Formative Evaluation of a Quasi-Algorithmic Training Job Aid

Steven Mc Donnell

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ABSTRACT

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Research has indicated that many smaller business' trainers are relatively unfamiliar with the processes of the Systems Approach to Training (Zemke, 1982). Systematic training is essential to help businesses to adapt to a rapidly changing world. A Quasi-Algorithmic Training Job Aid was developed to aid the smaller business trainer in conducting systematic training.

The Job Aid was subjected to the process of Formative Evaluation, during development. The first stage was actually a validation of the content and methodologies by a panel of subject experts. At this time the data gathering questionnaire was also validated. Required changes were made to prepare the Job Aid for small scale testing.

A representative sample of business trainers took part in the small scale testing. Data was gathered by questionnaire and follow-up interviews. Feedback was received that, when implemented, will lead to a refined product.

Simple statistical analysis was done to determine if the size of the business' training function would be reflected
in positive responses to the variable studied. The unexpectedly small sample size unfortunately, meant that the results could not be generalized. However, by combining statistical indicators with other data it would seem that the Job Aid was well received by small-business trainers.

The Job Aid was considered by many of the trainers to be a novel approach addressing a critical problem. Several organizations are using the prototype in their training activities. Overall, the response to the Job Aid has been such to encourage further development.
Dedication

The completion of this Thesis would not have been possible without the support and understanding of many people. This dedication is addressed to them with heartfelt gratitude. Firstly, I would like to thank my Wife, Joan and my twin daughters, Tara and Erin who were alone so often. Next I would like to thank Mr. Alan Scharff who, although he would not admit to knowing why, has been an inspiration to me throughout. I also take this time to thank Dr. D. J. Dicks for his perseverance in what must have been trying circumstances and Dr. D. P. Sheridan whose store of patience and professional knowledge I could not have done without.
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Chapter 1: The Role of Training in Business Organizations

Business organizations invest billions of dollars yearly in training. Training is viewed as an essential problem solving function (Stein, 1981). However, it is not a panacea for all organizational problems. Training assumes a major role in anticipating and reacting to internal and external organizational problems that are resolvable through learning. These include reducing the impact of technological change on employee skills and knowledge and the effects of individual's career plateaus (Maslach, 1981). To a lesser degree training can also affect employee attitudes and motivation towards work (Kearsley & Compton, 1980).

In 1982, of organizations that conducted formal training, 70% trained employees in supervisory, management development, communications and technical skills. Over 45% were involved in the training of skilled occupations such as sales, clerical and secretarial skills. Finally, 45% conducted formal training in new methods and procedures brought about by technological change (Zemke, 1982).

The United States Training and Census Report (1982) revealed that over 90% of organizations polled felt that training was essential to their operations. This was primarily due to the need for maintaining productivity. In addition, 51% stated that they had difficulty in finding qualified personnel for key jobs which necessitated further training.
The report also clearly indicated that organizations are becoming aware of the value of their personnel investment. For example, it was estimated that by 1985 each American clerical worker would have received an organizational investment of over $10,000. The days of quick hire and fire were coming to an end (Gardner, 1981). Training was emerging as a system of personnel development within the organization that benefited both the organization and the employee.

By 1982, training budgets in the United States, had reached considerable proportions. Nearly three billion dollars were being spent on training yearly. Smaller organizations, with 50-499 employees, spent nearly two-thirds of this amount. Therefore, smaller organizations accounted for about 66% of the U.S. training expenditure (Zemke, 1982).

The census revealed interesting statistics about training personnel. It showed that there were nearly 250,000 professional American trainers. Nearly 57% of organizations with full-time trainers had a training function headed by a professional trainer. Over 125,000 trainers were employed by small business organizations (<500 employees). In addition, these organizations employed a further 515,000 part-time non-professionals.

**Training and Organizational Problems**

Despite the impressive statistics quoted above indicating that training is well entrenched in the operations of business organizations, there were also alarming indications that all is
not well. In addition, there are formidable organizational challenges that training must address. These problems could well have a determining influence on organizational survival.

Zemke (1982) found that 43% of businesses with 50-99 employees did not conduct formal training. Even 21% of larger organizations, with 100-499 employees, did not have anybody responsible for training, 55% had only a part-time trainer. Unfortunately, many trainers did not possess relevant education or experience for training. Additionally, management has been found to be skeptical about the value of training and inclined to restrict budgets (Craig, 1975). One suspects, therefore, that many business organizations have not effectively met the training challenge. When training is conducted by such organizations it is often devoid of system. As a result, training needs are not properly identified beforehand (Cash & Minter, 1979). Training effectiveness evaluation is either ignored or restricted to measures of how well the trainees enjoyed the course. Whether or not the person can do his job better or that organizational performance improves is usually not determined.

Small business tends to receive little measurable return on its investment dollar when using outside sources. This is usually because the business has not properly identified its needs or determined the relevancy of the product being purchased. This does not mean that all outside sources are bad but they must be carefully evaluated and matched to
needs (Fisher, 1981). Many small business organizations are not able to do this due to a lack of competent personnel.

All business organizations are facing formidable challenges. These have greater impact on the smaller organization because it lacks the resources of the larger and is usually restricted to a small range of activities. The following is a list of problems facing business organizations that are at least partly addressable through training.

**Technological Change**

According to many researchers technological change poses the greatest challenge to organizations (Warren, 1969; Kaufman, 1974; Ewing, 1970). Ian Wilson (1973) states that the computer is producing a significant impact on the workplace. It is revising the nature and content of many jobs, eliminating some and creating others with bewildering rapidity. Wilson asks the question, "What will the people do and how will they do it?" Since he asked this question, the pace of computerization has significantly increased.

Technological change generally advances the production of goods and services to meet demands with fewer workers. This has led to the overall growth in the number of "white collar" workers so that even in manufacturing they now outnumber "blue collar" workers. Furthermore, organizations have flattened their hierarchies so that career mobility in industry has
become blocked. It is now more difficult for a worker to rise above the first level of management (Taviss, 1969). The introduction of new technology, particularly since 1975, has caused wide dislocation in traditional job areas. The introduction of robots, for example, in the automotive industry has dislocated thousands of assembly line workers. Reissman (1980) has argued that due to technological change, training prior to a job cannot be considered sufficient prerequisite to the job. Instead, he proposes that training be designed to lead employees from non-skilled entry levels to semi- and finally, highly skilled levels. Accrediting job experience would be an added bonus to the system.

Above all, technology has affected the professional such as the engineer, the technician and the manager (Kaufman, 1974). The individual must not only remain current in his own profession but in several ancilliary ones as well. It is not unusual to find an engineer's half-life to be slightly more than five years today before his skills and knowledge are considered obsolete.

Globally, rapid technological change has had a vast impact on organizations that did not anticipate these changes or could not alter their output to cope with them. Traditional labor extensive industries like iron and steel, automotive and textile were particularly hard hit. The impact on the individual has been unemployment, skills obsolescence and career plateaus.
Skills Obsolescence

The main negative manifestation of technological change has been obsolescence. In the individual, obsolescence has been considered a factor in both technical and managerial occupations. In the case of either unskilled or semi-skilled workers, organizations tend to externalize the problem by discharging the workers (Erikson, 1980). In unionized workplaces, displacement is bitterly contested resulting in confrontation and the retention of redundant workers. This is a major factor in low productivity and high unit production costs that lead to the loss of organizational competitiveness. Such organizations will go under unless bailed out by massive outside intervention and internal reorganization as in the case of the Chrysler Corporation several years ago. Kaufman (1974) points out that obsolescence has the following characteristics.

Lack of new knowledge and skills. Regardless of occupation, obsolescence occurs when the individual lacks new skills and knowledge. It involves a failure on the part of the individual to keep up to date. There are varying degrees of obsolescence and nobody is ever completely obsolete or current.

Ineffectiveness. The greatest impact obsolescence has had on the professional is resulting ineffectiveness. However, not all cases of ineffectiveness are due to obsolescence. A professional who has the most up to date skills and knowledge but is unwilling or unable to use them is ineffective but not obsolete. Only ineffectiveness that stems from the aging
of skills and knowledge can be considered obsolescence. It may be more relevant to some roles than others. Obsolescence is usually tied to the individual in his current organizational role. If he has lost the requisite skills and knowledge to do his job then he is obsolete. This is called 'job obsolescence'.

**Professional obsolescence.** The professional who does not keep abreast of current developments in his field is in a condition of professional obsolescence. This will affect his performance in future work roles in his career. This is similar in concept to potential obsolescence where the professional has not kept current but still performs his job assignment effectively. In these situations the capability of taking on new job assignments with greater responsibilities is limited.

**Organizational obsolescence.** Obsolescence can have a profound impact on the organization. The greater the number of obsolete persons in the organization, the greater the likelihood of the organization becoming obsolete. Organizational obsolescence can be described as the degree to which professional and skilled workers have failed to keep up to date with skills and knowledge necessary for current and future effective organizational performance. Organizations can become obsolete if key functions like research and development, production, marketing, sales, accounting, personnel and management use methods that are out of date and not as effective as those currently available and employed by competing organizations. Questions that can be asked to determine if an organization
is obsolete include:

1. Have products changed little or not at all over long periods of time;
2. Have few new methods been introduced;
3. Have few new ideas been developed;
4. Have errors in decision making increased;
5. Has there been an increase in the effectiveness of the competition; and
6. Has output been steady or declining.

Kaufman (1974) claims that by the time overt signs of obsolescence have become apparent it may well be too late to save the organization.

Career Plateaus

Kaufman (1974) has shown that individuals pass through periods of levelling off in their career development. However, other studies have clouded the issue. Mali (1972) found that professional development peaked in the thirties and declined steadily thereafter. Sparks (1965) reported that peak performance was achieved after the age of fifty. Indications are, according to Kearverny (1983), that career plateaus are most marked between the ages of 30-35, affecting between 59-84% of the professional white collar workers. This is the time that the professional is most likely to quit his job. There does not seem to be a relationship however, between age and plateaus. What does seem apparent is that there are times in any career where an individual's performance may not be optimal
for varying periods of time due to the effects of career plateaus.

The general characteristics of a person in a sustained plateau are marked with feelings of frustration and personal failure. Work is viewed as unimportant with little to look forward to in the future. Marriage failure, alcoholism and suicides rise during these times.

**Aging of the Workforce**

This phenomena is also known as 'the greying of the workforce' and will become very evident over the next 15 years. Demographic indicators are that there will be a shift in the average age from 28 years to over 40 years in the next 10 years (Leibowitz, Farren & Kaye, 1983). Characteristic of this phenomena will be a decline in the under 25 years of age group that currently represents the largest bulge in the population. By the year 2000 those over 65 years of age in the Unites States will number more than 32 million persons. The 'Baby Boom' generation will create a bottleneck in the 25-50 years age group. This will lead to intense competition for jobs and promotions. This will be amplified by the likely elimination of compulsory retirement, which will see sons fathers and grandfathers competing with each other (Washington Post, July 82). The implication is that those who have jobs will tend to hold onto them for longer periods of time. The heightened danger of obsolescence and prolonged periods of plateau is clear unless some form of career development is
emplaced to alleviate them.

Falling Productivity

Despite rapid technological changes over the past 20 years, industrial activity has actually declined. In Canada, productivity declined by nearly 10% in 1983 when compared to 1982 figures (Britannica, 1983). Many factors have caused this, but employee attitudes towards work have contributed. Kaufman (1974) states that motivation to work has generally declined although technological change has tended to mask resulting decline in productivity. Fewer individuals select a single career path and many frequently change career goals. Quality work and hard work are no longer viewed as pre-requisites for success. Furthermore, penalties for poor performance are rapidly becoming a thing of the past. A 'doom and gloom' outlook for the future has led many to desire instant gratification of needs and few will wait long enough to commit themselves for long term payoffs.

The Role of the Trainer in Smaller Business Organizations

In 1982 the typical small business training function was a one-person show (Zemke, 1982). Nearly 70% of small business training functions are of this type. The trainer is faced with a formidable challenge. Overall, he must be able to recognize and solve training problems. This must be done with very limited training resources (often with a budget of less than $10,000). Usually the trainer will be the manager and
instructor. Constraints will severely curtail in-house course development. This means that the trainer must be able to evaluate currently available commercial training programs for adequacy and appropriateness. Perhaps the most important aspect of his job is to be able to describe effectively to higher management to obtain their commitment (Cullen, Sawjin, & Swanson, 1978). Overall, the trainer's role is one of challenge and he/she must possess the requisite skills and knowledge if the function is to survive.
Summary

This chapter has discussed the importance and role of training in business organizations. All organizations, regardless of size, face great challenges. These include such problems as technological change, evolving employee work attitudes and obsolescence, both organizational and individual. The results of these problems have been the transformation of many traditional jobs, unemployment and loss of organizational effectiveness.

Career plateaus, while not necessarily caused by obsolescence, have serious organizational implications and to the individual are marked by sub-optimal performance for extended and varying periods of time.

Organizations have responded by spending billions of dollars yearly on training. Yet, despite the effort, many smaller organizations lack established training functions or qualified trainers in those that do exist.

How can these organizations meet the 'training' challenge?
Statement of the Problem

Business organizations are faced with awesome challenges that must be met if they are to survive. These are at least in part addressable through training. Obsolescence is the most obvious sign of an organization in trouble. This is a result of the individuals within the organization failing to keep current in skills and knowledge. The degree to which an organization is obsolete depends on the number of obsolete persons in it (Kaufman, 1974). Technological change is the primary cause of obsolescence (Lee, 1983). Obsolescence results in job displacement among workers and loss of organizational effectiveness.

If an organization is to avoid the pitfalls outlined above it must have ways of anticipating and reacting to change before it is too late. The Systems Approach to Training (SAT) offers a complex but effective methodology to identify and address organizational problems that are resolvable by training (Craig, 1975).

To effectively use the SAT normally requires considerable expertise on the part of the trainer. Unfortunately, as pointed out by Zemke (1982), many trainers, particularly small business trainers, lack these. They are often further hampered by management indifference and lack of resources.

The problem becomes one of finding an effective way of presenting the SAT to the smaller business trainer in an easily
learnable manner that will produce quick results.

Job Aids have been used extensively for many years for complex tasks (Rakow, 1981). They have proven an effective media if properly conceived and designed. Could a job aid for trainers be developed?

The goal of this Project became a study of the current literature to determine what the content and form should be of a Training Job Aid, to help small business trainers to learn and implement the SAT. The Project would also develop and test the Training Job Aid for appropriateness and make indicated changes to improve its chances of being adopted.
Chapter 2: Review of the Literature

The Design and Content of the Training Job Aid was determined after an extensive review of existing literature. The review concentrated primarily on Systems Theory and Training, Algorithms and Quasi-Algorithms and the design and applications of Job Aids.

Systems Theory and the Business Organization

The business organization can be viewed as a system of organized complexities (Schoderbek, Schoderbek & Kefalas, 1975). This is because it is composed of many different parts that interact in a logical and orderly manner (Tucker, 1964). The organization can also be viewed as a complex 'goal seeking organism' or system. The typical organization is hierarchical in structure, composed of sub-systems of different types. There is continuous interaction between the different sub-systems and the system's environment. Interactions are in the form of feedback loops, the more complex the loop the higher the sub-system's position in the organizational hierarchy. Each sub-system has its own goals and strives to maintain itself in equilibrium within the system. The sum of the sub-system's outputs becomes the system's output. The system's output attempts to fill perceived needs in the environment. The system will use feedback from the environment to identify goals and to remain stable, this is called homeostasis (Ashby, 1976). In Systems Theory the business organization would be termed a 'cybernetic system' (Odiore,
Schoderbek et al state the levels in the organizational hierarchy are readily discernible and their attributes studied. The first level is that of simple goal maintenance. Goals are set higher up in the organization and system's performance is regulated through negative feedback. Goal attainability depends on identified needs in the environment and how well performance can be measured against them. This level cannot actually set up levels of output but only strive to achieve them.

At the second level, deviation from pre-set goals is not automatically reduced as it occurs. The cause of the deviation is analysed and, in the light of experience, the goal can be changed. The ability to make decisions is based on recall or memory. By way of example, a sales manager who has been given set sales levels for a specific time might know from experience that he can expect higher or lower sales levels than the levels he has been given. Accordingly, he adjusts his inventory based on this experience.

