Building on Success -- Lessons Learned

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ABSTRACT

Initial success in a new corporate Expert Systems program can be difficult to achieve. However, even after initial success is gained, building on that success can be equally challenging. This paper examines a case study of a beginning Expert Systems program at a large regional life insurance company -- a program that began with excellent success, but has not been able to follow up on that success. Through examination of this case, the author points out lessons that can be learned from this experience, and suggests means of preventing this type of failure in other beginning Expert Systems programs.

The potential pitfalls of a beginning corporate Expert Systems program are numerous and daunting. Many well-documented failures exist, caused by problems varying from lack of executive management support to poor problem selection to poor understanding of the technology. Less study, however, has been given to the process of follow-up on initial success. What happens after initial management buy-in, excellent training, and good problem selection produce superior results in the first stage of a beginning Expert System program? What are the lessons to be learned about the process of building on success? This paper will examine these issues based on a study of the implementation of Expert Systems technology at a major regional Life Insurance Company (hereafter referred to as the Company).

Early in 1989, the company began a strict cost-reduction strategy, and the question of Expert System utilization was again proposed. The GINESYS Corporation was invited to make a presentation to the executive management group of the Company with the subject being the potential benefits of Expert Systems. The presentation was enthusiastically received, and the decision was made to select a person for the position of Project Manager of Expert Systems Development. An experienced and well-regarded Systems Analyst was selected for the position.

After completing the three-day Corporate Planning and Project Management Course offered by GINESYS, the project manager began an investigation of potential Expert Systems projects; and he also began the process of software selection. By July of 1989, more than 30 potential systems had been identified. The software selection process initially centered on several expert system shells that integrated well into the IBM mainframe environment, since several of the proposed systems seemed to need data from the mainframe computer. However, the cost of those shells was prohibitively expensive for a company involved in cost-cutting. Also, it turned out that most of the potential systems were very workable on stand-alone PCs. Therefore, since the project manager had been pleased with the relationship with GINESYS, he made the decision to continue with Knowledge Engineering training offered by GINESYS, and to purchase the K-Base(C) expert system shell from GINESYS.

The system selected as the first to build was a system to help Policyowner Service Representatives calculate taxable gain when money was withdrawn from Universal Life policies. The process of capital gain calculation had become exceptionally complex under the TAMRA tax law, and the MIS estimate for automatic calculation was considered, at 1.5 man-years, too expensive. In August and September of 1989 the Project Manager received three weeks of training in Knowledge Engineering and development using K-Base, and in the same period of time he built and fielded the system.
The system was an immediate success with both users and management. Policyowner Service Representatives saw the average time required for a taxable gain calculation of this type decrease from 45 minutes to 5 minutes, and their management conservatively estimated 3-year Return on Investment at 20-1 (even including the cost of hardware to run the system).

At this point, all signs were good. The executive management of the Company was very pleased with the initial results. However, it was at this time that problems began to occur. The project manager, believing that the first system had proved the mettle of the technology, began to explore other types of expert systems. Believing that the major power of the technology involved the ability to handle uncertainty, he built prototypes of several subjective decision-making systems (subjective being defined as systems that use lateral combination of certainty factors according to the model proposed by Shortliffe and Buchanan in the MYCIN system). Included in these prototypes were a system that determined the best candidate for a new agent and another system that helped determine the fit between a customer and each of the Company's insurance products. However, most managers were not enthusiastic about the possibilities of subjective systems. Most managers seemed uncomfortable with the idea of "fuzzy logic", or heuristic solutions. The project manager began to encounter resistance for any proposed system that was not objective or that offered benefits other than cost reduction.

By October of 1989, the project manager had begun to have difficulty in determining the next steps to take. He had expected the success of the first system to result in tangible signs of greater management buy-in. In particular, he expected that his position would become a true management position, with other staff assigned to the program. He also expected that the success of the first system would result in him being granted greater leeway to truly explore the technology. Neither of these assumptions turned out to be true. It was becoming clear to him that executive management expected him to quickly produce many systems with productivity gains similar to the results of the first system. In addition, the Executive Vice President of Operations (the person who managed, among other areas, the MIS department), asked the project manager to concentrate only on projects in the Operations area. This request had the effect of still further limiting the number of problems that the project manager was allowed to address.

Also, the project manager was frustrated to find out there was no plan to allocate additional resources to the Expert Systems area in 1989 or 1990. Since the management of the company perceived that all Expert Systems staff would need to be trained computer professionals, and since the MIS department had recently suffered a 30 percent staff reduction, there were no resources available. The project manager began to realize that his job, rather than being a step into management, was in actuality a standalone Knowledge Engineering position.

At about this time, the Company made a decision to purchase a completed Expert System for Underwriting. The project manager was tasked by the MIS department to develop a plan and schedule for the implementation of the purchased system. After the project manager had spent more than a month planning and scheduling the installation of the Underwriting system, the CEO of the Company scheduled an update on the progress of Expert System development. The CEO was chagrinned to find out in that meeting that the project manager had not yet begun to work on more systems like the taxable gain system. The CEO emphasized that his intention was that the project manager should spend all his time identifying and building small, objective systems with high payback in person-time productivity measures. The CEO made it very clear that he expected many such systems from the project manager in the next year. However, the project manager knew of relatively few potential systems that would fit those specifications, and he knew that his organization also expected him to be responsible for installing the purchased underwriting system.

