TECHNIKA TRANSPORTU SZYNOWEGO

Veronika FAIFROVÁ , Václav BAROCH , Zdeněk ŘÍHA

ELECTRONIC STRATEGIC INTERACTIVE MANAGEMENT – FUNCTIONAL APPLICATION

Abstract

In addition to commonly used optimization of the physical operation of a company, software simulation of business processes may also be used for training university students who need to know business processes for their future work. Software simulation provides students with virtual experience in which they can check their theoretical knowledge. The article describes the implementation of specific economic simulation software designed primarily for teaching economics and management. This simulation is being developed under name Electronic Interactive Strategic Management, abbreviated ESIM, for teaching purposes at the CTU Faculty of Transportation Sciences.

INTRODUCTION

Students of technical universities often do not understand the fact that a component of their education is also the teaching or training of managerial skills (of course besides the study of economics). On the other hand not only the experience of graduates, but also the demands of future employers show that the preparation, knowledge and practical verification are part of the educations in the branch of management. It is only the the queston of time when the graduates get in their carreer into leading positions or become members of a team solving a complicated technical problem. At this moment a classical technical educations is not sufficient and above all such employees are of use that dispose also of economic knowledge and managerial skills including the soft ones. From many experiences the individual predispositions play the role by their adoption by an individual however many of them can be obtained by progressive training.

A traditional approach to the education by the exercises and practical training does not satisfy this conception. So we put the question how to make the management education more attractive and to fit it to the demands of practical life of the business sphere. It is necessary to transfer this practice to the laboratory conditions of a university. In such organised teaching the emphasis should be put on teamwork and the use of simulated business environment.

A simulation can be defined like a method of sudy of complicated probabilistic dynamic systems by experiments with a computer model [1]. In a broader meaning a simulation is the process of the creation of a model of a real system and the performing of experiments with this model in order to better understand the behaviour of the studied system or to assess the variants of system function. The simulation itself does not solve the management problem [2]. The decision is made by the decision maker.

With the awareness of these facts we approached to a particular realisation of this idea in the form of a software simulation of a virtual business in a virtual economic environment. We concentrated not only on the very economic model, but above all on good accessibility to students. So we have been developing a system intended for student groups (teams) that compete one another in the framework of a virtual competition e.g. for the favour of virtual clients.

We call our project "Electronic Strategic Interactive Management" ("ESIM").

1. ELECTRONIC STRATEGIC INTERACTIVE MANAGEMENT-ESIM

The business simulation ESIM is adressed to evoke real economic environment where a few competing businesses rival under market conditions. In the same way like in the real world also in the economic simulation ESIM the main goal is the profit of a business together with its good economic health and hopeful future outlooks. Every system user can become one of top managers of a virtual business that functions in the same way like in the real world. The management is usually done by several managers together and so the business simulation ESIM allows for it.

A virtual businees in the ESIM environment solves the same problems like a real business. The top management usually gets regular operationg and finatioal reports about the business and its neighbourhood and bysed on them it can do many decisions that will lead in its opinion to a prosperous goal.

Particular users are joined into groups (managerial teams) at the start of a simulation and ESIM assignes them a virtual business with finantial and operational statements from the several last quarters. There are of course a few user groups on the market in the simulation framework and the simulation gives them space for mutual rivalry for the customers, costs, market shares, gaining of technology advantage etc..

Every user is supposed to be member of only one group. In case of a demand of the simulation organizer for a user to exist physically in more groups, it is necessary to create the corresponding number of system registrations for this user.

The goal of a simulation is to gain the best economic state of a business possible. This state is assessed by ESIM by a special way and determines on its basis the score of the business. The better is the economic state of the business, the higher is the score. The users dispose for the business management by a predefined virtual period and after its end their success and managerial skills are assessed only on the basis of the reached score and the most successful team of the simulation is published.

2. THE RUN OF AN ESIM SIMULATION

ESIM simulation is a discrete simulation, i.e. state variables change incontinuously in discrete intervals of the virtual time of the simulation of real internal and external business processes.

The ESIM system uses the following concepts:

Simulation – simulation of real internal and external business processes takes place in discrete intervals of virtual time based on certain input parameters.
Round – a discrete interval of virtual time, typically a virtual quarter. Users may always decide on business operation only between the intervals = rounds.
Decision – users enter certain parameters at the beginning of each round through which they manage their virtual business. This process is called a decision.
Report – at the end of each round, users get a summary of the current state of their virtual business. This summary is called a report – evaluation.