The third level is that of reflective goal changing. Feedback is of an anticipatory nature. The environment is actively searched for information indicating future trends. This is used to predict impact on the organization. Subtle manipulation of the environment is done to see what happens. Based on feedback, alterations to goals can be made either to take advantage or to offset the effects. This level is one of
active learning in which experience in similar situations is recalled and used to meet new requirements. This level sets goals and provides feedback for lower organizational levels. Information is the key to this level's operations, both internal and external. Without external information the organization can only react to environmental changes rather than anticipate them. As illustrated by the North American Automotive Industry in the early 1970's, this mode of operation can have disastrous results. Without internal information problems pertaining to sub-system's operations cannot be perceived and rectified.

**Systems Theory and Training**

Ideally, training is on the boundary between the second and third levels of the organizational hierarchy. It is generally one of the organization's sub-systems and at least some of its goals are set from above.

As the organization searches its environment for needs that it can meet, problems of production can arise. If the cost of production is so high as to endanger organizational profits then problems are said to exist. Most organizations in the business world exist to make profit. The goal of the training sub-system is to aid the profit-sharing ability of the organization by solving those problems that are addressable by learning (Craig, 1975).

The training sub-system actively searches internally
and externally to identify for problems to solve. Deviations from norms are classed as beneficial or harmful. Those that are considered harmful and reducible through training are addressed. Those considered beneficial and amplifiable through training are also addressed. The training sub-system is therefore an important feedback mechanism for the organization. Training needs in the organization can be anticipatory in nature, such as developing training programs in advance of changes due to technological change. This type of behavior is only possible if the sub-system is of an open loop type (Odiorne, 1978). To be open loop, training must function at least partially on the third level. When training goals are set from above but are unrealistic they are reduced, when this occurs the sub-system is operating on the second level. The training sub-system cannot function effectively if it is on the first level.

Training as a Sub-System Among Sub-Systems

The boundaries of the training sub-system are considered to be determined by the range of organizational problems resolvable by learning interventions provided through training. Most training problems will fall into the categories of production and operations (Craig, 1975). These boundaries are quite arbitrary as the distinction between training and other personnel problems is often unclear.

All sub-systems depend on the allocation of scarce resources given by the highest levels in the organization.
for survival. There is often fierce competition for these resources among the sub-systems (Blauberg, Sadovsky & Yudin, 1977). Those sub-systems that most effectively convert resources to desired outputs will be rewarded by more resource inputs. Those that are inefficient will be deprived of them. Training has been traditionally weak in proving effectiveness and in consequence is often severely restricted or eliminated during times of fiscal restraint (Cullen, Sawin & Swanson, 1979; Kearsley & Compton, 1980; Zenger & Hargis, 1982). Training must be able to perceive and solve problems that are considered important to the organization in terms of its ability to generate profits. It must solve these problems in a cost-effective and timely manner and express results to the higher levels in terms of cost savings and increased profitability. If this is not done the sub-system can lose its resources (Craig, 1975).

Characteristics of the Training Sub-System

The Training Sub-System should exhibit characteristics of systems and sub-systems as specified in the Systems Approach to Training (SAT). This widely accepted approach, is described as, "The application of a logical, interacting series of steps between the identification of a necessary task or problem and the provision of a trained person to do that task. The application of the Systems Approach to Training provides a structure for the management of training; it ensures an orderly approach to the goal of relating training to the job."
(Canadian Forces Publication 9000(1) Part2, 1979). An additional key element, is that Learning Theories are applied to solving identified training problems (Odiorne, 1978).

The training sub-system is basically cybernetic in structure and operation as illustrated below:

```
INPUTS----------->PROCESS----------->OUTPUT

|                  |                  |
|                  |                  |

<----------CONTROL---------->
```

As described earlier, the sub-system can either be close loop (Goad, 1982) and Canadian Forces Publication (CFP) 9000(1) Part 2, 1979 or open loop (Odiorne, 1979). It was felt that Odiorne's model was better suited for this Project because a close loop system can only evaluate its own performance. It cannot determine if its operations helped the organization to achieve its goals. In addition, any organization that chose to operate in the close loop mode could do so by not actively addressing it environment.

Goals are the key to the sub-system's operations and their importance cannot be over-stated. The objective in training, is an outline of the precise performance towards which the training is directed (Mager, 1975; Boston, 1972). Goals form the link between operational requirements and the training process (Griffin, 1982).

From the environment and from within, the organizational training needs are identified. The sub-system processes
these in 'The Analysis Phase' (Goad, 1972; Odiorne, 1978). The results are expressed as training objectives which are written in precise behavioral terms. These become inputs for the next phase, 'The Design Phase' (Craig, 1975; Odiorne, 1979; Boston, 1972). In this phase the objectives are processed into sub-objectives and sub-sub-objectives. These form the link between what the trainee must be able to do and what he must know to do it. At this time learning sequences, teaching methods, training and learning aids are all developed (Gagne & Briggs, 1974; Davis, Alexander & Yelon, 1974; Gropper, 1975; Briggs, 1981). It is here that operational requirements and learning theories meet (This, 1980). This approach is efficient as it maintains, through the objective, the link between operational requirements and training. It is effective as the training is designed to meet the need by taking into account the characteristics of the trainee and the available training resources (Hannum & Briggs, 1982).

The sub-system can be considered effective if the trainee can achieve all objectives. This means that the processes of evaluation and validation are essential control mechanisms of the sub-system. Evaluation is particularly important in the case of newly developed or acquired training programs. The purpose of evaluation is to identify and rectify problems that may exist with the training program itself and as such, is an integral part of the SAT (Dick & Carey, 1978; Briggs & Wager, 1981). Evaluation assess whether
the learner achieved the stated course goals?" (Hannum & Briggs, 1982). Validation is the mechanism that ensures the sub-system's output is meeting identified organizational goals and problems (CFP 9000(1) Part2, 1979). Without validation the sub-system cannot maintain equilibrium.

The elements of the training sub-system are in their own right sub-systems, although the term sub-sub-system will not be used here. The arrangement of the elements is essentially hierarchical in structure (Goad, 1982).

The Elements of the Training Sub-System

The characteristics of the training sub-system were derived from a variety of sources, many already referred to. Few, however, dealt with the process as a complete entity. Basic outlines were provided by Goad (1982) and Craig (1975). These were supported by many specific sources such as Mager (1972) for Objectives, Gropper (1975) for Instructional Systems Analysis, Craig (1975) for Organizational Analysis, Kearsley and Compton (1981) for Training Effectiveness Analysis and Shelley and Cashman (1981) for Systems Analysis and Communications.

It was by synthesizing these sources that the basic training model for the Project was developed (See Appendix A). It is generally acknowledged that these researchers have produced work that is effective in the domains addressed.
Analysis Phase

The key operations for this Phase involved the identification of organizational training needs through analysis. The training sub-system must be aware of the impact of the larger organization on its operations (Schoderbek et al, 1975). It must know the short and long term goals of the organization, this tends to reduce problems that could arise later. Training must align its own goals and policies to those of the organization (Mc Ghee & Thayer, 1961; Kilpatrick, 1975). Usually at this point an organizational chart is constructed (Craig, 1975).

Once a clear idea of the direction the organization will be taking is known it becomes possible to determine how training can help it achieve its goals. This is accomplished through the Situation or Organizational Analysis. Many aspects of the organization are studied, including manpower requirements, employee satisfaction and goals. Consistent patterns of problems are noted for further investigation (Becker, 1981). It is also important to predict future organizational trends. This is often done by employing The Delphi Technique. Consistent predicted changes may have future implications in terms of training requirements. Once possible problem areas are identified, they must be analysed for training appropriateness.

Many sources point out that most organizational problems are resolvable through methods other than training (Mc Ghee et al, 1961; Yager, 1981). With this in mind, all problems must
be carefully analysed before committing resources to them. Problems should be ordered beginning with the potentially most important one first. Many problems that at first appeared to be training problems will, upon examination, be otherwise. Even training problems should be analysed to determine if cheaper alternate solutions will suffice, such as job aids and checklists (Taylor & Lippiate, 1975; Mager & pipe, 1972). The small business training sub-system possesses few resources and must only commit them in areas that will bring the highest returns on the training investment (Steele, 1981; Becker, 1981).

Once a problem is deemed to be resolvable through training the cost of the problem to the organization must be determined. This often involves the conversion of non-monetary measures such as absenteeism rates, scrap rates, turnover rates and accident rates into dollars. This must be done as the organization communicates through dollars (Craig, 1975). It is also useful to calculate how the problem indirectly affects the organization or what Mager et al (1972) refer to as the 'Ripple Effect'. The total cost of the problem can either be projected over a period of years to realistically heighten the impact.

Before the commitment of training resources is made, higher management's view on the more expensive problems should be obtained. There are times when management will not allow training on a given problem due to unforeseen circumstances (Mc Ghee et al, 1961). Only the most expensive management
approved problem that will give the highest payoff should be pursued. Usually, the small training sub-system can only handle one such problem at a time (Steele, 1981).

Once the training problem is identified it is possible to begin the essential last step of the Analysis Phase, the Job Analysis. This actually involves two distinct but highly related processes, the Job Description (Occupational Analysis) and the Task Analysis. This analysis is critical as from it comes the objectives for the next Phase. The Job Description will produce a document that will outline the major responsibilities of the job, how many persons should do it, how well, how often and under what conditions (Craig, 1975). With this information, the extent of the training requirement can be determined and a projection can be made of the number of likely trainees to pass through the training during its lifetime can be made (Ricard, 1981).

The next step is to determine the actual job behaviors. This is done through the Task Analysis which breaks the job into minute detail. All observable tasks and sub-tasks must be identified and sequenced correctly. It must be possible to do the job from the results of the Task Analysis (Briggs, 1981; Davis et al, 1974). Areas requiring training can be isolated from the analysis and rewritten as performance objectives (Mager, 1975; Mager et al, 1972). There are various techniques for performing the analysis such as the Graphical Task Analysis Technique (Ricard, 1981). This technique results in a flowchart model
of the job. Once the Task Analysis is complete it is possible to enter the next phase, the Design Phase.

Design

In this Phase training course objectives are determined in great detail. These objectives must be derived from training needs. Objectives are broken down into the smallest worthwhile tasks (Mager, 1975). These should then be logically sequenced by going from simple to complex, in order of instruction or in order of performance on the job. At this point, with an overview of what will be taught, it is possible to decide whether to buy or develop the training. Small training sub-systems are usually better off buying training whenever possible due to high developmental costs (Fisher, 1981). Fisher states that even if the training is not ideal it usually can be modified for less than the cost of developing it in-house.

If it is necessary to develop the training, then the process of Instructional Systems Design must be followed.

The Instructional Systems Analysis

The goal of the Instructional Systems Analysis (IA) is to produce instruction that will effectively satisfy the training need. The process begins with the identification of the skills and knowledge that the trainee will require to achieve the instructional objectives. The minimum entry skills are determined by an analysis of the trainees themselves to produce what
is known as a Target Population Report (TPR) (Davis et al, 1974). A detailed analysis of available resources, facilities and instructional skills of instructors is also done at this time. Additionally, the cognitive level of instruction for each instructional objective is determined (Bloom, 1956). This will allow for a match up between instructional needs and methods, media and aids available. At this point schedules can be constructed in light of such factors as saturation, tempo and intellectual activities. In this manner an instructional strategy is developed.

Once the instruction has been developed, it is necessary to go through the process of Formative Evaluation.

**Formative Evaluation**

Formative Evaluation (FE) is done to identify and eliminate any problems with materials, content, strategy or scheduling before full-scale implementation of the training (Dick et al, 1978). Errors not discovered before implementation can be costly in terms of time and money. Dick et al (1978) detail a three part approach to FE that is very effective. These parts are:

1. **One on one testing.** This involves the Prototype of the instructional package, the designer and several persons who are representative of the target population. The designer sits with each person throughout the package while the trainee does it. This process reveals gross errors in the instructional design.
2. Small group testing. This second stage involves the course designer, trainers and groups of representative trainees. The instructional package is in a more perfected state at this point. The designer will observe the instructional process as it occurs. Errors in learning sequencing, instructional methods used and general administration will be uncovered by the process.

3. Fieldtest. This stage of the process is undertaken by an actual group of representative trainees and their trainers. The instructional package is in a virtually finished form. The identification of administrative problems is the primary purpose of this final stage.

Each succeeding phase of FE results in a more perfect package. This reduces the possibility of having to make costly design changes after implementation. It is not always possible to undertake each part but at least one on one testing must occur before implementation. During the FE process, tests can also be evaluated for face validity and sometimes reliability (Gronlund, 1976).

Evaluation does not cease once the course is implemented but continues in the guise of Summative Evaluation.

Summative Evaluation

Summative Evaluation (SE) is an ongoing process that is designed to ensure that the course effectively achieves its designed instructional objectives. This is a particularly valuable form of evaluation as it allows for changes to
courses as required due to constantly evolving conditions, such as changes in the Target Population or in training resources and requirements.

**External Evaluation**

External evaluation is a key feedback process of the SAT as it provides feedback to all sub-elements of the system. It has the primary role of measuring the degree to which training addresses the needs for which it was designed. Problems that have occurred at any point in the training process will be brought to light here. The tools of the process are essentially the same as other forms of evaluation, questionnaires and techniques of observation, but they are applied once the trainee has been back on the job for several months. It is conceivable for instructional objectives to be achieved but the training outcome still may not resolve the original training problem. Validation will show this problem and provide appropriate feedback to eliminate the deviation. It is such an important element of the SAT that it is considered to be the key to the CFITS(CFP.9000 (Part2) 1979).

Drew (1980) recommends that validation follow a process of establishing a data base through observation then constructing a questionnaire to gather data on a large scale. Care must be taken to ensure that all data is objectively gathered or else the validity of the analysis is at risk. (Chase, 1978). Chase recommends that when sample sizes are less than
20 that observation be the sole data gathering instrument. Data can be gathered through checklists and rating scales in observation. However, subjectivity is a problem with observation and it is difficult to gather statistically useful data with this method. The questionnaire, although time consuming to construct, provides more objective and statistically useful data. The 'Design and Use of Questionnaires in Training', (1975) is a very useful source for questionnaire design.

Cost-Effectiveness Analysis

Proving a course is cost-effective is one of the most important but difficult elements of the training process (Craig, 1975). The purpose of Cost-Effectiveness Analysis is to prove to the organization the value of the results of training exceed the cost of the training. The biggest problem is proving that reductions in accidents rates or in turnover rates are due to training and not other factors. If a course should not prove to be cost-effective it must be altered to become so. Cost-effectiveness can be realistically heightened by projecting the savings over the expected lifetime of the course (Kearsley et al, 1981; Cullen et al, 1978).

Communications of Results

The communication of results to higher authorities is the last step to be included with the training process. Communication occurs at all times of course, but it is a matter of convenience to separate them by type. Poor
communications have been the downfall of more than one training sub-system (Kelly, 1980; Craig, 1975 & Ricard, 1981). The characteristics of effective communications are in the style, length and the format. These should be concise, systematic and vary according to the management level addressed (Shelley et al, 1981). In training, formal communications should occur in the initial stages of development, the process stage and the reporting of results stage. It is general practice to decrease the size and detail of reports with ascending managerial levels. Terms used should be in the language that the higher authority will relate to and be familiar with, mostly dollars.

The Method

Determining the best method of presenting the SAT to the user was the next step in the research. A wide range of media is available. The appropriate method for the Job Aid was determined by studying the nature of the subject matter, resource constraints and by the characteristics of the intended user population which at that time were very imperfectly understood. The problem was compounded by the variance in skills, knowledge and experience among the intended users (Zemke, 1982). The amount of information that could be presented to them at one time was unknown. There was even doubt about their acceptance of the SAT. The idea was to introduce the SAT in such a way that users would adopt it. The algorithm or quasi-algorithm
seemed to provide a way of achieving this as each is used to present and apply complex rules of decision making and problem solving in many different areas of application (Horabin & Lewis, 1980; Lewis & Woolfendon, 1969).

Algorithms and quasi-algorithms have been successfully used in a variety of training and educational problem situations. They have also been used for the management of training in such organizations as NASA (Duffy, 1976) and the USAF (Caves & Wilkinson 1977). There are many examples of them being used in all aspects of the training process such as the instructional process (Duffy, 1976; Schmid & Gerlach, 1978; Aagard & Bradly, 1976), job and organizational analysis (Tashker et al, 1982; Kopstein, Kingsley & Giebold, 1978) and in evaluation and standards (Kopstein et al, 1978; Aagard et al, 1976).

Before finally deciding to use an algorithmic or quasi-algorithmic method for the Training Job Aid it was necessary to learn more about them.

