

Simulating the Implementation of Business Information Systems: The Case of Enterprise Resource Planning

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Abstract This paper seeks to understand the dynamics of information systems implementation within firms and more specifically focuses on the case of Enterprise Resource Planning (ERP). This contribution applies a simple differential equation based model to a real firm and successfully fits the model to the observed data. The model is able to predict the implementation time under various conditions. In a broader perspective, the paper discusses the use of simulations and how these methods could be the engine behind actionable managerial tools. This contribution outlines that these tools will become more prevalent in the future as graphics hardware becomes utilised, allowing computational intensive simulations to be performed far more cheaply and quickly than is currently possible.

Key words strategic management, information system, ERP, simulation

1 Introduction

Today's business innovation and technological requirements have made information technology a source of competitive advantage in the marketplace. Consequently, strategic management of information technology activities tends to play a significant role in increasing modern corporation's profits and market shares. That is to say, better information provides firms with a competitive advantage, mainly because of recent management strategies resulting from the innovative use of information systems. In terms of corporate use of information technology, researchers and practitioners agree that Enterprise Resource Planning (ERP) systems constitute the most important software development in the recent decade (Davenport, 1998). The implementation process of an ERP is costly and can range in a mid-sized company from €1 million to €5 million. Still, 90% of ERP implementations turn into runaway projects (Martin, 1998) or fail completely. This contribution focuses on the implementation process of an ERP within a firm. More precisely, this paper seeks to provide a better understanding of the dynamics underlying the reasons for success or failures of an ERP implementation. Simulation methods will be used to analyse this implementation process.

The paper falls in two main parts, which illustrate in turn the researcher rationality (Part I) and the practitioner rationality (Part II). The first section of the paper seeks to provide the researcher with a simulation-based model to represent the dynamics underlying the establishment of an ERP within an organisation. By way of illustration, this section presents a simulation model, whose behaviour is tested by applying it to real observations of a firm. The second section of the paper is a discussion towards the creation of an actionable tool, which would, based on the simulation model described in the first section, assist the management team to implement an ERP optimally. This potential simulation-based tool could face some limits in practice, which are discussed along with their solution, in terms of current and future trends in computing. The purpose of the contribution is twofold. First, it illustrates how simulation methods could be used to understand organisational processes, both from the researcher and the practitioner perspectives. Second, it argues that learning how to use a new technology – in this context, an ERP – is required but not sufficient for the successful diffusion of innovation within a firm.

2 Simulation and the Dynamics of Innovation

2.1 Use of Simulation in Organisational Studies

Simulation methods are increasingly used and widespread among the community of researchers in management, while remaining used much less by managers.

Simulation models have recently raised particular attention in the management research literature (*American Journal of Sociology*, Special Issue January 2005; *Academy of Management Review*, Special Issue: Simulation Modeling in Organizational and Management Research, October 2007). However, these models used by the researcher are still very poorly understood by the management research community, mainly because simulation methods still have a perceived link with deterministic

optimisation models. On the contrary, it could be argued that one of the main reasons for the use of simulation is that the complexity of managerial reality is often very difficult to analyse from empirical observations and human intuition alone is rarely adequate. On the one hand, traditional quantitative analysis or data processing statistics - which tend to homogenise agents in order to make better predictions - are often too simplistic in explaining this new management complexity. On the other hand, the only use of a single case study to address a management research question is often the opposite problem and no longer brings out the governing dynamics, flooding analysis with superfluous details. In this context, numerical simulation methods appear as an alternative path between theory and purely empirical studies. As Axelrod pointed out, simulation is “a third way of doing science. Like deduction, it starts with a set of explicit assumptions. But unlike deduction, it does not prove theorems... induction can be used to find patterns in data, and deduction can be used to find consequences of assumptions, simulation modelling can be used as an aid to intuition.” (Axelrod, 1997: 4). The main advantage of these models is to deal with heterogeneous entities / agents that have a procedural rationality and interact directly and indirectly with each other. The information available to the agent is largely local and the concept of equilibrium, which is at the centre of more traditional and standard models, is at best a situation of reference for the researcher (but not for the practitioner). Thus, such models provide a better understanding of collective phenomena arising from complex heterogeneous individual entities, and aims at a more realistic analysis of the real world. Consequently, because simulation models constitute the artificial reconstruction of a real system or phenomenon, simulation methods present the advantage to approach the dynamic nature of certain managerial concerns, in a more realistic way than standard equilibrium models.

