

SIMULATIONS AND SERIOUS GAMES FOR COMPANY BUSINESSES

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The Marconi University experience in applying a technological and didactic model to make learning processes and training practices in complex organizations *fun*.

Introduction

Gamification always needs to be more commonly intended as the processes through which design and implementation of learning and professional training paths have visual representation rules as well as its fruition and access to contents which are typical of modern video games. It therefore deals with the instructional design approach which is particularly sensitive to the conjugation of the fun aspect with the didactic one and applies typical elements of games and *non-playful* entertainment contexts, such as: different difficulty levels and access to the fruition, points and rewards systems, introduction to variables and the unexpected, high graphics appeal, an evident narrative structure and a high level of personalization/identification etc., in order to engage and motivate the learner/player as much as possible.

If on one hand, this design approach seems to give much to simplicity - and sometimes to the depletion - of the training contents, via a more progressive move away from the rigors of didactic design towards a more playful *entertainment* field, on the other hand, it goes towards the evolution of lifestyles and learning of end users, who are continuously more oriented towards *non-formal* and *informal learning*. In other words, towards non-structural but more or less intentional forms of training experiences which mature throughout life at work and during free time, as well as activities such as *social networking* and *social learning*.

This changing learning style, which requires, among others, different interests and motives for those who learn, is also reflected nowadays within company organizations, where we must consider the spread of continuously more internal training initiatives and professional developments of staff towards more

modern technologies for communication and information.

On the one hand, demand for interventions and solutions for distance learning rises with a strong orientation towards practical applications, verifiable demonstrations and problem solving; on the other hand, technological appeal, the interaction level and multimedia as well as the level of end user engagement, who has up to now been almost destined exclusively to the entertainment and videogames market, are required.

The *playfulness* of the learning and practical training processes: the Marconi University experience

The technological model and the strong applicative didactics that Marconi University has experimented successfully in university training over the past years - especially in Bachelor degrees for the faculty of Sciences and applied technologies, for which the teaching/learning processes require going through direct observations, practices and lab applications - can be extremely effective in the company sector too.

This same model, extended for the use of 3D technologies and for the reconstruction of so called *immersive* learning environments has revealed to be extremely effective also within teaching/learning paths in the humanistic and figurative art environments. The search for better quality of graphical reconstructions, as well as the extension of interface and multidisciplinary functions of learning contents, have slowly shifted the choices of instructional/training design towards edutainment solutions, capable of integrating didactic effectiveness, involving the end user and the general pleasure in its fruition.

Within the company organization models, training strategies and professional development needed for company growth, the applications of this innovative methodological approach to instructional/training design can take on different functions:

- professionally develop the worker on specific themes and contents (it's enough to think about e-learning solutions implemented in company intranet services or educational communication to raise awareness on security and privacy issues);
- implement solutions for learning/reproduction of procedures

or practices, as well as for training (it's enough to think about tutorials dedicated to technical staff for the acquisition and application of operational orders or to the real and proper simulators to reproduce and optimize the productive processes);

- increase the level of socializing and company identity (it's enough to think about the continuous spread of serious and social games and largely company based edu-tainment solutions which favor the adhesion to general corporate strategies and the sharing among workers).

With this in mind, Marconi University has designed, and is slowly implementing a series of training paths, web and mobile applications by taking into account themes and problems of huge interest for companies that are moving towards current market conditions and global communication.

- Enhance sales networks and distribution systems;
- virtuous management of financial systems and sources;
- correct vision of opportunities and tools of productive delocalization;
- enhance and develop logistic systems and technological infrastructures;
- guide to internalization, complete and contextualized processes towards the various *business* aims.

The technological and didactic model applied to these solutions requires two distinct moments and two different ways of teaching/learning.

1. The recipient can, first of all, use theoretical courses on-line, or rather the interactive/multimedia training modules, generally made up of virtual classrooms, video lessons, self-verification systems open questions for quick verification. All of this is aimed at knowing and studying the principles and phenomena and observing and overseeing their effects and consequences in the next stage dedicated to a practical application.
2. Secondly, and this represents the most innovative element, the possibility of having access to realistic simulations,

reproduced within the interactive and multimedia PLE - Personal Learning Environments - through which the final user (player/learner), via role playing techniques applied to instructional design, is asked to; take on an executive or organizational role, define the responsibilities towards the other players involved, observe the proposed scenario carefully and its complexity/problems and in the end, directly learn from the consequences of their decisions and actions. This method - which blends effective didactics and technological appeal - represents an experimental way of learning which goes towards direct observation, experimenting, formulation of hypotheses/solutions and verification in first person. The mode used for the transfer of knowledge and ability which is close to a real and proper dramatization, involves the direct and global involvement of the subject at a cognitive, organizational, social and emotional level allowing for pleasant and effective learning.