Characteristics of Algorithms

An Algorithm is a communications tool which tells people how to do things. It allows them to solve problems that are of interest to them. It should have a carefully designed set of instructions that will allow the user to turn out a nearly perfect performance at once (Horabin and Lewis, 1980). This general description of algorithms is supported by notable others such as Landa (1974) and Kreitzberg and Scheiderman (1975).
The algorithm must possess the properties of Replicability, Resultivity and Generality (Landa, 1974). Resultivity means that no matter how many times the algorithm is followed, for a given procedure, the result will always be correct, provided the user possesses the requisite entry skills to use it.

Replicability, the second attribute of algorithms, implies that the algorithm must be unambiguous. It becomes obvious that instructions have to be absolutely precise as only one course of action can lead to a correct outcome. They must include precise statements of the nature and conditions of each action. Therefore, if two persons perform a given task, following an algorithm for that task, the results will be correct provided that the data sets are the same.

The final attribute of algorithms, is that of Generality. This means that an algorithm must be capable of solving a whole class of similar problems. Horabin et al (1980) have shown that Generality depends not on the nature of the subject matter but on laws, natural or man-made. Algorithms developed for science and engineering are called grounded because they are based on hard or grounded laws of nature. Algorithms developed for games or for form filling are called agreemental as the man-made laws they are based on are founded on agreement. The type of law that the algorithm is founded on is of little consequence as long as it possess Generality for that class of problems.
The Quasi-Algorithmic Prescription

It was very clear that the Training Job Aid could not be designed as a true algorithm because it would lack the required precision of outcomes demanded by Landa (1974). Fortunately, Landa (1974) had foreseen such situations and had prepared an alternate solution which he called the quasi-algorithm.

The Quasi-Algorithm fits the same general description as given for the algorithm. The only major difference is that the precision of outcomes required for algorithms is relaxed and that Resultivity, Generality and Replicability need be ensured only in a general way. This makes the quasi-algorithm an ideal tool for the Social Sciences such as Education because they allow for the semantic interpretation of results, therefore mathematical derivation is not necessary.

The Medium

In determining which medium to use for the Job Aid a number of factors were considered. The most important ones included expense, user utilization facilities and production time.

This resulted in a paper medium being selected. It was fairly inexpensive to reproduce the Job Aid in this manner both in money and time and it could be guaranteed that the user would be able to use it without special facilities. Additionally, costs of revisions would also be reduced by using paper as the medium.
Language for Optimizing Graphically Ordered Systems (LOGOS)

Of the many possible ways to present the Training Job Aid, the flowchart seemed to offer the best way of efficiently representing the system while at the same time retaining the attributes of the quasi-algorithm. Flowcharts have been used successfully for many years to map out complex computer programs (Kreitzberg, 1975). Horabin et al (1980) provide many useful examples of quasi-algorithmic flowcharts which have been used successfully for training purposes. Silvern (1969, 1972) has used this method over the years with the USAF and other large organizations. His formalized flowcharting language is called LOGOS.

Flowcharting is a visual representation of the ordering and interrelationships between the elements of a system in such a way as to make the whole understandable. In this way the complex training sub-system could be represented in the simplest manner. This would also reinforce the function of the quasi-algorithm which is to provide a conceptual framework of problem solving that would be internalized, through use, by the user (Landa, 1974). Representation of the SAT through flowcharts promised to be useful for showing the novice trainer the logical links between it processes. It was hoped that this would make clear the reasons why there are so many steps involved in training.

LOGOS: A Language for Modeling Systems

Originally, LOGOS was intended to facilitate clear and concise communications by the simplest means (Silvern, 1969).
A clearly defined language forces the author to select from a restricted set of symbols. LOGOS thus becomes either algorithmic or quasi-algorithmic in nature. Silvern describes LOGOS as a, "...graphic language that uses alphanumerics and other symbols and shapes to represent fundamental vocabulary elements. The purpose of LOGOS is to communicate the thought or concept of a group of words or string of characters in another language."

In its simplest form, LOGOS uses alpha characters to form groups of words which, when combined with LOGOS symbols, produce a flowchart. In more advanced applications, the groups of words are supplanted by mathematical equations. This final version is very precise in nature. Originally, Silvern used LOGOS for representing systems in engineering but later used the alpha form for educational applications (Silvern, 1974). The basic LOGOS symbols are illustrated by Table 1.

[Insert Table 1]

About Here
LOGOS and Systems

LOGOS allows for the representation of system's attributes including:

1. The structure of the system;
2. The ordering of the parts;
3. The relationships between the parts; and
4. The relationships between the parts and the whole.

LOGOS can be used to model any variety of systems (Silvern, 1969). If a system is composed of two or more relational systems, each part is called a sub-system. When sub-systems are composed of smaller parts these are called sub-systems as well. It is possible to synthesize systems into larger systems called super-systems. This occurs when two seemingly unrelated systems are found to have a clear relationship. This process continues when two seemingly unrelated super-systems are linked to form supra-systems and finally meta-systems.

Systems models using LOGOS are developed through Systems Engineering which includes:

1. Analysis. To identify the problem from existing information and to derive the elements and their interrelationships;
2. Synthesis. Combines unrelated relationships and their elements into new wholes;
3. Models. Designed as constructs, which can predict effectiveness, without implementing the system; and
4. Simulation. The final step, designed to generate alternate solutions.

Silvern (1969) states that for a LOGOS flowchart to be valid it must be developed through System's Engineering. The main advantage to the user is that LOGOS offers the opportunity to analyse the system's elements and their relationships without using mathematical simulation.

LOGOS Modification

For the sake of simplicity, only a subset of LOGOS rules was used for flowchart construction of the Training Job Aid. Not all of the language elements were used, for the sake of simplicity. Feedforward Signal Paths, Feedback, Interference and simple intersecting path symbols were dispensed with. Other modifications included additional symbols to indicate binary decisions and additional information. It was important that all decision points be clearly indicated and that the user was provided with supporting information which was not part of the LOGOS symbology (See Table 2).

The flowcharts were designed to be scroll-like in appearance as an attempt to simplify the appearance of the flowcharts.

The Training Job Aid
The prototype of the Training Job Aid was developed through a logical and systematic process as outlined in the Literature Review. The Job Aid went through an evolutionary process of design, reconsideration and adjustment to reach its prototype form. One of the biggest problems was in providing the user with sufficient content. It was difficult to determine the cutoff point between overwhelming detail and insufficient. The only logical thing to do was to set the entry skill level at what was hopefully the correct level and see how the Training Job Aid stood up to evaluation and then make required changes.

The overall method of using the Training Job Aid was kept as simple as possible. The Training Process Flowchart (TPF) represents the highest level of the system. As such, it gives an overview to the entire training sub-system, including decision points at that level. The elements with associated sub-systems, have the letter 'A' in their numeric code, for example 1.A. The user simply has to locate flowchart '1.A Organizational Analysis' to find the sub-system. In addition the flowcharts themselves are provided with margin tabs at the top of each to allow for quick identification, there is also an index provided as an alternate means of identification. For those few sub-systems at the third level of the hierarchy, they are accessed directly through the associated second level flowchart. As illustrated by Appendix B the basic method of coding maintains the logic and continuity of the process from element to element and level to level (See Appendix B).
The Training Job Aid at this point was considered to be in a sufficiently developed state to undergo formative evaluation. This became the focus of the balance of this Project.

Summary

The Literature Review provided essential background for this Project. It allowed the approach, the content, the medium and the evaluation process to be developed. The result of this was the production of the prototype of the Training Job Aid which was then submitted to the formative evaluation process.
Chapter 3: A Justification of the Content and Quasi-Algorithmic Structure of the Prototype Training Job Aid

The purpose of this section is to justify, by explaining the logic of its content and quasi-algorithmic nature, that the prototype of the Training Job Aid was ready for testing.

It was essential that before testing could begin that the Training Job Aid be in as complete a state as possible. This required that the content and the logic be in place and that the whole be organized as a quasi-algorithm with those attributes prescribed by Landa (1974). Basically, all of the work that could be done without testing had to be done at this point.

The Content

It was difficult to clearly distinguish between content development and the development of the quasi-algorithm using Silvern's (1969) Systems Engineering Approach to LOGOS Flowchart construction. Obviously the two were highly interrelated. The content was derived exclusively from existing sources as outlined in the Literature Review previously. The reason for doing this was that these researcher's work has been validated in the light of experience. There was no reason to modify it except for adjustments to compensate for entry skill levels of the target population. The logic of each of the sub-system's processes was preserved through the flowcharts. The only 'novel' thing about the approach
was that the whole SAT was presented through LOGOS Flowcharts. The main concept of each process studied became an element of the Training Process Flowchart (TPF). This is the highest level flowchart of the Training Job Aid. Supporting detail was incorporated into the second and third level flowcharts. The main sources for the TPF were Ricard (1981), Craig (1975) and Odiorne (1979). Fortunately, the degree of consistency within the literature made it quite easy to standardize the detail. This consistency generally was true of the subordinate detailed flowcharts as well. Variance in the literature seemed to be highly related to the uniqueness of the situation studied. The purpose of the Training Job Aid was to generalize of course.

The following is a brief flowchart by flowchart description of the content of the Training Job Aid.

The Training Process Flowchart

The content of this chart represents the overview of model of the SAT used for this Project. The content is, as outlined above, conventional. The numeric coding and the information flow arrows form the links between the elements and the lower level flowcharts. The user, by referring to the TPF, is presented with a simplification of the training sub-system which is intended to reduce its complexity. The TPF also illustrates major training process decisions to be taken. For simplicity's sake, all decisions are of a binary nature.
Only major feedback loops are provided at this level. This appears to create a close loop system. However, to undertake the Goal and Situation Analysis requires data form outside the organization, so the sub-system is in fact open loop.

The main purpose of the TPF, in conclusion, is to provide the user with a simplified overview of the sub-system and to illustrate major decision points and feedback loops.

**Determine Organizational Goals**

The content for this flowchart was derived largely from Schoderbek et al (1975), Craig (1975) and Becker (1981). The purpose of this process is to determine how management perceives organizational goals and the direction the organization will take in the near and long term future. It also gives the trainer insight to the structure of the organizational power hierarchy. By knowing what direction the organization will take and what the goals are it allows the training sub-system to anticipate training needs and to align its own goals with those of the organization. This will maximize the chances of the sub-system being perceived as useful by the organization.

The output from this process, through the TPF, becomes input for the Situation Analysis.

**The Situation Analysis**

This is a two level flowchart. Its content was largely
derived from Craig (1975) and the CPP 9000 (1) Part 2 (1979).
It emphasizes the need for deriving potential organizational training problems, both current and future. This is consistent with an open loop training sub-system (Odiorne, 1979).

Questionnaires and interviews are the main data gathering tools and are so critical that an ancillary flowchart has been developed. This is referred to frequently not only by the Situation Analysis but throughout most of the flowcharts.

The Situation Analysis flowchart is designed to identify broad problem areas and to determine if the organization's situation will interfere with management's objectives determined previously.

Potential problems are arranged from the most expensive problem first and the least last. This is because of the limited training resources available. The training sub-system must invest resources only in those areas with the largest potential payoffs. Problems that would be of interest would be those that interfere with organization performance potential and profit generation.

The output of this process is a list of prioritized potential training problems. This becomes input to the Organizational Problem Analysis and is clearly indicated by the TPF.

Organizational Problem Analysis

Important sources for this flowchart were Mager et al, (1972), Mallory (1981), Mc Ghee (1961) and Taylor et al
At this point the sub-system is aware of potential training problems as indicated by previous elements in the sub-system. It must now determine which ones are training related. It is essential that only the most serious problems be addressed.

The first stage of the analysis focuses in on the general problem, who says there is a problem, where it appears to be and the validation of its existence.

If a problem does exist the next step is to classify it as training or non-training resolvable. This is done here largely on the basis of a set of criteria derived from Mager et al (1972).

Even if a problem is deemed training resolvable it is analysed further to determine if alternate methods can be used to solve it. Training must be justified as the only method for solving a training problem. If at any time the problem is found resolvable by other means then feedback loops in the flowchart indicate that another problem from the list should be selected for analysis.

If training is deemed the correct solution then this will be the input for the next part of the sub-system.

Standards

Before the training process continues further a critical question must be answered, "Do job standards exist?" Mager et
al, (1972), Mager (1972) and Kelley (1980) provided the sources for the content for this flowchart.

The TPF asks if standards exist for each identified training problem because if a person does not know how well he must perform his job or even what his job tasks are then there is no way to reduce performance discrepancies. Problems will arise that, on the surface, appear to be training problems.

In a small organization it is possible for the trainer to become involved in the establishment of job standards (Becker, 1981). The flowchart provides the process by which this is done. The process is very similar to performing a Job Analysis.

It is essential that standards be based on objective criteria and be set at logical levels. It is essential that if the standards are consistently met then the problem will disappear. Standards must be dynamic and evolve over time as necessary.

Once standards are established it is necessary for time to pass to determine if the problem has been solved. While this is occurring the TPF indicates that the training sub-system should be addressing other problems on the list.

**Enforce Standards**

If standards do exist or they have been set and the problem still exists then it is necessary to determine if they are being enforced. Often the failure to enforce standards is an indication of training problems within
the first level of management. Thus what appeared to be a performance problem can turn out to be a problem of supervisory training (Ricard, 1981; Craig, 1975 & Mager et al, 1972).

This flowchart also has two levels. This reflects the complexity of the problem if it is due to a lack of skills on the part of first level managers. In small business the trainer may be expected to solve this problem (Becker, 1981).

The approach used here is to provide information to the supervisor in the form of checklists, rating scales and even coaching. In the final event it may be necessary to obtain higher management's authority to force the issue.

The flowchart indicates that if it is not possible to enforce standards then there is no need for further intervention. The TPF loops back to choose the next most expensive problem on the list to analyse.

On the other hand, if standards are being enforced and they are realistic and the problem still persists, then it can be addressed as a training problem. The parameters of the problem become input for the Training Problem Analysis Flowchart.

**Training Problem Analysis**

Ricard (1981) and Craig (1975) provided most of the content for this flowchart.

The flowchart clearly illustrates the importance of
calculating the cost of the training problem in dollars and cents. This involves the translation of many non-dollar units. It is also critical to calculate indirect costs of training as well (Mager et al, 1972).

There are really no major decisions to take within this process as it really outlines how to do an audit of a training problem. This will be used when presenting the problem to management for approval for action to be taken.

The TPF uses the output of this process to compare the cost of each identified training problem. This process is clearly illustrated by feedback loops. Only the most expensive problem will be acted on.

Prepare Report to Management

The main source for this flowchart was Shelley (1981). It was difficult to decide where to place this flowchart as it really is not part of the SAT. Shelley (1981) indicates that major presentation reports are made to management usually at the beginning and the end of projects with updates provided on an agreed upon schedule. Therefore, this flowchart was given two numeric codes to reflect this, even though sub-elements are only provided with the first it is assumed that the user will understand.

The flowchart outlines the development of a presentation that is directed to the audience in as clear and concise a manner as possible. It also addresses the management level the report is directed to and which report it is, first or last.
Presentation principles and information are also provided. Shelley (1981) points out that presentations made with these principles in mind maximize the chances of success.

In the case of the first presentation, that of the problem, the training sub-system must await management's decision before proceeding with further action on the problem. Mager (1972) points out that sometimes management will not allow action to be taken on a problem for unforeseen reasons. If this should happen the TPF will loop back to the next most expensive problem on the list to begin again.

If management allows action on the problem then this will be used as input for the Job Analysis.

Do Job Analysis

The major sources of content for this flowchart were Craig (1975), the CFP 9000(1) Part 2 (1979), Ricard (1981) and Gardner (1981).

This is a crucial stage of the SAT so a fairly detailed two level flowchart was necessary to outline the processes. Most researchers indicate that both the content and conditions of job performance must be determined in depth. It is also important to determine early in the analysis if major job restructuring is likely in the near future (5 years). These requirements, as well as the need for only objective data, are clearly illustrated by the flowcharts.

The output of the process is a detailed job specification.
This allows optimal performance to be measured against actual to help identify training needs. To aid this process the user is provided with a fair amount of suggested data types.

Before the job specification can be produced it is necessary to develop a detailed task inventory of the job. This is where the third level flowchart is needed due to the complexity of the task. This flowchart is based on Ricard's (1981) Graphical Task Analysis technique. The flowchart is set up to illustrate the flow of this process in detail as well as the roles of the participants. The outcome is a highly detailed flowchart showing the tasks, in detail, of the job being analysed. The flowchart also provides critical decisions that must be taken when assessing the outcome of the analysis.

The results of the Graphical Task Analysis are returned to the second level flowchart and compiled to produce the job specification. This becomes input for determining training objectives.