Dooley (2001) distinguishes three main schools of simulation practice in organisational studies:

- Agent-based models¹ (which include cellular automata), – this simulation involves ‘agents that attempt to maximise their fitness (utility) functions by interacting with other agents and resources’ (Ibid: 829);

- Discrete event models² – this simulation is the most often used in the case of a system defined as ‘a set of entities evolving over time according to the availability of resources and the triggering of events’ (idem);

- System dynamics³ – these models are used when the simulation involves ‘identifying the key « state » variables that define the behaviour of the system, and then relating those variables to one another through coupled, differential equations’ (Idem).

The simulation model developed in the next section is built on the basis of the contribution of Repenning (2002), which used a system of differential equations. The following section then uses the last simulation practice referred to by Dooley (2001) as system dynamics. In his article, Repenning examined the possible occurrence of failure associated with the introduction of a new technology within the organisation and, more specifically associated with its diffusion among its community of users. Our contribution is a variant of Repenning’s model and is more particularly concerned with factors of failure, regarding the implementation of an Enterprise Resource Planning system within a firm.

2.2 Understanding the Process of Information Systems Implementation within a Firm

2.2.1 Model

In the same line of research as Repenning (2002), the following model seeks to understand the dynamics lying behind the diffusion of a new technology within a firm. More precisely, this contribution focuses on the case of implementation of an Enterprise Resource Planning System. The choice of adoption of an ERP by a firm could be justified by various reasons. This information system is, indeed, a factor of organisational reconfiguration, and enlarges the choice of best management practices available to the manager. An ERP is based on a single and common database gathering data from various departments of the firm and shared by its various business functions, such as customer relationship management, financial service, or computing service. This system makes the diffusion of information easier and reduces multiple errors through the standardisation of a modular software design. Obviously, these benefits are only made possible by the smooth functioning and success of the implementation of ERP to its community of users.

Also, the adoption of an ERP, if used by members of the organisation, would provide a benefit to

¹ Examples of multi-agent models include cellular automata and K model. For further details, cf. Phan, Amblard (2007).

² Used, for instance, in March (1991).

³ Method used by Repenning (2002).

the users of the technology and to the company as a whole, especially in terms of competitive advantage. However, very often, the implementation of this system fails, as pointed out in the introductory remarks. Repenning's main argument for these failures is associated with a lack of use of the new technology by its community of users. In turn, this lack of use could be explained by a low opinion of the new technology made by its users who, consequently, do not convince positively non-users to use the ERP system. The low number of users may also be explained by a lack of pressure coming from the managerial team. However, this contribution only focuses on the first explanation of failures. In this context, there are three important variables in the analysis of the implementation of an ERP:

- (1) The number of users of the ERP, $N(t)$;
- (2) The benefit the user obtains by using the ERP¹, $B(t)$;
- (3) The link between $N(t)$ and $B(t)$ provided by the users opinion of the technology.

In the model $N(t)$, and $B(t)$ are the variables modelled using a pair of coupled non-linear, 1st order, ordinary differential equations (ODE's). The rate of change of $N(t)$ is proportional to the product of the number of users and the number of non-users. That is to say, there are $N(t)$ people available to persuade the non-users, to use the technology. The number of non users is simply $N_{tot} - N(t)$, where N_{tot} is the total number of employees, assumed to use the ERP.