The physical course of the simulation is outlined in blocks in Figure 1.

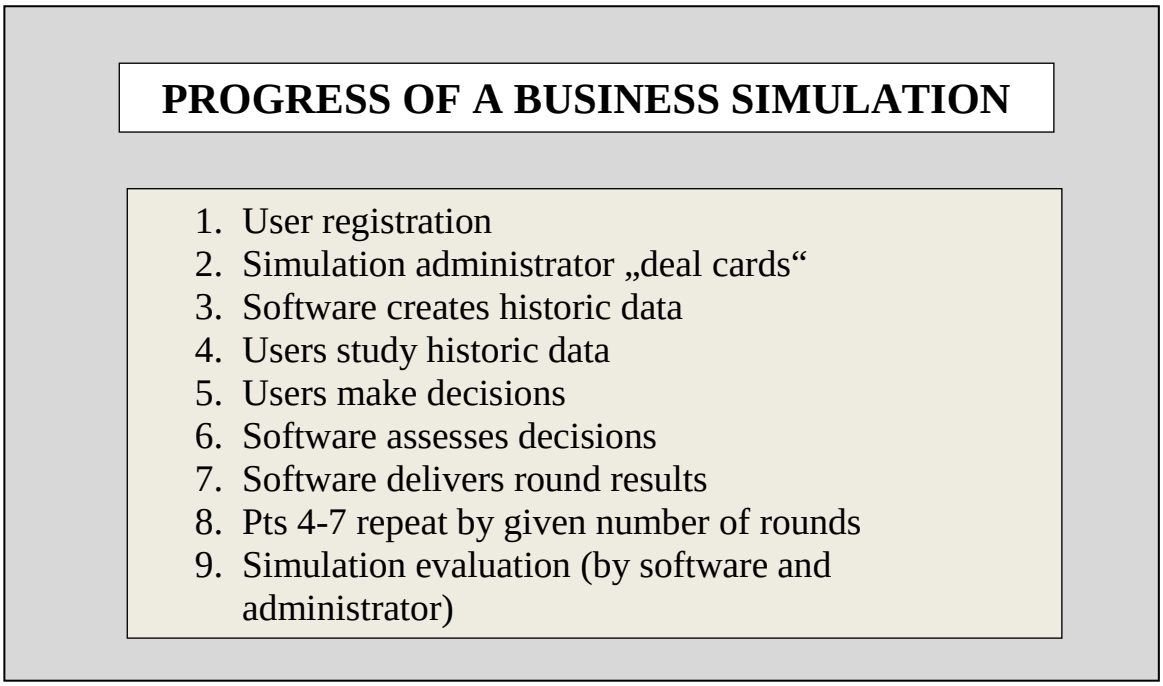

Fig. 1. The block diagram of the ESIM progress [5]

In real time, the simulation runs in individual times preset by simulation time schedule determining sequence of the times:

1. Time - simulation announcement (posting at the notice board, websites, in a leaflet – announcement encompasses basic information on the simulation, including the time schedule)
2. The end of registration of participants (it need not be determined if the number of participants is fixed at the moment of announcement and the organizer does not plan to admit further participants)
3. Division of the users into teams
4. Handing out the rules and the initial state of the virtual business to every team
5. Start time of the 1st round of the simulation
6. End of the 1st round
7. Handing out the results of the 1st round
8. Start of 2nd round of the simulation
9. End of 2nd round
10. Handing out the results of the 2nd round

    …

    (At the start of the simulation the number of simulation rounds is given)

    …

11. Start of the Nth round of the simulation (last round)
12. End of the Nth round of the simulation (last round)
13. Handling out the results of the Nth of the simulation (last round)
14. Announcement of results (based on the score reached in the last round)
15. Formal end of the whole simulation

3. THE APPROACH TO AN ESIM SIMULATION

Within the ESIM simulation we distinguish 3 groups of persons that work with it in different way:

Organizer of simulation – Representant of an educational organization supplying courses of accounting, business management, economy, strategic planning, human resource management etc., that realizes the simulation ESIM for course participants. This person defines the time schedule of the simulation and provides an electronic list of simulation participants (users).

Administrator of simulation – expert, educated person with the knowledge of principles of the ESIM business simulation project and advanced economic theories. This person serves the whole simulation by an administrator interface ESIM and is responible for the predefined simulation schedule.

User of simulation – participant of the simulation, registered to the simulation proclaimed by an organizer. Generally participants of various economic courses and similar activities. At least middle level economic knowledge is supposed.