The first of these applications that was developed by the department of Multimedia for Educational and Creative Production at Marconi University is a simulator aimed at optimizing the roles/processes/activities for a real and proper support for problem solving and decision making within companies which have a strong orientation towards commercialization and distribution of its product.

The application for mobile devices dedicated to the optimization of sales networks

Generally, the intervention of professional growth aimed at optimizing the company distribution processes has placed the onus on supplying all necessary tools to oversee the search for company value within the integrated management of the commercial network. The expert teachers of Engineering management applied to the economic models and company organization, who have contributed to the general concept of the project and the implementation of the mathematical-economic model which underlies the application, began from the evaluation that the value maximization of the distribution network must move through the informative integration, the personalization of marketing policies

and the maximization of advantages inherent to different fiscal dimensions and incentives present in the different contexts where the company is present. Intervening on the company sales network means enhancing final customer relations, loyalty and constant coverage of pre and post sales.

In order to design information systems, investments, marketing actions aimed at the sales network, the interested subjects must develop specific knowledge of the crucial elements of their decision, by facing the context in a strategic and knowledgeable way as well as considering the financial availability and in particular short and medium-long term results.

In light of these first considerations of the design method, the application intends to support the coverage of all those elements that contribute to the effectiveness/efficiency of the company distribution network. In particular, the basic elements of the network's income, the information, training and commercial integration tools, partnership consolidation and control of the network tools, the logistic elements and incentive and evaluation tools of the distribution system are highlighted and enhanced. Particular attention is also dedicated to the relationship between enterprise and distribution channel.

The application therefore, allows the crucial and strategic elements to be discovered by the company and complex organization staff in regards the relationships with the commercial network, by focusing the attention on the need to build a partnership with dealers in order to satisfy the client in after sales too.

Another particular aspect with which the application intends to be sensitive on is the rationalization of the number of dealers and their allocation. As a whole, by evaluating each single choice as a precise investment in synergy and balance together with all other management decisions, allows for the achievement of the *business* aims of the organization.

The application therefore aims to support the decision maker in developing constant attention for integration needs of the commercial policies and at the same time, their specialization, through investment choices, operating interventions and decisions, by also taking the seller's and buyer's loyalty into account.

The reference target and the design requirements

The application, which is a real and proper *serious game*, optimizes the distribution of the sales networks and was designed and developed to respond to the needs of the workers of the sector, sales managers, commerce and distribution sectors and all decision makers who are called upon to manage the modern distribution systems according to the virtuous schemes of the effectiveness and economic efficiency results.

Researches and sector studies have quickly shown that it deals with professional profiles which are continuously more sensitive to the use of mobile technology and mainly from tablets and smartphones, for which the portability of technological tools and the consequent ease of access to knowledge/practices for professional development make up a prerequisite of fundamental importance. The first feasible study for the design of an application/simulator dedicated to the training and growth of these professional figures has therefore had to keep into account this final use and the general training and technological aspects of the final users, or rather:

- the continuous availability in the transparency of the learning objects and professional practices, data and resource and the ease of access to knowledge and information;
- opportunities to access multidisciplinary paths which mention and highlight in detail the various themes and issues connected to the sales and distribution activities (economic, financial, marketing, accounting, work policy etc.);
- possibility of personalizing learning by transforming it into a concrete experience to measure performance;
- availability of informal learning opportunities and how engaging and fun it is;
- maximum usability and portability of the device, in particular to the current tendencies of using technologies (latest generation of tablets and smartphones).

In particular, this last product requires further studies of the logics and criteria of programming/development in HTML5, which is a particularly versatile language as well as being cross platform and device independent. It always takes the final user into consideration, as well as the relocation of instructional design models and design

of interfaces with adaptiveness and responsiveness requirements which are imposed by mobile technology.

Figure 1. Serious game logo



Figure 2. The application on the mobile device > Interfaces for data entry and the visualization of graphic results