Therefore

$$\frac{dN(t)}{dt} \propto N(t) \{N_{tot} - N(t)\}. \quad (0.1)$$

The benefit obtained from using the technology is defined as being $B(t) = 1 - D(t)$, where $D(t)$ is the number of defects which is reduced by the introduction of the new information system. Inversely to Repenning (2002), who uses the defect variable, $D(t)$, this contribution chooses to explicitly introduce the concept of associated benefit². In fact, by contrast with this author, who used a range of parameter values to examine the model behaviour, we test the model by applying it to real observations of a firm. Hence, in this context, it appears empirically very difficult to collect and measure a proxy variable of defect. However, the use of the benefit variable is empirically testable, making the selection of parameters much easier.

Schneiderman (1988) found that the number of defects emerging with the introduction of an ERP system decays exponentially over time, which assumes the existence of an increasing learning process. Whereby the rate of decrease in $D(t)$ is proportional to $D(t)$, therefore the rate of increase in $B(t)$ is also proportional to $B(t)$

$$\frac{dB(t)}{dt} \propto \phi \{B(t) - B_{max}\} \quad (0.2)$$

In this equation, we assume that the benefit can not exceed some maximum value, $B_{max} = 1 - D_{min}$. The prefactor ϕ is known as the decay constant. It is a measure of how long it takes to learn how to use the technology by its users. The larger ϕ is, the quicker the benefits obtained by using the technology are. However, the benefit also depends on the number of people using the technology; therefore we use the modified version of(0.2):

$$\frac{dB(t)}{dt} = \phi \{B(t) - B_{min}\} N(t) \quad (0.3)$$

¹ This variable can be understood as the benefit that the user gets from using the ERP instead of using the former internally developed system, 'home-made' by the computing department.

² It is here necessary to draw a comparison with Repenning's contribution. The author defined the defect variable in three different ways. (Repenning, 2002 : 115). The first one, could represent a defect in a certain category of processes. For the purpose of our paper, this could be the case of an increase into the delay of payments after the implementation of the ERP. The second meaning of the defect variable could be associated with an error made by the members of a service within the firm. In the case of an ERP adoption, we could think of a bad use of the tool and of mistakes made in the collection of data, mainly due to a lack of learning from the staff. Finally, the third interpretation of this defect variable by the author is the result of a lack of specific competencies of the users.

With the initial benefit, $B(0) = 0$.

Now, we can link the number of users, $N(t)$ to the benefit associated to the use of the ERP, $B(t)$. This is done by a functional $f[B(t)]$ which links the feed back or 'word of mouth' between users and non-users of the technology. If the users notice some benefit, then, they will recommend the technology to the non-users, and conversely if the users notice no or little benefit then they will not recommend it. We can write a functional f , which measures the influence of the benefits obtained by the users on their propensity to persuade non-users to start using it, because

$$\begin{aligned} f[B] > 0 & \text{ if } B \geq B_{\min} > 0 \\ f[B] < 0 & \text{ if } B < B_{\min} \end{aligned} \quad (0.4)$$

As long as f satisfies the property (1.4), its exact form does not significantly change the results (Repenning, 2002 : 116). We have used a smoothed step function. Therefore returning to (0.1)

$$\frac{dN(t)}{dt} = \omega f[B(t)]N(t)\{N_{tot} - N(t)\} \quad (0.5)$$

where ω is the rate of interactions between users and non-users.

We now have a pair of coupled differential equations (0.3) and (0.5) for both variables defined by 1) and 2), respectively the number of users of ERP, $N(t)$, and the benefit the user gets from using the ERP system, $B(t)$. The final part of the model is the functional form (1.4) which links the feedback between the number of users of the ERP and the benefit from its use, defined in 3).

2.2.2 Parameters of the model

It is argued that when a simulation model is tested against real world data and is able to make predictions which agree with other data, the model is considered valid (Cartier, 2003: 210). This second section uses this principle and therefore collects some observations of a real firm, to illustrate and validate the model presented in the previous section.