The project manager, frustrated over differing expectations from different individuals at the highest level of management, and disappointed over what he perceived as a setback to his management career path, began to explore other options. He left the company in January of 1990. The position of Expert Systems Project Manager is currently unfilled at the Company, and there has been no further progress in the development of Expert Systems. Since the first system was fielded with such fanfare and success in September, 1989, there have been no other systems fielded. In fact, ten months later, the program has effectively ceased.
What went wrong? How could an Expert Systems program that began with such promise fail so quickly? There are many lessons to be learned from this case study. In general, each problem that occurred was in one of three areas:

1. Expectations of executive management
2. Cooperation of middle management
3. Lack of critical mass in the organization

We will examine each of these areas in depth, and attempt to determine means by which the problems that occurred could have been avoided.

DISCUSSION: Shaping the expectations of executive management

The importance of executive management buy-in to a successful Expert Systems program has been demonstrated again and again. In our case study, executive management was interested and committed from the beginning. However, from the beginning, they saw Expert Systems as a way to cut costs in the short-term, and were never committed to the idea of Expert Systems as a means of capturing and distributing expertise.

In general, the executive management of the company saw Expert Systems as a way to get done more quickly things that could have eventually been done by the MIS department using traditional programming techniques. Since the Expert Systems Project Manager was selected from MIS, and since the position remained under the management and control of MIS, the technology was generally perceived as another programming tool in the MIS toolkit. Unfortunately, this perception immediately put the technology in a tenuous position -- there was no position of "Project Manager for COBOL Development", or "Project Manager for PASCAL Development". With the perception of Expert Systems technology as another MIS tool for doing traditional MIS projects, much of the power and potential of the technology is lost.

How could these perceptions have been avoided? Since the Company initially approached the technology as a part of a cost reduction strategy, how could the executive management group have been convinced to see beyond the short-term cost-reduction benefit of the technology? To begin with, the initial list of identified projects should have clearly indicated projected ROI as well as the means by which the return was expected to be achieved. When the executive management group saw a list of 30 projects, and saw the payback from the first project, they assumed that each of the other projects had similar paybacks in person-time productivity. Also, a stronger emphasis should have initially been made as to the long-term benefits of critical mass in expert system building. The executive management group needed to understand up front that the eventual value of the technology was in direct proportion to the extent to which it would be widely used in the organization. One person, working alone, would not give them the critical mass that they needed.

DISCUSSION: Gaining the cooperation of middle management

Throughout the short life of the expert systems program at the Company, middle management was a source of little support and much obstruction. This obstruction occurred, in general, in the form of much misunderstanding and distrust of the technology, and in specific, in the form of outright rejection of heuristic or subjective solutions. Neither of these observations should be particularly surprising. The idea that human expertise can be captured in a useful form in a computer program is not easily accepted at first. The idea that heuristic, sub-optimal problem-solving is an asset to the organization seems inherently absurd to many managers who have been trained to distrust non-algorithmic solutions.

It has been the experience of the GINESYS Corporation, time and time again, that training and orientation of middle management is essential to widespread success of Expert System implementation in an organization. Only if middle managers are educated in the concepts behind Expert Systems can they be expected to support their development. Only if middle managers are oriented with the plan for implementation can they be expected to provide needed assistance.
Getting middle managers to attend training can be a challenge, however. If executive managers are committed to making the technology work, they often perceive that they can pass down edicts that will assure the cooperation of middle management. Also, middle managers generally perceive that they are too busy to attend training concerning a subject that they consider of questionable worth. It is therefore very important, as a part of the initial presentation to executive management, that the point be made that some type of training for middle management will be required for the technology to work in large scale.

DISCUSSION: Achieving Critical Mass

In the discussion of shaping the expectations of executive management, we mentioned the need for critical mass. In general, companies achieve critical mass in one of three ways:

1. Some companies make a strong commitment to the utilization of expert system tools within the MIS department itself. Some expert system tools are marketed as CASE tools or fourth-generation languages; and if there is a decision to standardize on such a tool for development, critical mass can be achieved.

2. Another strategy for achieving critical mass involves the creation of Knowledge Engineering Groups (or KEGs). With the creation of one or more KEGs, companies train Knowledge Engineers and specifically allocate them to the Expert System program. This was the strategy that the Company in our case study was trying to implement. However, one individual did not constitute sufficient resources to establish critical mass through this strategy.

In the case of the Company, the allocation of additional MIS resources to the program was out of the question. Therefore, neither option 1 or option 2 was workable. There is, however, one other option that is being successfully employed by many large corporations:

3. In many cases, the best way to create critical mass in an organization is the utilization of Expert Systems for end-user development. This approach mandates the usage of an Expert System tool that is easy enough to use that non-technical experts can use it to write systems based on their expertise. The tool that was being used by the Company in our case study is such a tool, but the Company did not seriously consider using it in such a manner. Although the Company did not have other MIS resources to allocate to the Expert Systems program, they might well have been willing to consider making domain experts available for one to two weeks of training in how to write systems based on their own expertise. If the project manager had decided to pursue this possibility, the program might well have gone on to great success.

SUMMARY: Lessons Learned

Most failures of corporate Expert Systems programs are due to an inability to establish initial success -- the programs simply never get off the ground. This paper, however, has examined a case where initial success was strong and timely, but follow-up efforts failed.

What are the lessons that can be learned? First, there must be strong and consistent messages to management that the major benefits of the technology will be missed if the primary purpose of an Expert Systems program is seen as short-term cost reduction. Second, there must be strong and consistent messages to management that education of middle managers is essential to the success of the program. Third, for long-term success of the technology, there must be a plan for the development of critical mass in the organization. In many organizations, the best way to achieve critical mass is through the utilization of the experts themselves as end-user developers.

The Company in our case study achieved initial success because of early buy-in from executive management, good up-front training, and a well-chosen person for the position of project manager. If companies can combine these positive characteristics with the lessons learned in the failure of follow-up steps in the Company, long-term building on initial success will be likely.