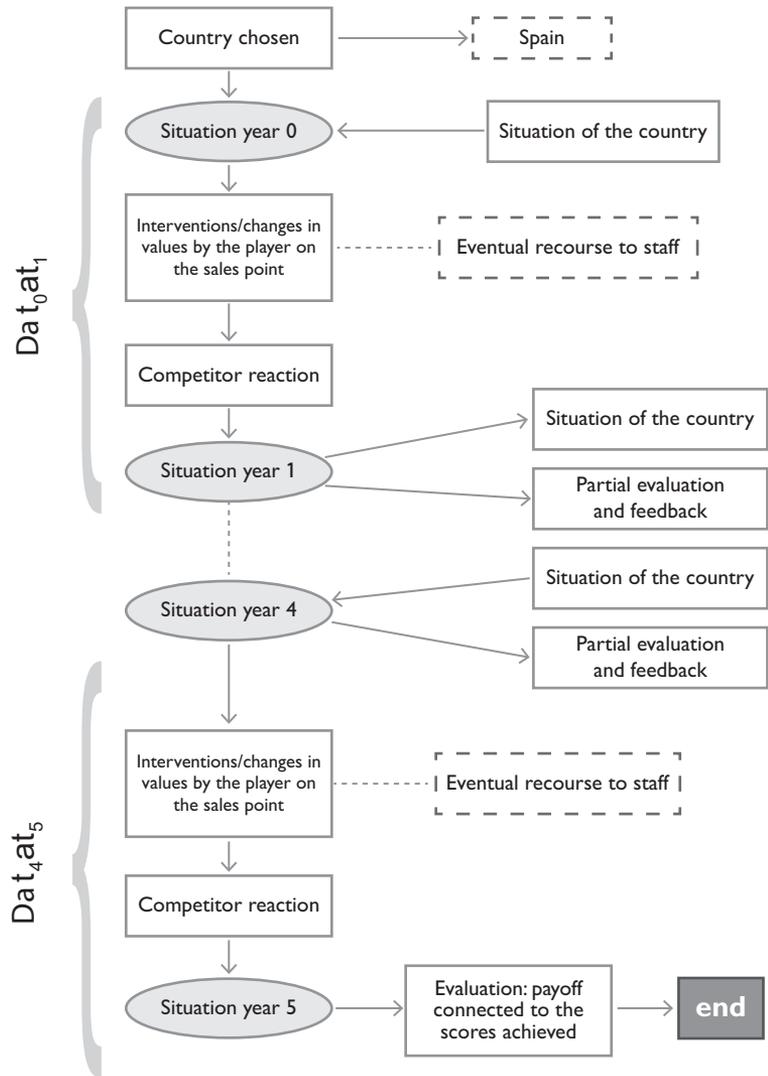


Figure 3. The application on the mobile device > Interfaces for the access to general settings and feedback

Serious game: general flow, content and game logic

The interface design, with relative interactivity to have access to the system of data entry necessary to activate the calculation system and the textual or audio/video content areas, is standardized according to the general usability criteria for mobile devices.

Figure 4. General flow of serious game



The structure of serious game foresees that the single *player/learner* - or the protagonist group finds himself in front of a scenario and personalized on the basis of level of difficulty and individual aims, in which the different players and various parameters coexist and interact:

- international sales network (owner or third party);
- a potential network (mostly vendors who serve competitors);
- the general panorama of the large organized distribution;
- the market objectives of the company for a specific product line.



Figure 5. Video-tutorial > Introductory frames to the serious game

Starting from a fixed maximum budget with a five year limit to achieve the objectives, the player/learner can power the different commercial, organizational, relational, computing, contractual and financial levers. Here are some of the main practicable interventional actions:

- decide network optimization, expansion and redefinition operations;
- launch IT investments - by defining broadness, production times and specific subject of the intervention - in order to have useful computer systems and allow them to have more precise information towards each different sales point at the end of its realization;
- select and favor incentive policies for some or all sales points of the network (even through the redefinition of the incentive mechanisms), by having different aims for each dealer (even in terms of after sales) and eventually deciding to start intra-brand competition processes;
- plan and implement marketing policies aimed at extending the sales network or part of it and defining the discretionary levels of the different vendors.

In supporting the activity, the player/learner has a team of marketing, IT, work contracting, accounting and finance professionals available. A decisive multi-skilled team in the definition of game/action strategies, capable of responding to the most disparate issues that

the player/learner needs to resolve.

Figure 6. Video-tutorial > The support staff for the player/learner



At the end of the five year term, the player/learner is evaluated on the general level of effectiveness of the results achieved and - thanks to the constant theoretical learning references and reinforcements, which allow for the verification in real time of the link between decisions to take and practical consequences - is summarized and commented by highlighting the strengths and weaknesses of the strategy implemented.

All these indications and operating instructions are presented through a constantly available video-tutorial which goes over the fundamental steps of the simulation and takes us towards the correct access to functions and contents.

The logic model and the mathematical-economic variables

The serious game design responds to the mathematical-economic model and to a system of complex calculations, which needed a joint and shared collaboration with an expert in the economic field, the instructional designer and the software developer, aimed at the elaboration, adaptation and computer implementation (with relative functional debugging) of a set of parameters and variables divided into different logic groups.

After, the description of the different economic sizes are implemented in the simulation, in cases where:

- a sales point is affiliated to the company of the player/learner;
- a competitor's sales point reacts to the actions of the player/learner;
- a neutral sales point who doesn't react to the actions of the player/learner.