The collection of data has been made after having identified a particular company which has implemented an ERP system, long enough ago to enable us to interview its users after the implementation has been completed. The company we selected (it will, for confidentiality reasons, be renamed "Prestige Service & Co.") operates within the sector 'Leisure Industry, Hotels', and has 3,500 employees. In 2000, Prestige Service & Co. took the decision to implement a new information system, which was replacing the existing internally developed system. Management teams argue that the reason for the adoption of an ERP was primarily a way to make the company more easily auditable. The community of users of the ERP only represented 10% of the entire company and concerned three business departments, namely the IT service, the administrative functions, and the purchasing department. In total, there were approximately 350 users of the new technology. Interviews conducted within the company were semi-directive and were conducted within the three different services using the ERP. Each manager of the three services was interviewed independently and we selected ten users by department who attended the introduction of the ERP in 2000 and agreed to answer our questions.

On average for a single user, the managerial team estimates the necessary learning time for the ERP, to be one month. In our model, this variable is represented by the constant ϕ , which estimates the amount of learning necessary for the use of the ERP by its users and appears in:

$$\frac{dB(t)}{dt} = \phi\{B(t) - B_{\min}\}N(t) \quad (1.6)$$

After taking into account that the learning time was on average 30 days per person and setting the

constant ϕ^1 , we get the following result for the whole company:

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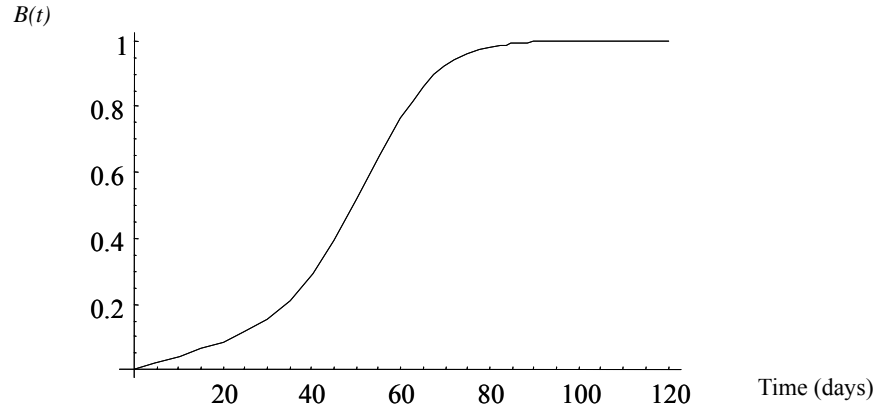


Figure 1 Shows The Evolution of the Benefit Variable, $B(T)$, over time

The y-axis shows the benefit, $B(t)$, against time, assuming that the minimum benefit from the ERP is 0, and its maximum value is 1. This graph chooses a time period of four months (120 days). The curve shows that the initial benefit is small before increasing sharply between the 40th and 90th day, by which time the full benefit is obtained - which corresponds to the technology being fully implemented across the firm. This implementation period of three months is predicted by the model as ϕ was set to give an implementation time for an individual of one month. The shape of the curve and the increase in time required for the full implementation can be explained by the benefit depending on the number of users (the appearance of $N(t)$ in equation (0.3)). The number of users depends on the feedback function, $F[B(t)]$, as expressed in equation (0.5), which is reproduced below:

$$\frac{dN(t)}{dt} = \omega f[B(t)]N(t)\{N_{tot} - N(t)\} \quad (1.5)$$

with ω , the interaction rate between users and non-users.

