using the Author System.

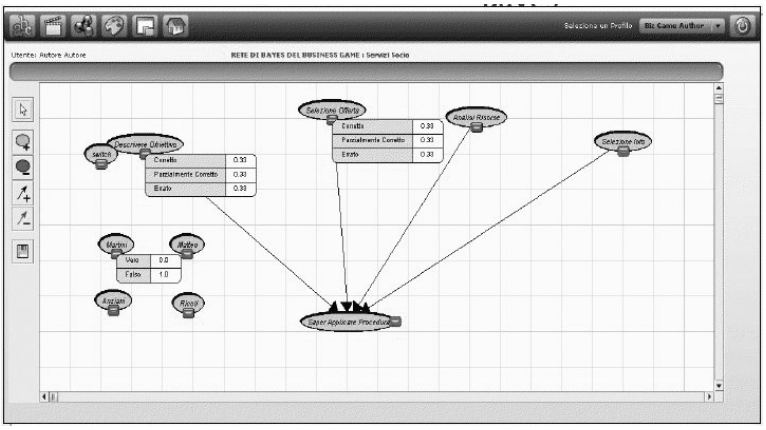

Fig. 2 Example of the graphic structure of the Bayes Network

At this point, it becomes possible to carry out the following primary operations:

- Design of the Bayes network: with the objectives, the events they are determined by and the probability of their occurrence;

- Definition of the events that can occur in the system of rules;
- Association of a variation in the probabilities influenced by the independent nodes of the network;
- Implementation of the play scenarios;
- Association of the "Actions", or of the result of the evaluation, with the events defined;
- Insertion of rules for evaluating the probabilities of the network nodes in the determination of the feedback.

Conclusion

In conclusion, the author system makes possible a simple approach to the development of complex training procedures, such as teaching simulations. Its capacity for customisation and management of the product mean that even operators lacking in-depth technical-computer knowledge can rapidly learn to use it. Its operating characteristics, fully in line with the logic of the SCORM standard, result in the production of training courses that prove compatible with any platform, and that can be utilised anew after only a few necessary changes.

In terms of ongoing development, once the know-how to formulate individual simulations of this type has been acquired, sight must be set further ahead, focusing on the development of a new dimension in the world of simulation-interaction: the "multiplayer" option.

As was the case with e-learning before virtual practice communities came into being, there was individual experience, and therefore only limited psychological involvement, meaning that the first step for the simulations was that of the "single player", with the user "living" his or her experience in a simulated environment, in interaction with third parties involved in the experience, all simulated by the system designed in advance. From the multiplayer perspective, a further dimension is added, so that other users, in different and distinct roles, can take part in the same experience, in order to reach a common goal, each with precise responsibilities, plus the need to deal with fellow workers, staff and intermediaries, within a scenario that is very realistic and thus highly effective in terms of training.

There are numerous possibilities for derivative applications: users can take part in the multiplayer simulations in their own roles, based on their own tasks and know-how, or in other roles, testing skills not yet used while gaining an awareness of problems previously underestimated, so as to continue the process of professional integration and growth.

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