An ESIM simulation can be used only by a preregisterd user with an assigned username and password, no one else can enter it. The username and password are assigned by the administrator only to pre registered simulation participants.

The part of a registration is also a basic email address for the communication with the system that in fact substitutes in the virtual world a physical address of the user in the real world.

Particular simulations are called by the organizer and he usually selectsthe simulation users by himself or chooses his own internal method for the registration into the database of users. Every simulation has a time schedule including the time to register for it.

Then the simulation administrator assignes a username and a password to every user and notifies it to him. In case of forgetting them, the access to the system can be obtained again by the simulation organizer in cooperation with the administrator.

4. INTERNAL PHASES OF ESIM SIMULATION

Internally an ESIM simulation runs stepwise in these phases:

1. **Phase of creation of user groups** – registered simulation users form user groups (teams) and the administrators respectivelly supports this process by and administrator interface.
2. **Phase of simulation creation** – the adminitrator creates by a special wizard and then configurates by means of an administrator interface all necessary simulation parameters and runs the simulation startup.
3. **Phase of the preparation of historic simulation rounds** – The administrator by the interface sequentially enters and then evaluates particular historic simulation rounds. This phase is very important, because the historic business data are created, and based on them the users later will be able to realize the proper simulation. These data serve above all like a guideline for a strategy choice. So it is necessary for the adminitrator to forward these data by a form chosen by the simulation organizer (e.g. by email) to all user groups.
4. **Phase of user simulation rounds** – Users sign up to the ESIM project web and enter their decisions for the next round. In predefined times the administrator locks the entering process and runs the simulation of the given round. Then he generates the round results, fprwards them to the particular user groups and opens the next simulation round.

5. **Phase of simulation evaluation** – after the evaluation of the last round of the user phase of the simulation the administrator forwards the final results of the simulation to the simulation organizer and finishes the simulation. The organizer of the simulation then acquaints the users of the simulations with the results by a predefined form and publishes the results respectively. The simulations is formally finished.

5. TEAMWORK AND ESIM SIMULATION

Team is a very important base of new organisational structure. Teamwork involves personal and social skills, team creation, interdisciplinary training, conflict solution, encourage ability and to maintain diversity. To create education programme of management concepts, as has been mentioned in previous part, is a perfect working model for the study of teamwork.

Two problems of education would aim at the teamwork: technical proficiency and interactive problem solution.

Technical proficiency is one of set elements called the hard knowledge. Subjects, as mathematics, physics, engineering disciplines, experimental approaches, data interpretation, system construction and application can influence proficiency.

On the other hand, effective communication, ability to work together with a team, professional, ethical and social responsibilities, professional development, and managerial behaviour can improve the interactive methods.

Teams are groups that can be marked with the attribute synergic. The values achieved by a group begin to exceed the sums of values that are the group members able to create individually [6].

A team role is according to Belbin [7] a tendency to behave, to contribute and to interrelate with others in a particular way. He specifies 9 types of behavior in team roles and their benefits and tolerable weaknesses: Implementer, Coordinator, Shaper, Plant, Resource Investigator, Monitor Evaluator, Team Worker, Completer Finisher and Specialist.

Teams are in a the simulation framework formed to be as diverse as possible regarding team roles. The minimal number of teams in one group suitable for simulation is four. The ideal number of students in a team is then 4 5 students.

Expected team positions in the simulation are: Team leader, financial planner, production planner, marketing specialist and stock manager.

CONCLUSION

The current trend of IT technologies development has been considerably shifting their use in various branches. One of the means is computer simulation. Its use in economic branches has very good perspective.

The authors M. Dlouhý and J. Jablonský [8] ask the question and open the discussion, whether a simulation of business processes is only an instrument, or it presents an independent managerial method. From the viewpoint of our existing experience we can contribute to this discussion by the statement that a simulation of business processes is a suitable instrument of the exercise of a management practice.

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Authors:
Ing. Veronika FAIFROVÁ, Ph.D., Ing. Václav BAROCH, Ph.D., Ing. Zdeněk Říha, Ph.D. – Department of Economics and Management of Transport and Telecommunications, Faculty of Transportation Sciences, Czech Technical University in Prague, Horská 3, CZ-128 03 PRAHA 2, tel. (+420) 224 359 165, EMAIL: faifrver@fd.cvut.cz

This paper is supported by the European Union and co-financed by the Social Fund and by the budget of the Capital City of Prague (project no. CZ.2.17/3.1.00/33309, "An innovative management education technique for better preparation of technical college graduates entering the labour market").