The setting of the model parameters consists of estimating the interaction rate ω , empirically. On average, during the three months of training, the users of the ERP interacted once a week with the non-users. In setting $f[B(t)]$, we get the following result:

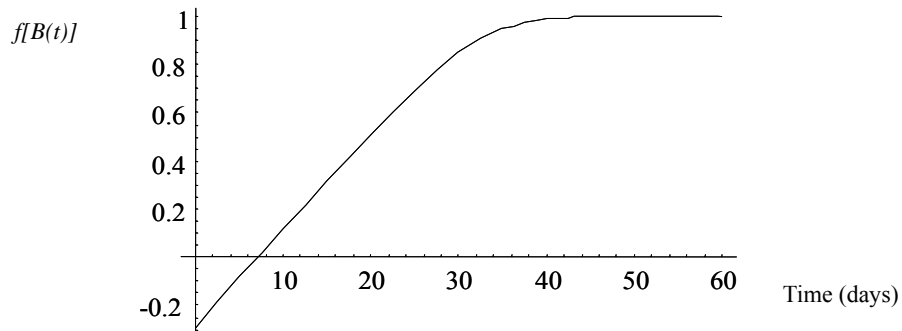


Figure 2 Shows the Evolution of the Feedbacks variable over time

This curve is initially negative, due to the small initial benefit (see Figure 1), and grows linearly

¹ It can be shown that $\phi \approx 7 \ln(2) / t_{learn}$ where t_{learn} is the time it takes to a user to obtain maximum benefit from the technology. We know that $t_{learn} \approx 30$ days for the technology of interest in this study, ERP. Therefore $\phi \approx 0.16$.

until approximately day forty. At this point in time, the curve reaches the value of 1¹, i.e. the maximum value, meaning that the users of the ERP recommend it very strongly to non-users.

If we now look at the dynamics of the number of users, $N(t)$, the equation can be reproduced below:

$$\frac{dN(t)}{dt} = \omega f[B(t)]N(t)\{N_{tot} - N(t)\} \quad (1.8)$$

Based on our empirical observations, we can now set the model with $\omega = 1/7$, and $N_{tot} = 350$. Thus, the solution to equation (1.5) could be expressed graphically:

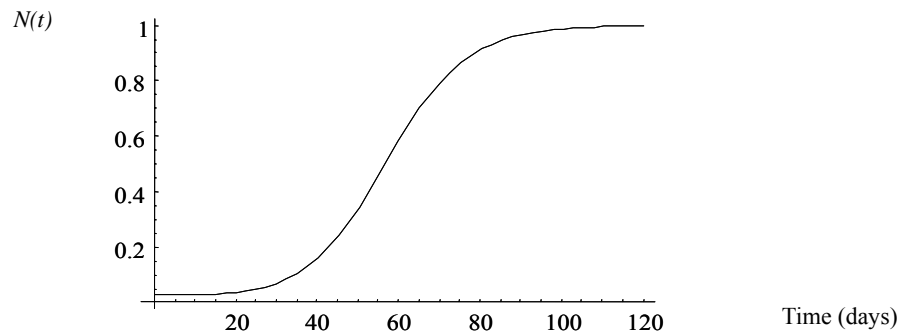


Figure 3 Shows the Evolution of the Number of Users over time

The number of users $N(t)$ remains roughly constant for the first 40 days, by which time the users have formed a strong positive opinion of the ERP system (see figure 2) persuading the non-users to adopt it, causing $N(t)$ to sharply increase until the third month of implementation of the ERP. By day 90 (end of the third month), the ERP has penetrated the whole community of users. In accordance with our model, one of the explanations is that workers initially do not recommend the technology as there is little benefit from using it. Once some users have had time to learn how to use the ERP, they obtain more benefit from it and recommend it. More people use it and go on to recommend it. This feedback continues producing rapid ‘viral growth’ and the new technology becomes the new standard after 3 months. The initial goal expressed by the managerial team is then reached.