1. *Changeable parameters by the player/learner*

- Pa: price in which the enterprise sells to the sales point and where resupply is carried out
- Rmax: the maximum resupply value allowed by the sales point.
- IA: marketing investments on the product and on the specific sales point ordered by the company, keeping in line with the budget
- Alfa: percentage variation on turnover that is recognized by the sales point
- Beta: percentage variation of investments that sales points make for activities aimed at after sales and customer loyalty) compared to the previous year which was recognized by the sales point
- Gamma: percentage variation of the investments that sales points make for product marketing) compared to the previous year which was recognized by the sales point

2. *Visible parameters unchangeable by the player/learner and constant during the simulation period*

- IS: availability of funds to finance acquisitions subsidized by the State
- Maturity level: the maturity level of the market
- CmP: unitary cost of production (for the player/learner and competitors)
- CT: fixed costs of the sales point (for the whole period)
- Pma: price in which the good is effectively sold by a neutral sales point
- Annual budget: amount that the company allows the player/ learner each year

3. *Visible parameters unchangeable by the player/learner and calculated by $t > 0$:*

- MP: market potential
- QM: market share of the sales point
- Pv: price in which the good is effectively sold by the sales point
- It: total investments of the sales points during the year

- QME: market share of the competitor's sales point
 - Pmc: price in which the good is effectively sold by the competitor's sales point
 - QMA: Market share of the "neutral" sales point
4. *Visible parameters, resulting from the evaluation of the player/ learner year by year*
- a. *Variables subject to overall evaluation*
- B: is given by the relationship between the sum of the consumed budget during the year and the consumable one
 - F: % variation of net company turnover at $t=0$
 - m: % var in total income with budget
- b. *Variables subject to evaluation of a single country*
- Q: variation of the total market share of the country's sales point at $t=0$
 - I: variation in the relationship between total investments in the country and those of the competitors at time t compared to time $t=0$
 - CL: variation of the relationship between investments in after sales and those of the competitor at time t compared to time $t=0$
 - MGP: average pre-tax sales point margin variation
5. *Parameters visible by the user starting from $t+1$ in case of ICT1 investments (market parameters)*
- TcM: annual growth rate of the market
 - a: reactivity of QM to the difference in price against the competitors
 - b: reactivity of QM to the difference in investments in after sales and loyalty of the sales point against those of the competitors
 - c: reactivity of QM to the difference in investments in brand advertising by the sales point compared to those of its competitors
 - d: reactivity of QM to the difference in investments in advertising on the sales points with those of the competitors
 - e: reactivity of the QM to the difference in direct investments

of the player's company against that of the competition

6. *Parameters visible by the user starting from $t+1$ in case of ICT2 investments ICT2 on the sales point*

- m: resupply or mark-up objective. It is the added percentage value to the costs to define resupply r. It takes the incentive policies into accounts
- IPV: Investment that the sales point makes for activities aimed at after sales and customer loyalty
- IM: Investment that the sales point makes for product marketing
- IV: investment that the sales point makes for the shop
- IE: total investments of the competitor's sales point during the year, given by $EPV+EM+EV$

7. *Parameters visible by the user starting from $t+1$ in case of ICT2 investments on PVC*

- CTE: fixed costs of the competitor's sales point
- EPV: investment that the competitor's sales point make for activities aimed at after sales and customer loyalty
- EM: investment that the competitor's sales point makes for product marketing
- EV: investment that the competitor's sales point makes towards the store
- EA: marketing investment on the competitor's product and on the specific sales point of the company

8. *Parameters visible by the user starting from $t+1$ in case of ICT2 investments on PVA*

- CTA: the fixed costs of the neutral sales point
- APV: investment that the neutral sales point makes for after sales and customer loyalty activities
- AM: investment that the neutral sales point makes for product marketing
- AV: investment that the neutral sales point makes towards the store
- AA: marketing investment on the product and on the specific

neutral sales point of the company

Conclusions

The challenge that the growing internationalization and globalization world of business launches towards distance learning is of great interest for the future of knowledge. The most advanced solutions of instructional design applied to training, professional growth and practices aimed at obtaining the best results of effectiveness/efficiency in the processes of production, distribution, commercialization etc. can, nowadays, encounter the changing lifestyle and learning of end users with great success. These latter are strongly influenced by the utilization of new technologies and are always more oriented towards the *fun* and *useful* use by increasing the expectations of innovative, usable and easily adaptable training interventions to the most disparate learning conditions. In particular, the recourse to simulations and serious games these days, represents the equilibrium point among andragogic validity, technological value and usability appeal.

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