**Develop Course Objectives**

This flowchart represents an essential part of the SAT. Its content was primarily taken from Mager (1972).

The development of course objectives forms a direct link between the Job Analysis and the Problem Analysis. The first part of the flowchart does not involve major decisions. The emphasis is on relating the Job Tasks to Performance Objectives. It is fundamental that these objectives be based only on objective criteria. Once all of
the objectives have been written they must be arranged in sequence.

Most objectives at this point will be too general to be used as course objectives. Therefore, objectives will be broken down into smaller component units. They will be written in the three part format advocated by Mager (1972). These objectives are then assembled in sequence as well. The next step is to determine what constraints could prevent these objectives from being attained.

The final part of the flowchart deals with the development of test items for each course objective. The purpose of such tests is to determine if success on the test means that the trainee can perform the performance objective.

Test to Determine if Course Outcomes will Match Job Tasks

Major sources of the content for this flowchart were Briggs et al (1981), Davis et al (1974).

The purpose of this flowchart is to ensure that training is directly relevant to the job. To ensure this test items are derived for each objective. The flowchart outlines the criteria for test design, test reliability and validity.

Additionally, requisite skills and knowledge needed to achieve each objective are also determined and tested. The tests must ensure that if the individual succeeds at the test he will be able to perform those tasks on the job. This will maintain the link between course objectives and organizational needs.
The output of this process is tested by the TPF for validity. If course objectives do not match job tasks or if test items do not match job performances then the TPF will loop back so alterations can be made.

If all is valid then the output of this flowchart will be used as input to the 'Do Purchase or Develop Course Analysis' flowchart.

**Do Purchase or Develop Course Analysis**

This essential process is primarily one of analysing information and making decisions on whether to purchase or develop training. The content for this flowchart was derived from Craig (1975), Ricard (1981), Stein (1981), Kilpatrick (1980) and Fisher (1981).

The flowchart reflects the logic of the small business purchasing existing training whenever possible. It is usually cheaper to buy training and then modify it than it is to develop it from scratch.

With course objectives available it is quite straightforward to match these with existing training packages for the best 'fit'. The flowchart also matches constraints with what is available. The general approach is that for small business developing training is a last resort.

The outcome of this process is a decision to either buy or purchase training. If it is necessary to develop the training then the complex process of Instructional Systems
Analysis must be followed.

**Do Instructional Systems Analysis**

The content of this lengthy flowchart was derived from Briggs (1981), the CFP 9000(1) Part 2 (1979), Davis (1974) and Gropper (1975).

This flowchart begins with what is essentially an inventory of training resources, constraints and the characteristics of the Target Population. These are then matched with intended learner outcomes. When these are related to cognitive levels of learning (Bloom, 1956) instructional objectives are produced.

The next step in the process is the selection of the best choice of media to match the instructional objective. The flowchart takes into consideration that this match must be done in the light of resource constraints.

With the instructional package at this stage of development it becomes possible to calculate the instructional time required for each objective. These times are then summarized to produce an estimate of the training time. Time constraints are then considered and if necessary, alterations are made to the instructional package to conform to them.

Next, lesson plans are developed for each instructional objective. These are based on the principle of the Developmental Lesson Plan. Assessment strategies are also developed at this time. They are based on either 'Norm' or 'Criterion' Referenced Testing types.
When the test items are completed the package is assembled into its complete prototype form to undergo Formative Evaluation. This process involves evaluation by SMEs and then by small group testing. Feedback within the flowchart allows alterations to be made as required. Only when the process is completed can the courseware be finalized.

Do Training Effectiveness Analysis

The output of the 'Run Course' element of the TPF is trained persons. It is essential to determine if they are able to do their job in such a way that the original organizational problem is solved. This form of evaluation is often not done but it is critical to the SAT. Sources for the content included Craig (1975), Hamblin (1974), Gardner (1981) and Cullen (1978).

Initially, the flowchart outlines the ways that data can be gathered to measure trainee performance back on the job. Only objective data must be used for this analysis. It is also important to account for any factor that could cause performance change other than the training intervention. If there are contaminating factors these must be filtered out or accommodated.

Performance changes are summarized to determine if the training was effective. If it was effective a report can be prepared. If it was not then the reason(s) why must be determined. If deficiencies lie in either the course or the trainee changes must be made to the course. Feedback loops in the TPF will allow for this to happen. The cycle will be continued until the
course is considered effective.

Do Training Cost-Effectiveness Analysis

This final flowchart is designed to test to determine if the training was cost-effective. Training must be cost-effective for the training sub-system to be deemed effective. The content of this flowchart was derived from Bell (1983), Craig (1975), Kearsley et al (1980) and Zenger (1982).

The first stage of the analysis involves the assessment of all training costs. These are summarized to produce a total cost. Trainee performance figures are accumulated once they have been back on the job for about three months. Pre-test performance levels are compared to post-training. If the new figures are not higher than the old then the training is automatically not cost-effective. This indicates serious flaws, the cost of these are then calculated. The process will be terminated at this point and the TPF will loop back to allow alterations to occur. It is also possible for post-training performance figures to be higher than pre-training but the net savings may be less than the cost of the training. In this situation the training is not cost effective. The costs will then be calculated and the process terminated as before.

Only when the savings accrued by training exceed costs is training considered to be cost-effective. The TPF will continuously loop until this occurs. When a course is cost-effective the TPF will then loop to pick up another problem and begin the process again.
The Quasi-Algorithmic Structure of the Training Job Aid

The following outlines why the Training Job Aid was considered to possess the attributes of quasi-algorithms.

The Process of Systems Engineering

The prototype of the Training Job Aid had passed through three stages of Silvorn's process of Systems Engineering. These stages were Analysis, Synthesis and Model building. It could be argued that as these lead to the development of a LOGOS model and that as LOGOS is quasi-algorithmic then the Training Job Aid had to be quasi-algorithmic. The following outlines the process as it was completed at this point:

Analysis. In this phase the initial problem was first identified from the materials available for research. Similarly, the available research was combed systematically to derive the basic content of the system and the system's elements and their interrelationships;

Synthesis. The overall system had yet to be developed and some content not normally included as part of the SAT had to be logically related. This phase caused the synthesis of all the content plus the user characteristics into a unique version of the SAT; and

Model building. When the SAT was combined with LOGOS flowcharts the model of the SAT was complete and ready for testing.
The Training Job Aid as a LOGOS Model

If the model of the Training Job Aid was to be a quasi-algorithm it would have the general characteristics of Resultivity, Generality and Replicability (Landa, 1974). At the completion of the Model Building stage of the Systems Engineering process these attributes could only be assumed until the model was tested.

Generality. This attribute was considered to be present because the content and processes used were not new and had been used successfully in different situations. By way of example, the task analysis is done basically the same way by all organizations, it is usually only the amount of detail that varies. The Training Job Aid sought to reduce this variability by using Task Analysis results as input to the Instructional Systems Analysis Flowchart which specified the level of detail required. The danger at this point, was that ambiguity caused by the degree of detail provided or the medium used might arise.

Replicability and Resultivity. These attributes were largely content related. It was felt that as all sources were well known the likelihood of committing a systems error on content was slight. This was further reduced by prior consulting and experience in those areas sometimes overlooked in the basic SAT, i.e. Situational and Organizational Analysis. By using this approach it was felt that the chances of producing correct and replicable results for similar types of problems would be maximized. The major potential flaw was that the content and
the medium had to be sufficiently clear to the user that he/she
would be able to use the Training Job Aid without ambiguity.
Ambiguity would also be a factor if the entry skill level of
the Training Job Aid had been incorrectly set.

The Target Population Entry Skill Level

Although it was acceptable to arbitrarily set the entry
skill level it would detract from the general usefulness
of the Training Job Aid if it was beyond the ability of the
general target population to use it.

The typical small business organization trainer is not a
training specialist and often lacks relevant skills and experience
to operate effectively. He/She is generally a business specialist
with some expertise in systems analysis. He/She often works within
the constraints of limited budgets, organizational indifference
and tight time frames (Zemke, 1982).

This description implied that the Training Job Aid had
to use non-jargonistic terms, be relatively elementary in
approach and be easy to use. Essentially, it would form a bare
minimally useable approach that could form a conceptual
framework that was expandable in the future.

Simulation

Simulation was the final step of the Systems Engineering
Approach. It would test the Training Job Aid to determine if
it possessed the attributes of quasi-algorithms and suggest
alternatives to improve deficient areas.
Up to this point it was only possible to say that by taking care and by following the Systems Engineering Approach that the chances of the Training Job Aid having the attributes of quasi-algorithms were maximized. The remainder of the Project was devoted to testing the Model with the intent of improving it.

**Summary**

This chapter formed the link between the Literature Review and the Evaluation phase of the Project. The prototype of the Training Job Aid was judged ready for evaluation because its content and logical flow were in place and the whole Aid had passed through the first three stages of the Systems Engineering Process for LOGOS flowchart construction thereby maximizing its chances of possessing the attributes of quasi-algorithms.
Chapter 6: The Formative Evaluation Process

The objective in formative evaluation was to determine the usefulness of the Training Job Aid as a quasi-algorithmic job aid to trainers in small business organizations. Usefulness was gauged with the following criteria:

1. Correctness of spelling and grammar;
2. Clarity of symbology;
3. Logical flow;
4. Appropriateness of content;
5. Clarity of layout; and
6. User acceptance and utilization.

As the Training Job Aid was in a prototype state it was not expected to be perfect. Feedback from the evaluation was to be used to make appropriate changes.

PART I: Validation by Subject Matter Experts (SMEs)

The first part of the FE process was in reality a validation of the content and methodology of the flowcharts by a committee of SMEs (Gronlund, 1978). The validity of the data gathering questionnaire was also examined. Each SME worked independently. The committee was composed of three members. Changes were made on a two out of three basis. In some cases changes were made on the basis of a single observation provided at least one other member agreed upon re-examining the issue.

The SMEs were drawn from the local training development field. The committee members were:

1. A Professor from the Saint Mary's University MBA Program and private training consultant;
2. A Senior Training Development Officer from The Canadian Armed Forces Fleet School Halifax who is also a professor at Saint Mary's; and
3. The Vice-President of Human Resources for Michelin Tire in New Glasgow.

Process

Each member was given the rough prototype of the Training Job Aid and a guide on what to evaluate. The following areas were to be considered:

1. **Errors.** These were the most obvious of flaws, including, spelling, grammar, mis-directed arrows and other similar problems;

2. **Generality.** Would all parts of the Aid be suitable for the organizations it was designed to be used by;

3. **Resultivity.** Would the sub-system as represented, lead to correct results;

4. **Replacibility.** Would the results achieved by various organizations, be similar in similar situations; and

5. **Organization.** All of the above would be affected by the logic and content of the Aid as well as by the interpretation of it through the flowcharts.

The SMEs were also left free to identify any other problem areas they might see fit. They were asked to complete their
evaluations within one month.

The questionnaire was to be evaluated by the following criteria:

1. **Errors.** These included spelling, grammatical and typographical;
2. **Completeness.** Did the questionnaire ask sufficient numbers of appropriate questions to yield the required data;
3. **Question quality.** Were the questions used open ended and unambiguous in nature; and
4. **Organization.** Were all instructions and scales concise and unambiguous in intent.

It should be noted that the questionnaire was in an almost finished form having been produced using the facilities of the CAN8 text formatting editor. The Training Job Aid was in a rather crude, but complete, hand drawn draft form. It was expected that rather more radical changes would have to be made to it before the next Phase than the questionnaire. This is why it was decided to save the expense of word-processing and photo-reduction and to do this when incorporating the corrections and changes of the first Phase.

**Results**

The overall results of the first Phase were quite encouraging. There was a high degree of consistency between the evaluations which made it easier to make changes.
There was no problem with the organization, as it clearly illustrated the SAT although there were problems with the detail. There were also rather extensive problems associated with the questionnaire.

Problems Associated with the Training Job Aid

The expected errors in grammar, spelling and mis-directed arrowheads did appear. An unexpected type of problem of that nature was the tendency to state descriptors in the negative. All SMEs indicated that this would distract the user and that all descriptors should be positively stated.

Several rather controversial issues were raised. One revolved around apparent inconsistencies between the structure of the Situational/Organizational Analysis Flowchart and the other flowcharts of the Aid. The problem was that this flowchart had a third level in its hierarchy. The way that it was structured seemed to make this level independent of the second level. This problem was repeated in the Job Analysis and Standards flowcharts although these were not indicated by the evaluators. The appropriateness of using Standards as part of the content of the SAT was also questioned.

One SME felt that the Training Job Aid was too complex for the typical small business trainer. His concern was that the complexity would reduce the liklihood of trainers using the Aid. He also felt that the trainers would experience difficulties in correctly interpreting it. This would cause different interpretations which would clearly violate the
criteria for quasi-algorithms.

On a more subjective note, the SMEs as a group felt that the Training Job Aid was a unique approach which addressed a pressing problem and that it could make the basis for an attractive consulting tool.

Problems Associated with the Questionnaire

The committee was generally much more critical of the questionnaire. Other than the obvious expected errors there was a variety of other problems.

The most serious concern was over the 'General Information' section. This was because in the evaluator's view, the organizational attitude towards the Training Job Aid would be largely determined by the attitude towards training in general. This section had to be designed carefully so as to bring this attitude out. Two SME's stated that this section would answer the question, "Can the Training Job Aid be used to educate the small business organization so that it will adopt the SAT?" A negative answer to this question could have led to switching emphasis to larger organizations with established training commitments. The main problem in this section was the use of many closed questions which would detract from the value of the desired data.

The members unanimously stated that the instructions for 'PART C: Content' were totally confusing. Ambiguity through the use of jargon was also a problem. Jargon, it was felt, could
easily lead to misinterpretation by the non-specialist. A final concern was the use of a six point Likert Scale rather than five. It was also stated that the scale should appear not simply at the top of each section but with each question requiring it.

Revisions as a Result of Phase I Evaluation

All problems affecting 'face validity' were dealt with as they appeared. More serious problems were dealt with on a two out of three basis.

Major Revision to the Training Job Aid

The most extensive changes were made to the Situational/Organizational Analysis, the Job Analysis and the Standards Flowcharts. Each had to be revised so they would be consistent with the other flowcharts in both logic and layout. This was done by attaching the second and third level flowcharts together. The entire third level flowchart was encased by systems boundary lines and given the appropriate numeric code to relate it back to its parent second level element. Information flow arrows were then drawn linking the two levels together. Finally, each third level flowchart was terminated by a 'RETURN' command to clarify the flow of the process. These changes made the flowcharts consistent with the others of the Training Job Aid.

The final problem that was corrected was that all negatively worded descriptors were re-worded to reflect the positive.
The question of complexity was not addressed as only one SME thought this was a problem and if it was, this would come out in the fieldtest.

Upon completion of these changes, the Training Job Aid was redone using an AES word processor and photo-reduced to prepare it for the next Phase, the fieldtest (See Appendix C)

Revisions Made to the Questionnaire

Due to the consistencies of the criticisms of the questionnaire, revisions were straightforward. All ambiguous questions were rewritten to be concise and open ended. The instructions for "PART C: Content" were entirely reworked. The instructions were reduced from about eight lines to four. The statements were made concise and worded without jargon. Seven suggested questions were included with "PART A General Information". Finally, all Likert scales were converted to five points and placed beside each question as needed. one.

With these changes the questionnaire was ready to be used as the data gathering tool in Phase II: Evaluation (See Appendix C)

Phase II: Small Group Evaluation of the Training Job Aid

This Phase of the evaluation had two purposes. The first
was to have the Training Job Aid evaluated by a group of users representative of the Target Population. The second was to determine if the Training Job Aid was useful in helping small business organizations conduct systematic training.

It was very difficult to find persons who were willing or able to take the time to participate in the evaluation. There were several persons who were initially willing to take part but who later backed out when told of the size of the job. An additional problem was that there were few organizations in Nova Scotia that fitted the general population for which the Training Job Aid was designed. The result was that only six organizations were recruited to take part. The most serious repercussion of this was that statistical manipulation of the data became extremely difficult.

**Description of the Sample Population**

Despite the small sample size, every effort was made to obtain a representative cross-section of the population. The purpose of this was to obtain results that could be generalized. With the exception of Taylors et Fils of St. Lambert, Quebec, all organizations were situated in Nova Scotia.

Insert Table 3

Michelin Tire did not quite fit the general target population characteristics, but given the paucity of the sample
size, it was decided to accept their offer to help out. The person doing the evaluation was not the same one who took part in the first Phase, he was a novice trainer.