This argument validates the model presented by Repenning (2002), by strengthening it with empirical variables. Our model used a value of ϕ corresponding to a learning time of 30 days²; the time required for a user to get the maximum benefit from the use of the ERP. However, the model is able to predict that it will take 3 months for everyone (350 users in our context) to adopt the ERP. This gap between the mastering of the ERP and the current use of the ERP by the whole community is largely due to the time required for people, not only to learn to use this new technology, but also to be convinced to use it. This feedback loop or positive reinforcement described by our model confirms the idea of Repenning (2002), and can be summarized as follows:

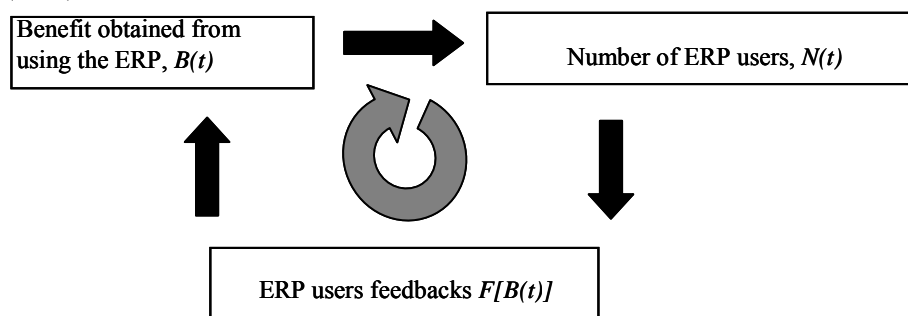


Figure 4 Shows a Modified Version of the Feedback Loop Introduced by Repenning (2002), and Adapted to Our Model of ERP Implementation.

¹ 1 corresponds to a 100% benefit associated with the use of the ERP.

² Based on our case study.

2.2.3 Concluding remarks

At this stage of the analysis, it now seems relevant to confront the predictions of the model to what has actually happened in the reality of Prestige Service & Co. The main theme of the questionnaire was directed towards the diffusion of the ERP system within the organisation. Prestige Service & Co. started a training plan which lasted three months. This training - initially provided by a service company specialised in ERP implementations – first focused on training 10 people, that the managerial team qualified of ‘experts’. These experts were then removed from their usual daily duties to train and to persuade 20 more people that managers describe as ‘super users’; this stage took one month. These ‘experts’ and ‘super users’ were then scattered throughout the three services, to interact with the rest of the firm who were all non-users. At the end of the second month of the implementation process, half of these non-users had mastered the technology (160 more people). Three months after the start, the entire staff was using the new system.

The model allows fictitious scenario to be simulated, something what would be very costly if done in practice. We compare our model to what would have happened if Prestige Service & Co. had adopted another strategy (e.g. by training a higher or lower number of initial users or ‘experts’). This gives the following results:

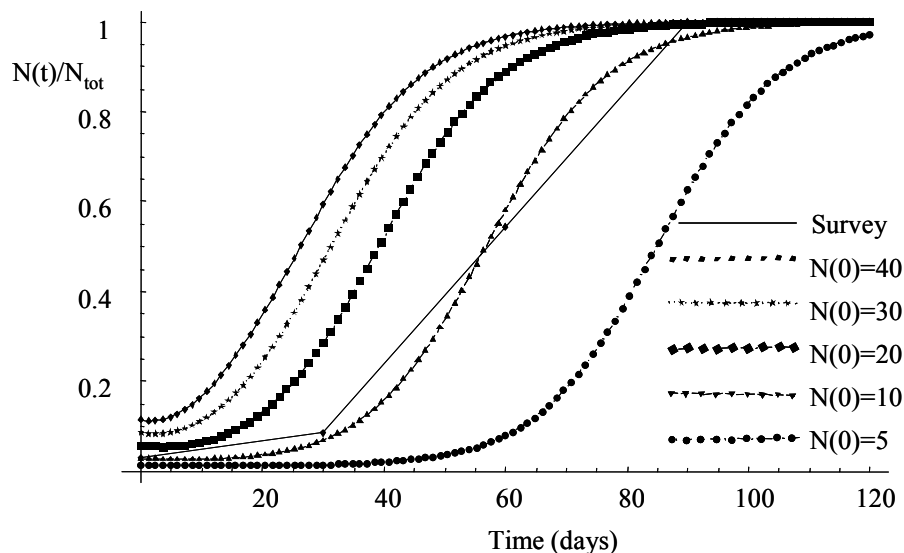


Figure 5 Shows The Fit Between Our Model and the Reality Of Prestige Service & Co. Where $N(0)=10$.also Shown is the Effect of Varying the Initial Number of Users.

