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BUSINESS PROCESS RE-ENGINEERING

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ABSTRACT

This paper provides a brief introduction to SIMPROCESS and explains how models can be developed without programming. The type of users who benefit most from SIMPROCESS, the types of systems SIMPROCESS can model, and the various implementations of SIMPROCESS are also described.

1 INTRODUCTION

SIMPROCESS is a business simulator written in SIMSCRIPT II.5 that provides its user with the ability to quickly model businesses without programming. This capability is made possible with a mouse driven graphical user interface that enables the user to build a graphical representation of his or her business. This paper describes who should use SIMPROCESS, the types of systems SIMPROCESS can model, and how a model is constructed.

2 WHO SHOULD USE SIMPROCESS?

SIMPROCESS has been written for business planners and engineers whose other duties make it impossible for them to work on a simulation full time. Usually, this is because they have many other non- simulation tasks to perform and yet find a need for simulation in their work. In many cases they will do without simulation altogether rather than use a programming language. However, there are often times when even experienced simulation users require a model in less time than is possible with a language. In either case, ease of use and rapid production of working models are extremely important. That is what SIMPROCESS is designed to provide.

3 WHAT CAN SIMPROCESS MODEL?

As the name SIMPROCESS indicates, SIMPROCESS is useful for business process re-engineering. Systems that have been modeled with SIMPROCESS include an insurance company wanting to know how many people were necessary to handle incoming phone calls, another used SIMPROCESS to model the flow of paperwork through an office. SIMFACTORY II.5 is a companion product to SIMPROCESS, geared for manufacturing simulation. Both products are included in the same package, so a manufacturing company could use SIMPROCESS to model the front office and SIMFACTORY II.5 to model the factory floor, then tie the two models together if they wish.

4 HOW IS A MODEL DEVELOPED?

Modelling with SIMPROCESS is most successful when it is performed in an iterative manner, starting with a fairly simple and therefore manageable representation of the business. After the initial model is developed and working it is saved and copied. The copy is then enhanced until it reaches the next milestone in the development of the model. Again the model is saved and a copy is made for further refinement. This process is repeated until the last milestone in the model is reached.

We call the first simplified model of the business the basic model. A basic SIMPROCESS model represents only the stations, queues and transfer paths that exist in the office. Even though many products may be processed in the business only two or three are included in the model at this time. Any information about shifts, equipment failures, special office machines, etc. is not entered until later. The objective is to create a working model that can be progressively refined until the desired level of detail has been reached.

The basic model is built by first defining the business layout, then the products processed by the office, and finally, by setting the run options indicating the run length, number of replications and so on. The complete process is explained in the following paragraphs.

5 DEFINE THE LAYOUT

The layout consists of processing stations, queues, receiving areas, and transfer paths. It is created by selecting and positioning icons that represent these components. As each icon is positioned the data that describes its characteristics (name, capacity, setup time, etc.) are entered. Of course, editing capabilities such as copying, moving, or deleting icons are available for making changes at a later time. After the icons are positioned and described, the transfer paths that connect one icon to the next are drawn. Figure 1 show a layout of a document processing office.

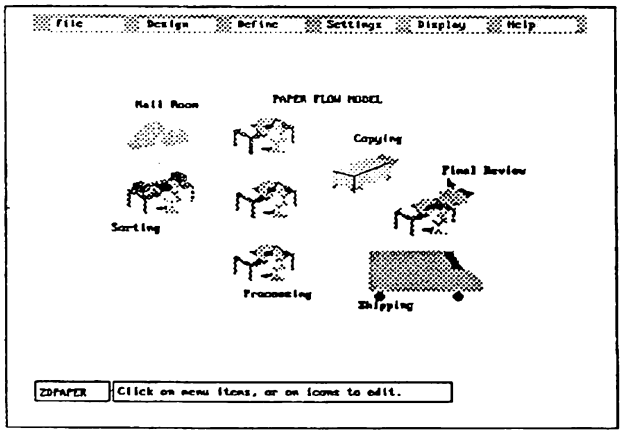

Figure 1: Layout of a Business

6 PROCESSING STATIONS

Stations are locations where work is done. A station might be a switchboard, copy machine, typing pool, optical scanner, etc. In SIMPROCESS stations are described in terms of the processes they perform. The part remains in the station for the amount of time called out in the workflows. (The workflows are explained later in this article.) After processing, the work will be sent downstream for further work. If none of the downstream stations or queues are able to accept the work, it will remain in the processing station until a station or queue becomes available.