The difficulty in obtaining evaluators while being discouraging was by no means unexpected. A professor, in conversation warned, "... since most business in the area is involved in primary industrial activities, with high levels of locally unemployed to draw on, training is not an important consideration. Additionally, many of these organizations are faced with the prospect of going out of business in the near future so that the importance of training is further reduced." These factors would tend to weaken the attractiveness of the Training Job Aid for small business, at least in Nova Scotia.

Fieldtest

Each participating organization was sent the questionnaire and the Training Job Aid. The evaluation was done either by a trainer or the personnel manager. The evaluators were asked to return the questionnaire by the 7th of February 1984, they did not have to return the Training Job Aid. If the questionnaires were outstanding then follow up telephone calls were made.

Statistical Analysis

Due to the smallness of the sample size, only crude data manipulation was possible. The tool used was Pearson's R Correlation.
The Question

It was expected that there would be no correlation between the size of the organizational training function and the attitude displayed towards the following aspects of the Training Job Aid:

1. Its usefulness to the organization;
2. The value of the content; and
3. The logical organization.

If a high correlation between these variables was found, then the implication would be that the Training Job Aid was more useful to larger organizations with more elaborate training activities.

The data was obtained by analysing the information received from each questionnaire. The size of the training function was given in the General Information section. The data relevant for Content, Design and Usefulness was obtained by summarizing the information given for each organization.

The Results

Only five of the questionnaires were returned. The one from Taylors et Fils was too incomplete and had to be discarded. With such a small sample size it would have been impossible to argue that the results obtained were statistically sound. The results can, however, be used as indicators in conjunction with other data from the questionnaire and from later sources. A problem with interpreting the questionnaire data was that
the comments were quite sparse with those questions that had Likert scales. This made it difficult to know why certain responses were made the way they were. As can be seen from Table 4, there was a high correlation between the size of the organizational function and the positive results on the variables studied. This indicated that the Training Job Aid was better accepted by the organizations with larger training functions. The data used for this analysis were obtained by averaging the scores of the Design, Content and Usefulness sections of the questionnaire from each organization.

The results did indicate that a more detailed analysis of the appropriateness of the Training Job Aid for small business would have to be conducted. This was not a totally unexpected result as it had been hinted at previously by evaluators in the first Phase and by other persons consulted on the subject.

Training and Organizations Taking Part in the Evaluation

The following is a compilation of the information received from Part I: General Information of the Questionnaire.

Only Maritime life had a training function that was independent of personnel. Each organization did have a training function, although the size and scope of activities varied.
Training budgets ranged from Crossley Karristan's less than one quarter of one per-cent of the corporate budget to Maritime Life's nearly twenty per-cent. Overall, Michelin Tire spent the most on training with expenditures in the millions of dollars annually.

The size of the training budget was directly related to the number of programs initiated. The number of courses given annually ranged from Crossley Karristan's one to over thirty each by Michelin Tire and Maritime Life. The most commonly conducted courses were in management, supervisory skills, clerical, safety and sales. Michelin Tire was heavily involved in technical computer courses and technical trades cross-training.

Organizational training needs were identified in a number of ways, some were very sophisticated. The favored method was that of using skills inventories. Michelin Tire employed manager involvement strategies to determine needs and to obtain commitment. Other needs were identified through the analysis of technological changes, turnover rates, accident rates and corporate performance levels. Farmer's Dairy was involved in a method of managing through performance goals which created a need for management courses. Maritime Life was involved in establishing the automated office which created a training requirement.

Most organizations tended to acquire training programs from outside sources. This included courses offered by equipment sponsoring agencies. Only Michelin Tire and Farmer's Dairy developed and conducted in-house training. Michelin Tire
the organizations felt that training was too slow in providing a return on the investment dollar. Maritime Life's approach was innovative and training received a higher priority as management was involved in the Needs Analysis and Problem Analysis stages of the training process. They developed a commitment to training as they had invested work in it. Farmer's Dairy had a high commitment to training as it was required for persons to attain set performance goals. Michelin Tire had the greatest commitment of all, even to the extent of having their own technical school. This organization felt that it had to invest in its people to remain competitive.

From the information received, it was expected that Michelin Tire, Maritime Life and Farmer's Dairy would react the most favorably to the Training Job Aid. There were to be some surprises.

How the Training Job Aid was Judged

The Design, Content and Usefulness sections of the questionnaire provided the data for the evaluation of the Training Job Aid.

The data from all of the questionnaires was summarized. If an area under evaluation was considered to be satisfactory, no further referral was made to it, unless an important point was raised through a comment. The areas considered to be problems will be dealt with below.

Design
developed almost all of their training while Farmer's Dairy had developed one course in the last year.

Outside consultants were used rather infrequently. On the average, each organization used training consultants less than twice a year. Five organizations used consultants as resource persons while Farmer's Dairy used one as an instructor.

Training effectiveness was measured in a variety of ways. The methods used ranged from simplistic to complex. Michelin Tire used complex manpower quality control measures. Farmer's Dairy used cost-benefits analysis and on the job observation. The others did not measure training effectiveness.

All of the organizations upper management, with the exception of Crossley Karristan's, viewed training as being essential and were committed to it. Crossley Karristan's management viewed training as being discretionary. The others generally claimed that management's attitude was demanding but positive.

There were mixed attitudes about accepting the SAT. Michelin Tire reported that the SAT provided the ideal degree of flexibility required by the organization. Maritime Life felt that it could be accepted by upper management if it was presented properly. The remainder of the organizations felt that it had some interesting points but that overall it was too cumbersome to be of much use.

The priority training received varied from company to company. Crossley Karristan and Helly Hanson felt that management's commitment to training was more verbal than concrete because
Two comments were noted that raised the possibility of the Training Job Aid being too complex. This was particularly the situation in the case of the one person training function. All organizations, with the exception of Michelin Tire and Maritime Life, felt that the complexity of the Training Job Aid made it nearly useless to them. This appeared to be because of the numerous steps and complex interactions of the elements of the Training Job Aid flowcharts. The evaluators felt that given the limited resources they had that not all of the steps and interactions could be followed. Time was difficult constraint as management expected immediate solutions to training problems. Micheline Tire said the complexity provided was just right for them. All organizations stated that by mounting the flowcharts on the wall the system became even more complex and that the print was too small to read easily. Two evaluators commented that they did not like those flowcharts that were joined together hierarchically because this was inconsistent with the others.

The Content

The degree of satisfaction varied from flowchart to flowchart. Overall, Farmer's Dairy expressed the most dissatisfaction. They also found the SAT to be totally unsuited for their needs. Farmer's Dairy stated that under no circumstances would they undertake a complex Instructional Systems Analysis, an Organizational Analysis or a Training Effectiveness Analysis. This was rather suprising as this organization was employing
very sophisticated management strategies to achieve performance goals. Excluding Farmer's Dairy, three organizations stated that the Instructional Systems Analysis flowchart was too detailed. This problem was of particular concern to the smallest training functions which felt that they simply lacked the manpower to attempt an Instructional Systems Analysis. Michelin Tire suggested that the Organizational Analysis lacked sufficient depth to be useful. This was because this person frequently used this tool and was familiar with it. On the other hand, Farmer's Dairy considered it to be too detailed for them. Overall, Micheline Tire and Maritime Life commented that the Training Job Aid was the most complete piece of work on the subject they had ever seen.

Usefulness

This section provided some of the most interesting feedback. Comments ranged from those which were favorable to those that were highly critical. Four organizations stated that they would use the Training Job Aid or some portions of it. The portions that they would use would be those that they had the manpower for and those that would contribute towards what they tended to consider their unique situations. Farmer's Dairy had no use for it all. Maritime Life, Michelin Tire, and Helley Hanson claimed that the Training Job Aid would be useful for keeping track of training activities and to justify training. One person, rather surprisingly, felt that it could be
used to raise embarrassing questions about training within his organization. Michelin Tire intended to use the Training Job Aid as a 'Train the Trainer' instructional tool. One evaluator, from Maritime Life felt that it could be used to form the curriculum for a post-graduate Training Development Program.

In summary, three organizations felt that the Training Job Aid was too complex to use in its entirety. However, two of these would use at least the parts that they felt were relevant to them. Two organizations intended to use the Training Job Aid in its entirety. The main problems seemed to stem from limited resources and a certain amount of organizational resistance to some of the approaches used, particularly the Instructional Systems Analysis. However, the questions raised over the complexity and the positive correlation found between the size of the organization's training function and its acceptance of the Training Job Aid were troubling. It did appear that the appropriateness of the Aid for small business was in doubt, at this time.

With problem areas outlined it was now possible to focus on them in detail. Farmer's Dairy was of the most interest as it had the most negative attitude. The generally less responsive attitudes of the smaller organizations had to be followed up. Finally, problems dealing with complexity, the medium, layout and any problem not yet brought would be revealed by follow-up interviews. Accordingly, a follow-up interview plan was developed and interviews were conducted. The interview
was designed to be about 30 minutes long and produced very valuable results.

Results of the Follow-Up Interviews

Data that was obtained from the interviews was summarized and resulted in a number of revisions to be made to the Training Job Aid (See Appendix D).

Insert Table 5
About Here

The most important thing learned, that most of Farmer's Dairy's dissatisfaction was caused by easily corrected problems. Once these were rectified their attitude became positive. The following outlines the feedback received by the interviews.

Instructions. Three organizations encountered difficulty with interpreting how to use the Training Job Aid. One of the main sources of the problem were the instructions. It was generally felt that every single training program contemplated would, in process, have to follow each step of the Training Job Aid. This was the cause of much of the complaints about cumbersomeness and over complexity. Farmer's Dairy wished to use only those parts of the Training Job Aid that were applicable to them but felt they were restricted from doing so. Other instructions that caused confusion were those dealing with how to set up the flowcharts and how second level flowcharts were referred to from the first
level.

**Print size.** All agreed that once the flowcharts were wall-mounted, that the print was too small to read. Was it possible to use them in some other fashion?

**Language.** There was no problem with the vocabulary used with any of the flowcharts. No evaluator reported the slightest problem with interpreting jargon. Farmer's Dairy, however stated that the flowchart containing the Graphical Task Analysis was particularly easy to use because it outlined the process by using the example of how to make an omelette.

**Logic.** The organization of the flowcharts was considered to be clear and unambiguous.

**Layout.** The purpose of having the flowcharts wall-mounted was to give the user an overview, at a glance of the entire SAT. Another purpose was to allow them to plot the progress of their training activities using color coded pins. The interviews, unfortunately, revealed just how unsatisfactory this was. It was felt, overall, that this resulted in making the system seem much more complex than it actually was. It was also very impractical to find wall space of the area required to mount the flowcharts, and when they were mounted the print became too small to read, heightening the frustration. Crossley Karristan suggested that having the flowcharts on flipcharts would make them more practical to use. Two others suggested that it would be more practical to have the flowcharts in a binder with an index.
Complexity. This problem turned out to be a function of the instructions, the layout and the print size of the Training Job Aid. Farmer's Dairy had the misfortune to receive a Training Process Flowchart that had several typographical errors that made them think that they were missing flowcharts or not using the ones they had correctly.

Errors. With the exception of those found by Farmer's Dairy errors were not a problem.

Through the interviews, it was learned that Crossley Karristan, Michelin Tire and Maritime Life had incorporated the Training Job Aid into their training organizations and that that it had been used to modify certain of their training approaches. Each of these organizations felt that there was money to be made by using the Training Job Aid in a consulting role.

Action Taken

To improve the effectiveness of the Training Job Aid the following steps were taken:

1. The flowcharts were modified to fit into a three ring binder. Each flowchart now folds out onto a normal sized desk;

2. The Training Process Flowchart was preceded by a set of clear directions;

3. An index was provided and each flowchart was further indicated by top margin tab identifiers;

4. All errors have been corrected; and

5. The Situation Analysis, the Job Analysis, and
The Standards Flowcharts were separated into their individual levels. The levels were linked by numbered information arrows which indicated the flow of the processes.

The outcome of this process were alterations to the Training Job Aid, based on feedback received during each part of the PE process, these were intended to make it more appropriate for the small business trainer. Evaluators indicated that if these revisions were made then the Training Job Aid would meet with their approval. At this time the new version has not been implemented.

**Summary**

The FE process of this Project corresponded to the final step of Silvern's Systems Engineering Process for LOGOS Flowchart construction. Along the way the Training Process Flowchart was refined, on the basis of feedback received, from crude handwritten charts to the final product. Changes were made to the layout, the medium, spelling, wording and to a certain extent, the logic. There were some surprises, particularly that there was such dissatisfaction with wall-mounting the flowcharts. The final product, however, has been suitably modified to meet the requirements of the user while preserving the essentials of the SAT. The fact that four of the organizations involved in the evaluation have accepted the Training Job Aid in its unmodified form is proof of its appropriateness.
Chapter 7: Discussion and Conclusion

The Training Job Aid was presented in a basically theoretical fashion. Only the Graphical Task Analysis Flowchart was presented through an example, the making of an Ommlette. It has been suggested that the latter might have been a more effective approach. The individual who made this comment felt that the use of the example made the SAT seem more relevant and simpler to understand. It would be interesting to test this approach.

The SAT is more than just an approach to training, it is a philosophy as well. This caused some degree of resistance on the part of certain evaluators. It would be of value to include an effective model of Change Agentry to facilitate the acceptance of the SAT by users. Change Agentry itself is an important role of the trainer in any organization, the current edition of the Training Job Aid overlooks this fact. Therefore, models of Change Agentry should be incorporated into the Training Job Aid.

It is possible that one reason for the mixed reaction to the Job Aid was that the users still lacked the requisite skills and knowledge to execute the processes. This problem might be resolved by conducting group seminars prior to the user going off on his/her own with the Job Aid. It would then be possible to deal with ambiguities as the individual becomes familiar with the training processes through practical simulation exercises and case studies. It might prove necessary to increase the instructional role of the Job Aid even with using the seminar, it may be useful
to develop a reference list or bibliography to accompany each process block of the flowcharts. This would be a major undertaking in terms of both the researcher and on the part of the user to obtain and study the material. Alternatively, it should be possible to provide more information by combining different types of aids. Checklists, rating scales and truth tables could all be useful in backing up the Job Aid in areas where analysis indicated that many users were weak. This approach would still maintain the systems perspective given by flowcharts.

It has become clear that a much more detailed understanding of the Target Population is necessary before developing the Job Aid further. Analysis may indicate that the Job Aid is really only suited for the experienced trainer as an Aide de Memoire, a still valuable function.

This Project did not involve the actual testing of the Job Aid with a real organizational training problem. It would be useful to determine how it would be used under 'operational situations'. It would be interesting to measure the difference in the efficiency of how the problem was solved as compared to previous methods. It would also be valuable to determine if other organizations using the Training Job Aid used it similarly in like situations and were their results comparable. Such tests would be concrete measures of the appropriateness of the Aid.

From flowcharts to computers is really a small step. A possibly very effective medium might well be to develop an
interactive approach based on the content, intent and quasi-algorithmic design of the Training Job Aid. The difficulty, until recently, with computers is that they tended not to be able to deal with data that was incomplete or in the least bit ambiguous. The complex interactions between variables in the training process almost indicates an heuristic approach is necessary in places. However, recent advances in artificial intelligence and expert systems has made the possibility of a truly effective computer based Training Job Aid a reality. In fact, given the apparent lack of skills among trainers this approach may prove to be a salvation if pursued. Expert Systems are being actively explored in Canada by the Department of Defense Research Analysis, to be used in the identification of objects through Towed Array SONAR, an area that until now has been out of the realm of computerization due to vague and often distorted data gathered.

Conclusion

We live in a rapidly changing world where requirements for products, production methods and personal skills are constantly changing. People and organizations are failing to remain current with these changes and are becoming obsolete. The SAT offers a methodology to address this problem. However, it is complex to understand and use and frequently the smaller business training function, where it exists at all, lacks the personnel qualified to use it. Yet, smaller business faces the same challenges as the corporate giants but without their redundancy of resources.
The Training Job Aid was designed to help the smaller business training function to use the SAT. It contains the latest content in the field and has been presented in an effective quasi-algorithmic fashion. By following the basic principles of Systems Engineering for LOGOS Flowchart development the quasi-algorithmic attributes have been maximized. Subject-matter experts and evaluators representing a cross-section of the Target Populaction of users provided the necessary feedback to complete the process.