This graph requires several comments. The first relates to the period of implementation of the ERP. The model can be fit the data very well, with 10 initial users ($N(0) = 10$), the modelled curve agrees with the curve obtained by surveying Prestige & Service Co., which has initially formed 10 experts. In both cases, three months are necessary to achieve the full use of the ERP by the whole community. We can investigate the effect the initial number of users has on the implementation time. If the team management had decided to train, initially, only five users, it would have taken a month longer (120 days) for the whole community (350 users) to use it. It is not clear here about what the optimal number of users to form initially has to be. One would have to compare the cost of training of 5 more experts with the gain associated with the use of ERP a month earlier.

However, it is interesting to note that if Prestige Service & Co. had more experts initially, it would not have proportionally accelerated the required time before its use by the entire community. In fact, if the company had trained 20 initial users (instead of 10), approximately 70 (instead of 90) days would have been enough for the whole community to use the ERP, which may have been worthwhile. While in comparison, training 30 people would have only reduced the implementation time to approximately 65 days. A negligible reduction in implementation time is obtained by training more initial users. This means high levels of investment in training projects may not have the expected consequences on the speed of using an ERP.

3 Use of Simulation Methods in Business

The first part of this contribution provided the researcher with a simulation tool to represent the dynamics underlying the establishment of an ERP within an organisation. It is only after the researcher manages to analyse this dynamics, it becomes possible to think about an actionable tool for the manager as regards the implementation of an ERP system in his firm. Put differently, the previous step was therefore necessary to develop a possible tool, which would, based on the simulation model described above, assist the management team to implement an ERP optimally.

3.1 Towards Simulation-Based Tools for ERP Implementation

The model presented in the previous section paves the way to several lines of thinking. The use of this simulation model might be useful to a management team, especially working for a large corporation. In this context, it would be interesting to think of a tool based on simulations, which could assist the management team in the implementation process of an ERP. Obviously, this tool has to be seen as a tool for the management team of representation *a priori* of the future dynamics of diffusion of the ERP, rather than as a totally reliable way of controlling the implementation of an ERP.

First, this simulation based management tool might indicate to the management team the time required for the implementation of an ERP, depending on the number of initial users fixed by managers. For instance, in our case study, 10 'experts' were initially trained. The formation of these initial users is costly, since they are full-time detached from their usual duties. If the team management had decided to train 40 initial users, the company would have not only experienced higher expenditures in training, but also a very low relative gain in the necessary time for the implementation of the ERP. However, if too few original users had been selected, or if too little expenditures had been invested in their training, the ERP would have never been used by the rest of the firm, since non-users would not have been encouraged to use it (because of the lack of positive feedback). Therefore, a critical threshold of initial users below which the development of technology is doomed to failure seems to exist. Conversely, there is little reduction in implementation time obtained by excessively training a large initial user base, moreover there is likely to be a considerable cost in doing so. Therefore, the development of a tool based on a simulation model (allowing for characteristics of the firm) could allow the managerial team to estimate the optimal initial critical number of users to train.

In the same way, we could consider that this tool might help the managerial team in its search for the right balance between the cost associated with the training programmes for users detached from their daily activities and the gain associated with the use of the ERP on a longer period. The model presented in the previous section is a very deliberately simplified version of reality. The aim was to find a good balance between the development of a too simplistic and a too complex model. It is often argued that the best objective to reach is to build a model as simple as possible that can explain more complex observed phenomena.

However, it is now possible to make this model more realistic by considering more than two parameters. We could consider, for instance, the critical level of managerial pressure put on users, necessary to the successful implementation of an ERP. We might consider, also, to provide the manager with the ability to predict the frequency of 'optimal' interaction between users and non-users for the proper implementation of a technology. Finally, we could set the model so that it takes into account different levels of learning associated to each user of the ERP.