6.1 Queues

Queues are simply areas where work waits before the next process is performed. Work may accumulate in the queue until its capacity has been reached. At that time no more work may enter the queue until some leaves. Queues have built-in inventory control strategies which model common stock management policies found in businesses.

6.2 Receivers

New work that is entering the factory enters at receivers. Work may be scheduled by assigning a quantity to arrive periodically or by using a schedule to specify the exact time of arrival.

6.3 Transfers

Another component of the layout is the transfers, which indicate the path from one station to the next and which queues(s) feeds which station(s). Transfers have a wide array of controls to modify how they pick up and deliver material.

7 DEFINE THE PRODUCTS

In SIMPROCESS the steps necessary to make a product are defined in the workflows in terms of the processes necessary to produce the product. Workflows determine what processes are performed on the product, the duration of each process, and the order in which the processes are to be performed. Assemblies, disassemblies, and branching (such as occurs at an inspection station where the product passes part of the time and fails part of the time) are all shown in the workflows. This approach also makes it possible to show different types of work being processed in the same office. In fact, each product may have its own unique set of processing times. Reprocessing loops are easily constructed even if different processing times are used on the second pass through the business.

A workflow consists of three lists: a list of inputs to the plan, a list of processes performed on the inputs, and a list of outputs produced by the workflow. The inputs may either be raw materials or work-in-process produced by another plan. The processes list references the processes performed by the stations in the business layout. This list of processes combined with the information on the layout tells SIMPROCESS how to route the parts through the business. The output products may be finished goods, scrap, or work-in-process.

8 RUN THE BASIC MODEL

The last step in building the basic model is to set the length of the run, the number of runs to make, the length of the warm-up period, and the reports that will be generated by the model. SIMPROCESS can automatically choose the run time to generate valid statistics.

At this point the basic model is fully defined and should be run. Obviously the output is not yet what is needed for analysis and decision making, but the output should be checked to see if this version of the model seems to be working properly.

9 DEFINE ADDITIONAL PRODUCTS

After the basic model is working the first refinement that should be made is to define additional products. If a large number of products are being modeled then they should be defined two or three at a time. Then when the model works properly with the newly defined products move on and add more.

10 DEFINE RESOURCES

In SIMPROCESS the term resources refers to anything that is necessary to carry out an process at a processing station. For example, a resource could be some special equipment or a skilled operator.

Resources are added to the basic model in two steps. In the first step the resource is defined and the quantity available at the start of the run is set. In the second step each station requiring resources is defined. This is done by indicating what resource (or resources) is required by the station and the quantity required.

11 DEFINE THE INTERRUPTIONS

Interruptions are any activity that interferes with the process of a station or transfer. The two most common examples are equipment failures and preventive maintenance. In SIMPROCESS we would say the failure is a priority interruption because it takes priority over anything else the station could be doing. Preventive maintenance will only occur when the station is between processes.

Other characteristics of interruptions that can be specified are the mean time between interruptions, the type of interruption clock, and the mean time to resume. The mean time between interruptions is the time from one interruption to the next. This can be calculated from the end of one interruption to the end of the next, or it could be the time between interruptions, or it can be based on the calendar time, or the operating time of the station or transporter being interrupted. The mean time to resume specifies the duration of the interruption.

12 WHAT REPORTS ARE AVAILABLE?

During the simulation traces and snapshot reports are available to track the progress of the simulation. Traces provide detailed information about each event as it occurs in the model. This will include events such as the arrival of raw materials, the start of an interruption, the completion of a final product and so on. Snapshots provide a picture of the model at specific point in time.

After the simulation, reports are available that summarize how the model performed. Information on such things as equipment utilization, throughput, product makespan and queue utilization is available. Each run (or replication) is summarized in a set of reports. A summary report of all the runs provides means, standard deviations and confidence intervals on the model output.

13 HOW IS THE ANIMATION PREPARED?

The animation of the business automatically follows from the description of the model. In other works, there are no extra steps to prepare the animation. However, animation can be improved by creating custom icons in the Icon Editor.

14 IMPLEMENTATION OF SIMPROCESS

SIMPROCESS is available on the following computers: IBM PC AT's and compatibles (under DOS, Microsoft Windows and OS/2), IBM PS/2's, HP 9000 Series 700 and 800, SparcStation. The look of SIMPROCESS on each of these machines is consistent, as are the data files. Users will have little trouble working on the different implementations and moving data from one machine to the other.

15 SUMMARY

SIMPROCESS's graphical representation of the factory together with sound modelling practices make SIMPROCESS the ideal tool for rapid model development. It should be seriously considered by anyone who is short on time but who requires a model for their analysis or presentation.

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AUTHOR BIOGRAPHY

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