There were several distracting problems that arose during the course of the Project. The two most serious had to do with the small sample size, which effectively prevented any generalization of results statistically and the apparent lack of knowledge among users. The last problem questioned the appropriateness of the Job Aid for novice trainers and made the Job Aid seem non-user friendly. Even so, the logic and organization of the SAT was still clear to the users and the problem of entry skills is being addressed.

It was rewarding to see that most of the organizations that participated in the evaluation of the Training Job Aid had adopted it for their training functions. This was proof that it had been accepted and that the pressing need for well founded training functions in smaller business organizations was recognized. It was pleasing to be able to conclude that this Project had produced a product that had practical applications, even though the results were not measurable in a strictly experimental fashion.
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### TABLE 1

**BASIC LOGOS SYMBOLOGY**

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>NAME</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Symbol" /></td>
<td>Rectangle</td>
<td>Represents system process elements</td>
</tr>
<tr>
<td><img src="image2" alt="Symbol" /></td>
<td>Descriptor</td>
<td>A group of 1–5 words that describes the function of the element. It must be concise and unambiguous</td>
</tr>
<tr>
<td><img src="image3" alt="Symbol" /></td>
<td>Numeric Code</td>
<td>Major functions are coded numerically. Together they form the first level of detail. Levels are indicated 1.1, the second level, 1.1.1, the third and so on.</td>
</tr>
<tr>
<td><img src="image4" alt="Symbol" /></td>
<td>Signal Path</td>
<td>Indicates, by the arrowhead, the direction the information is carried. Information can be carried in one direction.</td>
</tr>
<tr>
<td><img src="image5" alt="Symbol" /></td>
<td>Input and Output Signal Paths</td>
<td>Information entering and exiting a systems element.</td>
</tr>
<tr>
<td><img src="image6" alt="Symbol" /></td>
<td>Crossing Signal Paths</td>
<td>Signal paths may cross if there is no relationship. If there is, then they are joined by an arrowhead at the point of intersection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7.</td>
<td>---</td>
<td>Input or Output from Distant Functions</td>
</tr>
<tr>
<td>8.</td>
<td>F</td>
<td>Feedback Signal Path</td>
</tr>
<tr>
<td>9.</td>
<td>F.P.</td>
<td>Feedforward Signal Path</td>
</tr>
<tr>
<td>SYMBOL</td>
<td>NAME</td>
<td>FUNCTION</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td>Binary Decision</td>
<td>Indicates decision points in the subsystem</td>
</tr>
<tr>
<td><img src="image2.png" alt="Diagram 2" /></td>
<td>Information Process</td>
<td>This symbol allows for the representation of information that does not require action but is supplemental.</td>
</tr>
<tr>
<td><img src="image3.png" alt="Diagram 3" /></td>
<td>Unrelated Intersecting Signal Paths</td>
<td>Same function as original LOGOS but clearly shows the function</td>
</tr>
</tbody>
</table>
TABLE 3

ORGANIZATIONS PARTICIPATING IN THE EVALUATION

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>FUNCTION</th>
<th>INDEPENDENT TRAINING *</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CROSSLEY KARRISTAN</td>
<td>RETAIL</td>
<td>NO</td>
</tr>
<tr>
<td>2. FARMER'S DAIRY</td>
<td>DAIRY RETAIL</td>
<td>NO</td>
</tr>
<tr>
<td>3. HELLEY HANSON</td>
<td>SURVIVAL EQUIPMENT</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>RETAIL</td>
<td></td>
</tr>
<tr>
<td>4. MARITIME LIFE INSURANCE</td>
<td>SERVICE</td>
<td>YES</td>
</tr>
<tr>
<td>5. MICHELIN TIRE</td>
<td>MANUFACTURING</td>
<td>NO</td>
</tr>
<tr>
<td>6. TAYLOR'S ET FILS</td>
<td>CLOTHING RETAIL</td>
<td>NO</td>
</tr>
</tbody>
</table>

* Is the Training Function independent of the Personnel Function
## TABLE 4

**SUMMARY OF QUESTIONNAIRE DATA**

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>number of Trainers</th>
<th>Part of Quest.</th>
<th>Summary</th>
<th>Correlation % Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Crossley Karristan</td>
<td>2</td>
<td>DESIGN</td>
<td>3.125</td>
<td>r=.73 v=85%</td>
</tr>
<tr>
<td>2. Farmer's Dairy</td>
<td>1</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td>3. Helley Hanson</td>
<td>2</td>
<td></td>
<td>3.21</td>
<td></td>
</tr>
<tr>
<td>4. Maritime Life</td>
<td>3</td>
<td></td>
<td>3.37</td>
<td></td>
</tr>
<tr>
<td>5. Michelin Tire</td>
<td>16</td>
<td></td>
<td>3.63</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>number of Trainers</th>
<th>Part of Quest.</th>
<th>Summary</th>
<th>Correlation % Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Crossley Karristan</td>
<td>2</td>
<td>CONTENT</td>
<td>2.72</td>
<td>r=.63 v=80%</td>
</tr>
<tr>
<td>2. Farmer's Dairy</td>
<td>1</td>
<td></td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>3. Helley Hanson</td>
<td>2</td>
<td></td>
<td>2.90</td>
<td></td>
</tr>
<tr>
<td>4. Maritime Life</td>
<td>3</td>
<td></td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>5. Michelin Tire</td>
<td>16</td>
<td></td>
<td>3.43</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>number of Trainers</th>
<th>Part of Quest.</th>
<th>Summary</th>
<th>Correlation % Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Crossley Karristan</td>
<td>2</td>
<td>USEFULNESS</td>
<td>3.13</td>
<td>r=.71 v=85%</td>
</tr>
<tr>
<td>2. Farmer's Dairy</td>
<td>1</td>
<td></td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>3. Helley Hanson</td>
<td>2</td>
<td></td>
<td>2.71</td>
<td></td>
</tr>
<tr>
<td>4. Maritime Life</td>
<td>3</td>
<td></td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>5. Michelin Tire</td>
<td>16</td>
<td></td>
<td>3.75</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5

**Summary of Problems from Follow-up Interviews**

<table>
<thead>
<tr>
<th>Problem Type</th>
<th>No Problem</th>
<th>Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Print Size</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Logic</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Language</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Layout</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Complexity</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Errors</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>n=5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Numbers refer to organizations that expressed difficulty or no difficulty with each of the listed problem types.*
QUESTIONNAIRE INSTRUCTIONS

This Questionnaire is subdivided into the following topics:

1. General Questions;
2. Design Questions;
3. Content Questions; and
4. Usefulness Questions.

Part A: General Questions: Please give a brief answer to each of the questions or N/A.

Part B: Design Questions: For each question circle the appropriate number on the RATING SCALE provided. If further explanation is needed space is provided below each question.

Part C: Content Questions: Examine each of the flowcharts and give your assessment of the level of detail.

Part D: Usefulness Questions: Same as Part B.

Please complete the Questionnaire and return it using the pre-posted and self-addressed envelope provided. As this information is VITAL to this project please return the Questionnaire no later than the date indicated in the covering letter.

Thank You for your co-operation on this Project!
COVERING LETTER

Mr. S. Mc Donnell
166 Amaranth Cr.
Dartmouth, N.S.

Dear (whoever):

As per our conversation of (whenever) I have sent you this package which should contain:

1. The Algorithm
2. The Questionnaire
3. Self-addressed pre-stamped return envelope

I would like to thank you very much for donating your time to help evaluate the Algorithm. Without your co-operation the completion of this project would not be possible. As you know the Algorithm is basically in a prototype form but with your help it may soon be available to aid the small business trainer.

Would you be so kind as to return the completed Questionnaire to me by (whenever).

Sincerely

S. Mc Donnell
Part A: General Information:

1. How many persons are employed by your Organization?

2. What are the main income generating activities of your Organization?

3. Who is responsible for training in your Organization?

4. If there is a training function, then how many full/part-time training personnel are there?

5. How many training persons have training related degrees/courses?

6. What proportion of the Organization's budget is for training purposes?

7. In the past year, what training programs have you conducted in the past year?
Part A: General Information cont:

8. Briefly describe how training needs are identified?

9. If any recent changes have caused a need for new training activities briefly outline what they are and how they generated needs.

10. Where are training courses/materials normally acquired?

11. If outside consultants are used for training, how often are they used.

12. How are training results measured?

13. How has management reacted to training in the past?
Part A: General Information cont:

14. How suitable is the Systems Approach to Training for your training function?

15. What level of priority is training given by your Organization?

16. Why is training given the priority it has?
Part B: Design:

very sufficient very 
poor                      good
1 2 3 4 5

1. How clear is the layout of the Algorithm to a non-
   trainer?

1 2 3 4 5

RATING

2. How clearly is the role of the one person
   training function illustrated by the Algorithm?

1 2 3 4 5

3. Are the relationships between elements and sub-elements
   easily discernible?

1 2 3 4 5

4. How logical is the Algorithm?

1 2 3 4 5
Part B: Design cont:

5. Are the symbols employed clear in meaning? 1 2 3 4 5

6. How practical is it to use the Algorithm? 1 2 3 4 5

7. How difficult is it to read the Algorithm? 1 2 3 4 5

8. Is the print used sufficiently large for easy reading? 1 2 3 4 5
Part C: Content cont:

<table>
<thead>
<tr>
<th>Element from Training Process Flowchart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine Corporate Goals/Objectives</td>
</tr>
<tr>
<td>Do Situation/Organizational</td>
</tr>
<tr>
<td>Do Organizational Problem Analysis</td>
</tr>
<tr>
<td>Establish Performance Standards</td>
</tr>
<tr>
<td>Do Training Problem Cost Analysis</td>
</tr>
<tr>
<td>Choose Problem with Greatest Cost Impact on Organization</td>
</tr>
<tr>
<td>Make Higher Management Aware of Problem</td>
</tr>
<tr>
<td>Do Task Analysis of Problem</td>
</tr>
<tr>
<td>Develop Course Objectives</td>
</tr>
</tbody>
</table>
Part C: Content:

Do Purchase or Develop Course Analysis

1 2 3 4 5

Do Instructional Systems Analysis

1 2 3 4 5

Do Training Effectiveness Analysis

1 2 3 4 5

Do Cost-Effectiveness/Benefits Analysis

1 2 3 4 5
Part D: Usefulness:

1. How will you be able to use the Algorithm in your work?

2. How does the Algorithm make it easier to keep track of the training process?

3. Does the Algorithm cause questions to be raised about the training process in your Organization?

4. How will the Algorithm aid in helping to make management more aware of the importance of the training function?
Part D: Usefulness cont:

5. How useful is the Algorithm to newcomers to the Training Development field? 1 2 3 4 5

6. How will you personally use the Algorithm? 1 2 3 4 5

7. Why does the Algorithm help to generate ideas that lead to training problem solutions? 1 2 3 4 5

8. Would you recommend that the Algorithm be available for general use (published)? 1 2 3 4 5

RATING

Thank You!
APPENDIX D

FOLLOW-UP INTERVIEW QUESTION FORMAT

1. How clear are the instructions of the Training Job Aid?
   (If a problem, why, how often and where)

2. Which of the following are too complex, why?
   - Do Organizational Analysis
   - Choose the Problem with the Greatest impact
     on the Organization
   - Do Job/Task Analysis
   - Do Modified Instructional Analysis
   - Do Instructional Systems Analysis
   - Determine Corporate Goals/Objectives

3. How would you simplify all of the above?

4. Why do you feel the Training Job Aid is too complex?
   (Will depend on response given in questionnaire)

5. How could it be made useful to you?

6. Which parts are unnecessary to you?

7. Which terms are ambiguous?

8. How would you describe the logic and clarity of the Training
   Job Aid?

9. What would you do to improve the Training Job Aid that we
   have not already discussed?
INFORMATION GATHERING:
INTERVIEWS AND QUESTIONNAIRES

1. Numbers to be sampled

2. Use Questionnaire

3. Gather Detailed Information

4. Develop Questionnaire

5. Make Questions:
   - As brief as possible
   - Avoid Long Narrative Answers
   - Phrase Questions in a Logical Order
   - Avoid all Ambiguity

6. Set Interview Objectives

7. Determine Role of Management Persons to be Interviewed

8. From Organizational Chart

Advantages

- Economical
- Allows many to Participate Process
- Can Cover Unlimited Topics

9. Interview Upper Management

10. Interview Line Personnel

11. Could include:
    - Secretaries 28.1.1
    - First Line Supervisors 28.1.2
    - Machine Operators 28.1.3
    - Forepersons 28.1.4
    - Clerks 28.1.5
    - Salespersons 28.1.6

12. Base Objective on the Role of the Person to be Interviewed 28.1

13. Use Interview Technique

14. Preliminary Investigation

15. Detailed Investigation

16. 15.0

17. 15.1
Do Follow ups to Obtain Late Returns

Compile all Data

Use Simple Statistics

Progress Satisfactory

Complete Interview

Record all Information

Send Thank You/ Summary Memo to Interviewee

Others to Interview

Terminate the Interview

Access Reason for Failure

Try Another Person

Use Question Sheet

Do Within 30 min of Interview

Might Include

- Personality Conflicts
- Lack of Preparation
- Nestled Interests
- Interviewed Wrong Person

27.1
TRAINING PROCESS FLOWCHART

1. Determine Corporate Goals and Objectives

2. Goals Clear

   Yes → Do Situation/Organization Analysis

   No → Go back to 1. Determine Corporate Goals and Objectives

3. Do Situation/Organization Analysis

4. Do Organizational Problem Analysis
1. Select first problem on the list
2. Find person who says there is a problem
3. Conduct interviews
4. Determine with whom does the problem lie
   - Interview:
     - Supervisors
     - Employees
     - Managers
   - Example: Does the problem seem to be with supervisors
Choose Next Most Serious Problem on the List

4.19

Problem Valid

4.7

no

yes

Validate the Existence of the Problem

4.6

Review all Relevant Sources of Information Including:

Personnel Records

4.6.1.1

Departmental Records

4.6.1.2

Market Reports

4.6.1.3

Industrial Performance Indices

4.6.1.4

Investment Returns

4.6.1.5

4.6.1

Example: Salespersons are not operating the new cash registers properly

4.5.1

Example: Does the problem seem to be with supervisors?

4.4.1

Determine Which Task Functions are Involved in the Problem

4.5

Determine With Whom the Problem Lies

4.4
Do Situation Analysis 3.1.

From information gathering, interviews, and questionnaires.

Determine What the Organization Needs to Achieve its Goals 3.1.

Are Immediate Needs More Urgent Than Future 3.2.

Determine the Future Corporate Situation 3.6.

Determine the Present Situation 3.3.
Organise Problems from the Most to the Least Serious

Give Questionnaire to Key Personnel

Notify all Involved of the Confidentiality of all Information

This will tend to relieve persons of potential problems if their predictions should prove to be wrong

Concurrent Patterns to the Projection Should be Analyzed for Possible Training Requirements

Manpower Forecasts 3.7.1.2
Corporate Goals 3.7.1.3
Production Methods 3.7.1.5
Market Forecasts 3.7.1.6
INFORMATION GATHERING:
INTerviews AND QUESTIONNAIRES

1.0 Numbers to be sampled

2.0 Use Questionnaire

3.0 Gather Detailed Information

4.0 Develop Questionnaire

2.1 Advantages

2.1.1 Economical

2.1.2 Allows many to Participate Process

2.1.3 Can Cover Unlimited Topics

4.1 Make Questions:

4.1.1 As Brief as Possible

4.1.2 Avoid Long Narrative Answers

4.1.3 Phrase Questions in a Logical Order

4.1.4 Avoid all Ambiguity

14.0 Preliminary Investigation

27.0 Detailed Investigation

28.0 Interview Line Personnel

15.0 Interview Upper Management

15.1 Determine Role of Management Persons to be Interviewed

15.1.1 From Organizational Chart

16.0 Set Interview Objectives

28.1 Base Objective on the Role of the Person to be Interviewed

28.1.1 Secretaries

28.1.2 First Line Supervisors

28.1.3 Machine Operators

28.1.4 Forepersons

28.1.5 Clerks

28.1.6 Salespersons
Determine Organizational Goals 1.1

Does Organizational Chart Exist 1.1

- yes
- no

Develop Chart 1.11

Determine:
- Who is the Highest Management Person in Organization 1.11.1.1
- Who is the Next in Line in What Capacity Link to Highest Person 1.11.1.2
- Continue to Next Level of Management, Outline Each's Capacity and Who They Report to 1.11.1.3
- Continue to Supervisor Level Outline Capacity Link to Person They Report to and Those That Report to Them 1.11.1.3

Interview Top Management 1.2

Ask:
- What are the Main Corporate Functions 1.2.1.1
- How are They Conducted 1.2.1.2
- What are the Social Responsibilities of the Organization 1.2.1.3

Interview Middle Management 1.3

Ask:
- What are their Main Responsibilities 1.3.1.1
- What Direction are They Headed
  - Who 1.3.1.2.1
  - What 1.3.1.2.2
  - Why 1.3.1.2.3
  - When 1.3.1.2.4
  - How 1.3.1.2.5

Compare the Goals of Both 1.4
Summarize Data
3.3.1.7

Will Provide Useful Data
3.3.1.8

Changes in Categories of Employment
3.3.1.9

Changes in Skill Requirements
3.3.1.10

Conduct Organizational Audit
3.3.1.12

Use Only Quantifiable Units of Measure
3.3.1.12

Including:

Returns on Investment
3.3.1.12.1.1

Labor Costs
3.3.1.12.1.4

Quality Control Records
3.3.1.12.1.7

Number of Employees
3.3.1.6.1.4

Educational Levels of Employees
3.3.1.6.1.2

What is the sex ratio per Employment Category
3.3.1.6.1.6

3.3.1.6.1
Conduct Organizational Audit
3.3.1.12

Compare Each Type of Data to Past Performance
3.3.1.13

Compare Each Type of Data to Industrial Averages
3.3.1.14

Consistent Poor Performance is Indication of Problems
3.3.1.15

Use Only Quantifiable Units of Measure
3.3.1.12.