However, in a practical perspective, the more complicated a simulation model, the greater the computer power required to solve the differential equations or run the simulations. The next section sets the limits of the use of simulation in business, while offering some early technical solutions.

3.2 Graphics Hardware – A Revolution in Simulation Methods

The information system is a set of resources that are organised to collect and store, share and process data. Considering the case of an information system which would assist the implementation of an ERP, we could think of setting up an information system that would help identify the values of parameters to be used by the model developed in the previous section. In determining these parameters, the system would then repeatedly solve the equations of the model, by varying the possible parameters. The main objective of this information system would therefore be to process data. In this context, it appears that the solution of the system of differential equations would become increasingly complex as more parameters are considered, requiring the use of a super-computer.

This argument raises two types of limits in the use of simulation methods in business. The first limit relates to the issue of technical skills of the staff required to perform simulations to enable the management team to be guided in the implementation of an ERP. This limit will not be considered in

this contribution, mainly because it did not appear as significant enough in the few contributions on the matter (Melao, Pidd, 2003). The second limit relates to the hardware required to implement these simulations. In fact, the establishment of repeated simulations tends to be largely constrained by the speed of the processor. The purchase of super computers comprising multiple processors is a solution with a particularly high cost.

Yet, an intermediate solution could be considered: the use of graphics hardware in a standard PC. Modern graphics cards include approximately 200 processors for a very low cost, and this number is rapidly rising to cope with the ever increasing computational demands of the videogame industry. These cards represent a new approach to calculations, in which hundreds of processors simultaneously communicate and cooperate to solve complex calculations up to one hundred times faster than a traditional central processor, CPU. More precisely, the role of graphics cards is to convert digital data – internal to the computer - into a digital signal - compatible with the monitor. Although these cards are primarily used today on the video games markets, they are a significant computational resource for business simulations. Recently, after having experienced such a reduction in their costs¹, these cards are increasingly used in various fields, such as simulating weather patterns, and financial cycles. It seems highly likely that these cards could then be applied to any activity requiring a large amount of simulation activities that can be parallelised. That is to say when the task can be broken up into smaller tasks which are solved independently; parameter searching is a naturally parallel problem being the repeated solution or running of simulations with different parameters.

For instance, NVIDIA – currently one of the two major manufacturers in the graphics card market - offers solutions and assistance to support their use with the development of the CUDA (compute unified device architecture), which essentially allows source code to be easily executed on graphics hardware. Intel is also introducing a similar project under the working name of Larrabee. This new high-tech equipment is now very attractive and accessible to all companies whose strategic management uses intensive numerical simulation, and paves the way for implementing more realistic simulations based on more complex models.

4 Conclusion

According to Melao and Pidd (2003), simulation tools are currently relatively uncommonly used by practitioners. Their results confirm earlier studies, such as that conducted by Hollocks (1992), which showed more than ten years ago, that the use of simulation by the UK industry was around 9%. This can be partly explained by the fact that management teams cannot see the benefits of using methods of simulation, when human intuition seem sufficient to their management. Yet with the increasing complexity of organisations, simulation based tools seems more suited to the business world. The low use of simulation tools can also be explained by the difficulty of defining some of the organisational processes, and thus properly building the model. The case study conducted by Melao and Pidd (2003) confirms the results of our study, in showing that failures associated with the diffusion of a new technology is not primarily related to difficulties in learning how to use it, but is rather due to resistance to change (Melao and Pidd, 2003: 7). Also, the argument of a correlation between low use of simulation tools and lack of training used by Hollocks (1992) is challenged by our contribution which showed that the main factor of successful implementations is more related to the feedback effects. Therefore, the main idea of this contribution has not been to provide simulation as a certain and reliable method, which would aim to dictate to the management team how to implement an ERP. Quite on the contrary, this paper is more a first step which has sought to think how simulation methods could be used in business.

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¹ Their range price is between 100 and 700 euros.

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