Available Through Statistics Canada
3.3.1.14.1

From information gathering:
interviews and questionnaires

Including:

Returns on Investments
3.3.1.12.1.1

Manhours Spent on Given Job Tasks
3.3.1.12.1.2

Sales Volume per Salesperson
3.3.1.12.1.3

Labor Costs
3.3.1.12.1.4

Loss of Production Due to Grievances and Strike
3.3.1.12.1.5

Turnover Rates
3.3.1.12.1.6

Quality Control Records
3.3.1.12.1.7
Begin Needs Analysis
3.3.1.16

Summarize Data
3.3.1.17

Note Recurring Problem Patterns for More Investigation
3.3.1.18

Return to 3.3.1

Develop Questionnaire Along Lines of Job Dis/satisfaction
3.3.1.16.1

Conduct Interviews with Key Personnel
3.3.1.16.2

What Factors Lead to a Sense of Well Being, Which Detract From This Feeling
3.3.1.16.1.1
Establish Performance Standards: 7A

Obtain Information About the Job
7.1

Break Down Job into Individual Tasks
7.2

List all Job Skills
7.3

Determine if List is Complete
7.4

Complete
7.1

List

Sources of Information:

Observe Job Being Done
7.1.1.1

Interview Supervisors
7.1.1.2

Interview Employees
7.1.1.3

Read Job Description
7.1.1.4

7.1.1

Example:
A Secretary files, takes notes, types, organizes agendas, and so on
7.2.1.1

from information gathering: questionnaires and interviews

Ask:

Employees
7.4.1.1

Supervisors
7.4.1.2

7.4.1
Determine Levels of Acceptable Performance
7.8

Are all Statements Unambiguous?
7.9

Clear up Problems
7.14

no

yes

Assemble all Statements to Become Job Performance Standards
7.10

Define Quality of Performance in Terms of:

Accuracy, Neatness, Tolerance
Number of Errors, Scrap Rates
7.8.1.1

Define Quantity Standards as:

Production Rates
7.8.1.2.1
Volume
7.8.1.2.2
Sales Rates
7.8.1.2.3
Units of Work per Hour
7.8.1.2.4
7.8.1.2

Define Time in Terms of:

Duration of Activities
7.8.1.3.1
Frequency of Activities
7.8.1.3.2
Punctuality
7.8.1.3.3
Schedules and met Deadlines
7.8.1.3.4
7.8.1.3

Look for:

Grammatical and Spelling Errors
7.9.1.1
Sentence Structure
7.9.1.2
Logic Errors
7.9.1.3
Confusing Information
7.9.1.4
7.9.1
Assemble all statements to become job performance standards

7.10

Validate job performance standards

7.11

Verify:

- Conditions of Performance
  - 7.11.1.1

- Levels of Acceptable Performance
  - 7.11.1.2
  - 7.11.1

How to Verify:

- Observe employees on the job
  - 7.11.2.1

- Have supervisors verify through a questionnaire
  - 7.11.2.2
  - 7.11.2

from information gathering: interviews and questionnaires.

Alter job performance standard

7.15

yes

no

Validated

7.12

Return
Enforce Standards
9.1

Ensure Senior Management's Support

Make Standards Enforcement Part of First Line Management's Job

Provide Performance Standards Checklists for Those Jobs the Manager is Responsible

Outline Methods of Standards Enforcement

Include:

- Supervisors
- Forepersons
- Section Heads
- Office Managers

Pro=} 9.4.1
Outline Methods of Standards Enforcement 9.4

Are Managers Enforcing Standards 9.5

no

Are They Unwilling 9.4

no

Inform Persons Involved: 9.7

yes

Determine the Cause of Problem

Could be:

- Cause for Supervisors Training Course 9.8.1.1
- Required Coaching 9.8.1.2

- Importance to the Organization 9.7.1.1
- The Level of Management That Supports Standards Enforcement 9.7.1.2
Employee to 9.4

Re-enforce Employee Behavior
9.4.6

Continue Process
9.4.7

Can Use:

- Note in Employment Record 9.4.6.1.1
- Security 9.4.6.1.4
- Praise 9.4.6.1.5
- Set New Challenges 9.4.6.1.6

Explain Performance Standards
9.4.10

Monitor Closely
9.4.11

Take Appropriate Action
9.4.19

Set Time Problem
4.12

Check for Reason
9.4.13

Employee at Fault
9.4.14

Council
9.4.15

Action Within the Sphere of Responsibility
9.4.19.1

Knowledge, Skills and Motivation 9.4.13.1.1

Physical and Social Environment 9.4.13.1.2

Necessary Resources to do the Job 9.4.13.1.3

Understanding of Production Expectations 9.4.13.4

Explanation 9.4.1

Improvement 9.4.18
Process

Take Appropriate Action 9.4.19

Is This a General Problem 9.4.20

Inform Next Level of Management 9.4.21

Conditions May Have Changed 9.4.21.1

Council 9.4.15

Attempt to Make Employee Aware of Problems and to Have Him Determine Plan to Solve Problem 9.4.15.1

Action Within the Sphere of Responsibility 9.4.19.1

Yes

Improvement 9.4.18

No

Recommend Termination 9.4.22

Yes

Is This a General Problem 9.4.20

Inform Next Level of Management 9.4.21

Conditions May Have Changed 9.4.21.1

Council 9.4.15

Attempt to Make Employee Aware of Problems and to Have Him Determine Plan to Solve Problem 9.4.15.1

Action Within the Sphere of Responsibility 9.4.19.1

Yes

Improvement 9.4.18

No

Recommend Termination 9.4.22

Yes

Inform Next Level of Management 9.4.21
Training Problem
Analysis 10.1

Determine Measures of Loss
10.1

Include:

- Loss of Productivity 10.1.1.1
- Excessive Rates of Turnover 10.1.1.2
- Cost of Idle Facilities 10.1.1.3

- Losses Due to Low Productivity 10.1.1.4
- Losses Due to Obsolete Methods of Production 10.1.1.5
- Loss of Sales 10.1.1.6

- Losses due to Lack of Competitiveness 10.1.1.7
- Losses due to Excessive levels of Absenteeism 10.1.1.8
- Losses due to Accident Rates 10.1.1.9

Determine if the Problem has Affected other Areas
10.2

Outputs from one Department are often inputs to another. If there are Problems with the Outputs then it is likely to 'Ripple' out.

10.2.1
Prepare Report to Management 13A.31A

Define Target Audience 13.1

Initial Report 13.2

Directed to Upper Management 13.1

Derive Basic Subject Materials 13.4

Define Objective 13.5

Will Be:

Upper Management 13.1.1.1

Middle Management 13.1.1.2

Lower Management 13.1.1.3

Benefits:

Direct to Middle and Lower Management 13.3

Derive Basic Subject Materials 13.4

Initial Problem Awareness 13.4.1.1

Methods of Investigation 13.4.1.2

Time Required for Study 13.4.1.3

Cost of Problem 13.4.1.4

Why the Problem is Considered a Training Problem 13.4.1

Include:

All Materials from Initial Report 13.19.1.1

Strategy Employed to solve Problem 13.19.1.2

Cost of Solving Problem 13.19.1.3

Cost-effectiveness of Solution 13.19.1.4

Recommendations 13.19.1.5

Does not appear to Break Chain of Command by going over heads 13.3.1.1

Involves persons most affected by problem and solution 13.3.1.2

Helps to ensure co-operation 13.3.1.3

13.3.1

13.1.1
Define Objectives

Final Report
- yes
  - Include:
    - Approach to Solving the Problem 13.7.1
    - Costs of Solving the Problem 13.7.2
    - Net Benefits to the Organization 13.7.3

- no
  - Organize Presentation 13.8
    - Ensure Objectives are Met 13.8.1

Include:
- All Materials from Initial Report 13.19.1.1
- Strategy Employed to solve Problem 13.19.1.2
- Cost of Solving Problem 13.19.1.3
- Cost-effectiveness of Solution 13.19.1.4
- Recommendations 13.19.1.5

Usually:
- Appraise Management of Situation 13.5.1.1
- Express Discovery of the Problem 13.5.1.2
- Explain the Costs of the problem to the Organization 13.5.1.3

Let Each Objective Flow Logically into the Next 13.8.2.1
Verify sequence of Recommendations and Findings to Gain Confidence of Management 13.8.2.2
A-V Materials for Presentation
13.10

Include:
- Headset
  13.10.1.1
- Flip Charts
  13.10.1.2
- Slide Tape
  13.10.1.3
- Keyboard
  13.10.1.4

Various Techniques
Emphasize Points
13.10.2

Practice
13.11

Benefits:
- Show Rough Spots
  13.11.1.1
- Anticipate Possible Criticism
  13.11.1.2
- Increase Own Self Confidence
  13.11.1.3

Make Presentation
13.12

Prepare Written Report
13.13

Sell Self:
- Be Confident
  13.12.1.1.1
- Avoid Conflict
  13.12.1.1.2
- Be Straight Forward
  13.12.1.1.3

Control the Presentation:
- Direct Points he Considers Important
  13.12.1.2.1
- Must Avoid Getting off the Topic
  13.12.1.2.2

Answer all Questions:
- Honestly
  13.12.1.4.1
- At the Level of the Audience
  13.12.1.4.2
- Completely
  13.12.1.4.3

Use of Techn.
V.O.
Rela
Do n
13
Identify with the Audience:
- Use Eye Contact 13.12.1.3.1
- Use Self-Directed Humor 13.12.1.3.1

Use Good Speaking Techniques:
- Voice Control 13.12.1.3.1
- Avoid Distractions Habits 13.12.1.3.2
- Relaxed Approach 13.12.1.3.3
- Set a Proper Pace 13.12.1.3.4
- Do not Read Speech 13.12.1.3.5

Direct Towards Lower Management 13.15
Use:
- Detail Specific 13.15.1.1
- 5-10 Pages Long 13.15.1.2
- 13.15.1.3

Use:
- Bare Essentials 13.16.1.1
- Broad Implications 13.16.1.2
- 1-2 Pages Only 13.16.1.3

Direct Towards Upper Management 13.16

Use Cont Letter 13.17
Do Job Analysis:

16.1

Determine Job Content

Determine how Many Persons Perform Job

16.2

What is this Job's Relation to Other Jobs

16.3

Are There Major Changes to be Made to This Job

16.4

no

Determine:

Main Job Objective

16.1.1.1

Main Conditions Under Which the Job is Performed

16.1.1.2

The Principle Duties and Responsibilities

16.1.1.3

The Main Difficulties Associated with the Job

16.1.1.4

16.1.1

Conduct Interviews with Employees and Supervisors

16.1.2

from information gathering:

interviews and questionnaires
Determine When Each Task is Done 16.11

Measure the Degree of Difficulty Associated with Each Task 16.12

Determine Minimal Levels of Performance for Each Task 16.13

Will Provide Useful Checkpoints for New and Current Employees 16.14

Such as:

- Where 16.15.1.1
- Temperature 16.15.1.2
- Noise Levels 16.15.1.3
- Dampness 16.15.1.4
- Light Intensity 16.15.1.5

4 of
Determine Specific Conditions Under Which Job is Performed 16.15

Specify What Major Job Changes will Occur in the Near Future 16.16

Synthesize Data to Make Job Specification 14.17

Date the Specification so Updatability can be Easily Determined 16.17.1

Intrinsic Conditions:
- Is the Work Dirty 16.15.2.1
- Is the Work Mentally Straining 16.15.2.2
- Is Heavy Physical Labor Involved 16.15.2.3

16.15.2

Psychological Aspects:
- Degree of Stress 16.15.3.1
- Working Hours 16.15.3.2
- Degree of Boredom 16.15.3.3
- Degree of Companionship 16.15.3.4
- Amount of Reward 16.15.3.5

16.15.3
Outline:

1. Arrange Time and Place for Study: 16.9.1.2.1.1
2. Organizes the Room: 16.9.1.2.1.2
3. Determines Sessions Rules and Procedures: 16.9.1.2.1.3
4. Guides the Participants Through Detailed Task Analysis: 16.9.1.2.1.4

   - Assistant: 16.9.1.2.1.5
     - Yes: Records Tasks on Cards: 16.9.1.2.1.6
       - Yes: Gives Cards to Leader: 16.9.1.2.1.7
         - Leader Places Cards on Wall: 16.9.1.2.1.8
     - No: Records Tasks on Cards: 16.9.1.2.1.13
   - No: Records Tasks on Cards: 16.9.1.2.1.13

   - Prods Participants on Ordering and Simplification of Tasks: 16.9.1.2.1.9
   - Leader Must not Contribute to the Content of the Analysis: 16.9.1.2.1.10
   - Leader Must not Give Opinion on the Tasks: 16.9.1.2.1.11

End
Construct Outline of Main and Secondary Duties 16.9.1.21

Make Changes 16.9.1.22

Do Persons Interviewed Agree with Outline 16.9.1.5

yes

Request Several Top Performers for Several Days 16.9.1.6

Inform Managers That This is Not a Training Session 16.9.1.23

no

Are They Top Performers 16.9.1.7

yes

Interview:
Supervisors 16.9.1.21.1.1
Proven Competent Job Performers 16.9.1.21.1.2
16.9.1.21.1

from information gathering: interviews and questionnaires

Input Task
Managers That
Not a Trainer
9.1.21
\[ (\text{no}) \]
\[ \rightarrow \]
They Top
Formers
9.1.7.
\[ \rightarrow \]
Inform Participants of Study Purpose
16.9.1.8
\[ \rightarrow \]
Inform Participants when and where Sessions will Take Place
16.9.1.9
\[ \rightarrow \]
Participants Will Bring Their Regular Job Tools
16.9.1.10
\[ \rightarrow \]
Begin Session
16.9.1.11

Participants Will Make Detailed Task Outline of Their Job
16.9.1.12

Symbols:
- Process
- Rectangular
16.9.1.1
- Decision
- Hexagon
16.9.
- Connect by Join
16.9.
- Always
- Decision
- Before Proceed
16.9
Begin Session 16.9.1.11 → Inform Participants That Tasks are to be Visually Represented as Flowcharts 16.9.1.12 → Explain the Concept of Initial Stimulus 16.9.1.13 → Familiarize Participants with the Process 16.9.1.14 → Practice 5 to Make an 16.9

Symbols:

- Processes Use a Rectangle 16.9.1.12.1
- Decisions Use a Hexagon 16.9.1.12.2
- Connections Made by Joining Arrows 16.9.1.12.3
- Always Follow YES Decision to its end Before Doing NO Then Proceed to First NO 16.9.1.12.4
Have Participants Come to a Consensus on What the Minimum Level of Performance is and how They will Know that This Has Been Met 16.9.1.29.1
Develop Course Objectives 17.A

Write Brief Description of What the Intended Outcomes of the Course will be
17.1

Example: This Course will Teach personnel to operate the 709 Machine Tool
17.1.1

Determine Basic Entry Skills Required to do the Course
17.2

State Overall Task Skills Required to Perform the Job
17.3

Using Identified Exemplar as Source:

Identify Number of Years and Type of Education
17.2.1.1

Optimal Number of Years Experience on the Job
17.2.1.2

Displayed or Tested Aptitudes
17.2.1.3

Attitudes of Employees Towards the Job
17.2.1.4
17.2.1

Obtain from Personnel Office
17.3.1

Obtain from Industrial Averages
17.3.2
Review Objectives
17.15

Do Constraints Prevent Course Sub-objectives from Being Attained
17.12

yes

Reassemble all Sub-objectives under Their Respective Objectives
17.15

Sequencing Correct 17.16

yes

Make Certain That all Sub-Objectives and Objectives are Referent to the Job Function
17.17

no

Make Indicate Changes 17.14

no

Referent 17.18

Examples of Constraints:

- Lack of Time
  17.12.1.1

- Budgetary
  17.12.1.3

- Difficulty in Creating Real Work Conditions
  17.12.1.2

17.12.1

Compare the Above to to Tasks From Job Analysis to Determine Reference
17.17.1
Reassemble all Sub-objectives under Their Respective Objectives 17.15

Sequencing Correct 17.16

Make Certain That all Sub-Objectives and Objectives are Referent to the Job Function 17.17

Make Indicated Changes 17.18

Referent 17.18

Compare the Above to To Tasks From Job Analysis to Determine Reference 17.17.1

yes

no

yes

Return
Participants Purpose

Inform Participants When and Where Sessions Will Take Place 16.9.1.9

Participants Will Bring Their Regular Job Tools 16.9.1.10

Begin Session 16.9.1.11

Inform Participants That Tasks are to be Visually Represented as Flowcharts 16.9.1.12

Symbols:

Processes Use a Rectangle 16.9.1.12.1.1

Decisions Use a Hexagon 16.9.1.12.1.2

Connections Made by Joining Arrows 16.9.1.12.1.3

Always Follow YES Decision to its end Before Doing NO Then Proceed to First NO 16.9.1.12.1

16.9.1
Events That Usually Occur

- Explain the Concept of Initial Stimulus
  - 16.9.1.13

- Familiarise Participants with the Process
  - 16.9.1.14

- Practice Session 'How to Make an Omlette'
  - 16.9.1.14.1

- Begin Practice Tasks Analysis
  - 16.1.15

Event Occurrence That Causes Action to Begin
  - 16.9.1.13.1
Initial Stimulus 'Sunrise' 16.9.1.16

Terminating Event 'Omelette Ready' 16.9.1.17

Break Job into Sequence of Tasks Beginning With Sunrise 16.9.1.18

Break Tasks Into Subtasks 16.9.1.19

Is Task Too General 16.9.1.20

Write Task on Card 16.9.1.24

Example:

Task: 'Cook Egg' may become 'Take Egg from Fridge Set Pan to High Crack Egg into Pan etc.'

16.9.1.19.1

16.9.1.19.1
Place Task Card on Wall 16.9.1.25

Proceed to Next Task in Sequence 16.9.1.26

Review Sequence After Several Tasks Actions Have Been Completed 16.9.1.27

Sequence Correct 16.9.1.28

Backtrack and Make Changes 16.9.1.29

no

yes

Establish Performance Criteria and Meet 16.9.1.29.

Have Participants to a Consensus on the Minimum Level Performance is an They will Know th Has Been Met 16.9.1.29.
Performance Measures

Last Task 16.9.30

Can Anyone Reproduce Job Tasks 16.9.1.31

Number all Cards Sequentially for Reproduction 16.9.1.32

Was This a Trial Run 16.9.1.33

Begin Actual Task Analysis 16.9.1.34

no

Upon Reflection is Sequencing Correct 16.9.1.40

Combine Sequen Tabular Form 16.9.1.41

no

Challenge Participants 16.9.1.42

no

no

Participants Come on What Level of is and how know that This 1.29.1
Develop Course
Objectives 17.A

Write Brief Description of What the Intended Outcomes of the Course will be
17.1

Example: This course will teach personnel to operate the 709 Machine Tool
17.1.1

Determine Basic Entry Skills Required to do the Course
17.2

Using Identified Exemplar Source:

- Identify Number of Years and Type of Education
  17.2.1.1
- Optimal Number of Years Experience on the Job
  17.2.1.2
- Displayed or Tested Aptitudes
  17.2.1.3
- Attitudes of Employees Towards the Job
  17.2.1.4
17.2.1

State Overall Task Skills Required to Perform the Job
17.3

Obtain from Personnel Office
17.3.1

Obtain from Industrial Averages
17.3.2
Rewrite Tasks as Performance Objectives
17.4

Determine What Measures can be Used to Evaluate Performance Objective
17.5

Use Measures that are Direct and Measurable
17.5.1

Interview Supervisors
17.3.3

Determine Exact Observable Behavior Required for Skill/Objective to be performed Adequately
17.4.1

Detail What Materials, Tools or Instruments are Available
17.4.3

Define Under What Conditions or Constraints will the Behavior be Performed Under
17.4.2

Averages
2
Ressemble all Sub-objectives under Their Respective Objectives
17.15

Sequencing Correct 17.16

Make Certain That all Sub-Objectives and Objectives are Referent to the Job Function
17.17

Referent 17.18

Make Indicated Changes 17.19

Compare the Above to to Tasks From Job Analysis to Determine Reference
17.17.1

Return
TEST TO DETERMINE IF COURSE OUTCOMES WILL MATCH JOB TASKS
18.A
Make Revisions 18.10

Determine Which Do not
18.9

no

Objectively Derive Tests 18.6

Do All Test Items Meet Criteria 18.7

yes

Match Introductory Sub-Objectives With Designated Training Pre-requisite Skills and Knowledge 18.8

Return

Criteria for an Objective Test:

Independent Observers Must Agree That the Learner's Test Performance Has Met the Conditions Set Out by the Objective

18.6.1.1

Test Must Include Only Those Tasks That Those Who Achieved the Sub-objectives can do

18.5.1.2

Include the Following:

- Reading Skill Levels
  18.8.1.1

- Mathematical Skill Levels
  18.8.1.2

- Prerequisite Courses
  18.8.1.3

- Prerequisite Work Experience
  18.8.1.4

18.8.1
DO PURCHASE OR DEVELOP COURSE
ANALYSIS: 20.A
Do Purchase or Develop Course Analysis 20.A

Conduct Market Analysis 20.26

Match Required Objectives to Possible Course 20.27

No

Course Unique 20.1

Yes

Calculate Costs of Development 20.2

Calculate Salaries of Evaluators x Time to Evaluate 20.30.1

Calculate the Cost of Evaluation 20.30

Evaluate Course 20.29

No

Find Other Courses 20.37

Determine Time Constraints 20.3

What is Total Cost of Course Development 20.4

Use as a General Estimate:

Average Course Length
5 days x 8 hours

Each Hour of Instruction Cost 25-300 hours Development Low End for Traditional Classroom Approach, High End for High Tech Approach

Developer $200 x 8hr/day x no. of Developers

20.1.1.1

20.1.1.2
Were They Satisfied 20.20  

yes

Obtain the Cost Estimate 20.21

Other Companies 20.22

no

Choose the Company With the Best Offer 20.23

don

Return
DO INSTRUCTIONAL SYSTEMS
ANALYSIS 23.A
Do Instructional System (I.S.)
Analysis 23.1

Analyse the Current State of the I.S. Environment
23.1

Look for:

If the Course is Part of a Larger Curriculum Identify Areas of Gap or Overlap so that the Course Goals and Objectives will fit the Objectives of the Overall Curriculum
23.1.1.1

If the Course is not new Determine if Changes in the Environment will Affect the I.S.
23.1.1.2

Determine Available Resources
23.2

Include:

Instructional Personnel:
Obtain Agreements on Common Exams, Scheduling Scarce Resources, Instructional Goals
23.2.1.1.1
23.2.1.1

Instructional AI Materials:
Audio-visual Equipment, Trainers, Simulators, Blackboards
23.2.1.2.1
23.2.1.2

Facilities:
Libraries, Audio-visual Centers, Laboratories and Consulting Services
23.2.1.3.1
23.2.1.3

23.2.1
Define Conditions for the Learning for each Sub/objective

23.7

Conditions by Learning Class:

Information:
Relate What is to be Learned to What Learner Already knows
23.7.1.1.1
Provide for Practice, Increase Time Between Practice for Long Term Retention
23.7.1.1.2
Learn Material Whole If There are no Logical Divisions
23.7.1.1.3
Make Material as Interesting as Possible
23.7.1.1.4

Principles:
Relate to Previous Learning
23.7.1.2.1
Have Learner Use Principle to Predict new Effect
23.7.1.2.2
Use Example to Extend Association
23.7.1.2.3
In General, Work From Concrete to Theoretical and From Simple to Complex
23.7.1.2.4

Skills:
Explain Relevancy to Learner
23.7.1.3.1
Have Competent Performer Demonstrate Skill
23.7.1.3.2
Demonstrate Level of Performance Expected by Trainee
23.7.1.3.3
Begin With Elementary Practice of Skills Gradually Increasing to Complex
23.7.1.3.4
Provide Rapid Feedback on Performance Gradually Shifting to Self-evaluation
23.7.1.3.5
Test Against Objective Performance
23.7.1.3.6

Concepts:
Outline Application of to be Learned, Review Concepts
23.7.1.4.1
Present Instruction in Manner as the Relational Commonality of the Core Patterns are Revealed
23.7.1.4.2
Extend Association to Simple Examples Then Imply More Complex Ones
23.7.1.4.3
Ensure That Learners Define, Recognize an Use the Concept
23.7.1.4.4
Do Media Selection for Each Sub-objective

23.8

Determine the Pertinent Stimuli of the Sub/objective

23.8.1

Stimuli:

Visual, Tactile Audio and Others 23.8.1.1

Media Available

Overhead Projectors, Blackboards Simulators, Computers, Photographs, Tape Recorders, Film Projectors, Slide Tape Machines, Television and Actual Equipment 23.8.1.1.1

Obtain Additional Resources 23.3.1

Adapt Needs to Fit Situation 23.3.2

Is the Necessary Media Available 23.9

no
y of the Sub-Objectives me or Similar to Others

23.11

yes

no

Determine the Time Requirements to Teach Those Sub/Objectives

23.12

Guess the Time Estimates for Each Sub/Objective

23.13

Add Total Times Together to Estimate Total Course Time

23.15

yes

no

re all Time Requirements estimated for the Course

23.14
TO 23.A
Assign Learning Objectives to Lessons Based on Class Length
23.16

Do Course/Lesson Durations Fall Within Constraints 23.17
no

Modify Course 23.34
no

Alter Time Constraints 23.35
yes

Lower Performance Expectations 23.36

Have Course Outline, Media Selections, Strategies and Time Allocations determined 23.18
To be Considered 'Met' at least 80% of learners must acquire skill

23.44.1

Run Course 23.43

Have all Learner Sub/objectives Been 'Met'? 23.44

yes

no

Identify Those Sub/objectives not Met 23.45

Determine the Cause of Failure:

Obtain the Learner's Viewpoint on the Cause of the Problem 23.45.1.1

Obtain Instructor's Viewpoint on the Cause of the Problem 23.45.1.2

23.45.1

Problem Types:

Not Enough Time for Learning 23.45.1.1.1

Improper Vocabulary Level 23.45.1.1.2

Mismatch Between Sub/objectives and Assessment Method 23.45.1.1.3

Improper Sequencing of Instruction 23.45.1.1.4

Bad Attitudes Among Trainees 23.45.1.1.5

23.45.1.1

Check Each Change 23
Make all Changes
23.49

Review I.S. Process
23.48

yes

Check Each Objective in Detail Before Making Changes
23.46

WIll Major Portions of the I.S. Have to be Reviewed and Changed
23.47

no

Types:
1.1 Time for
1.2 Vocabulary
1.3 Between Sub/objectives
1.4 Sequencing of
1.5 "This Among
1.65.1.1

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DO TRAINING EFFECTIVENESS ANALYSIS 26.A
Do Training Effectiveness Analysis:
26.A

Do Analysis of Trainees Back on the Job Performance
26.1

Choose Assessment Technique
26.2

Allow Trainee 3 Months on the Job Before Analysis
26.3

Use Only Object Gathered Data
26.4

Can Include Measurement:
- Morale 26.4.1.1
- Absentee 26.4.1.2
- Accident Rates 26.4.1.5
- Loss 26.4.1.9

Methods to Gather Performance Data:
- Observe Trainee on The Job 26.2.1.1
- Interview Trainees and Supervisors 26.2.1.2
- Conduct Questionnaire Survey 26.2.1.3

from information gathering: Interviews and Questionnaires 26.2.1

26.2.1
Choose Other Measures

26.17

Are There Other Performance Measures 26.16

no

Can the Effects be Filtered Out 26.8

yes

Filter out Effects 26.9

Compare the Performance of Persons who Have Undergone Training to Those who Have not 26.18

no

Proceed Performance Measure by Performance Measure 26.19

Summarize all Individual Performance Changes 26.20

Compare Present Performance to Past 26.10

Subtract Present Performance From the Former 26.12
Summarize Data to Obtain Average Performance Change 26.21

Make a List of Each Performance 26.12

Place a Plus Where Overall Performance has Improved and a Minus Where It has not 26.13

Plus Greater Than Minus 26.14

Training Program was not Effective 26.22

Are Known Tracy Util

Training Program is Effective 26.15

Determine Where Changes are to be Made 26.23

Determine Changes Training Implement

Return
DO TRAINING COST-EFFECTIVENESS ANALYSIS 29.A.
Do Training Cost Effectiveness Analysis

29.1

Calculate Daily Costs of Trainees

Multiply Each Cost by the Number of Training Days:

Add all Trainee Costs Together

Travel Expenses

- Yes
- No

Determine:

$ Value of Salaries from Personnel Records

29.1.1.1

$ Value of Benefits from Personnel Records

29.1.1.2

$ Value of Lost Production While Undergoing Training

29.1.1.3

Calculate Costs:

Airfare

29.5.1.1

Accommodation

29.5.1.2

Incidentals

29.5.1.3

Car Rentals

29.5.1.4

Food

29.5.1.5

29.5
Calculate Travel Costs for Each Employee  
Add all Travel Costs Together for Total Travel Costs  
Calculate Costs of Training Personnel  
Add all Costs of Training Personnel

Determine:

- $ Value of Support Staff Salaries:
  - Secretaries, Graphic Artists, Programmers, Technicians
    - 29.8.1.1
    - 29.8.1.2
    - 29.8.1.3

- $ Value of Consultant's Salaries:
  - 29.8.1.4

- $ Value of Benefits of Line Personnel:
  - Instructors, Analyst/Developers, Managers
    - 29.8.1.5

Value of Benefits of Support Staff:

- Secretaries, Graphic Artists, Programmers, Technicians
  - 29.8.1.6

- Value of Salaries of Line Personnel
  - Instructors, Analyst/Developers, Managers
    - 29.8.1.7
Give Employees 3 Months back on the Job 29.15.2

Obtain Current Trainee Performance Figures 29.15

Statistics Available yes

Compare Pre-Training Performance Averages to Post-training 29.21

Present Performance Figures Higher 29.22

no

Training not Cost-effective 29.31

Indications of very Grave Problem: 29.32

Determine Problems 29.33

Using Averaged $ Figures Include:

Rates of Absenteeism 29.15.1.1
Sales Volumes 29.15.1.2
Unit Production Rates 29.15.1.3
Turnover Rates 29.15.1.4
Losses Due to Strikes 29.15.1.5
Repair Times 29.15.1.6

no

Form a Panel of 5 Consisting of, Supervisors and Employees 29.17

From Course Description and Job Description, Outline Areas of the Job Function that will Have Changed due to Training 29.18

Each Member is to Estimate the Value of Such Changes on a Monthly Basis 29.19

Discard the Highest and lowest Estimates. The Remainder will form the Modified Mean 29.20

Add
Project Net Performance Savings over the Lifetime of the Course
29.23

Continue with Process for each Training Activity
29.24

Accumulate all Projected Savings
29.25

Subtract all Tr

Usual Course Lifetime is around 5 years
29.23.1

Extensive Modifications to Course Indicated
29.34

Accumulate Net $ Losses
29.35

Add all Figures Together and Express in $’s
29.21
From Savings Training Costs 29.26

Savings Exceed Costs 29.27

yes

no

Training not Cost-effective 29.36

Indicative of Serious Problems 29.37

Conduct Investigation into Entire Training Process 29.38

Compare the Net Saving Figure to the Cost of the Problem Left Unsolved over the same Time Period 29.28

Greater than or Equal to 100% 29.29

Training is Completely Successful 29.30

no

Training Not Completely Successful 29.39

Determine Problem Areas 29.40

Make all Necessary Changes 29.41

Return