



# **AN OFFICE ANALYSIS AND DIAGNOSIS METHODOLOGY**

by

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## **Abstract**

With the advent of computer technology designed for use in the office, office analysis, or the process of understanding office work for the purposes of introducing technology, has become increasingly important. The Office Analysis and Diagnosis Methodology (OADM) is a tool to help the analyst gather the data required to decide how, and whether, to introduce office automation technology into a particular office. OADM is best suited for studying semi-structured offices, rather than pure processing operations or special projects. OADM is used to perform a detailed study of a single office and is not designed for use in determining the general automation needs of a large organization.

Initial experience with OADM's ideological parent the Office Analysis Methodology (OAM) suggested areas for change and OADM is designed to overcome the perceived weaknesses of OAM. An evaluation of OAM presented in this thesis confirms its limitations. OADM has not been evaluated directly, however, the evaluation of OAM shows that the most significant differences between OAM and OADM should make OADM a more useful methodology.

Chapters 2, 3 and the appendices of this thesis form a complete manual for the use of OADM, but do not provide a description of the office model on which OADM is based.

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To my husband, Jay Koven, and my parents,

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# Chapter One

## Introduction

"Each office is different" may be a platitude, yet it is the heart of the office automation problem. Offices are complex systems, with infinite variations along many dimensions. In order to optimize any system, one must know how the system works, what is wrong with it, and how to do an optimization. This thesis will address the second of these items, based on a model for the first that has already been developed.

### 1.1 Office Automation

Since this thesis is to concern a method for improving office automation, some definitions and background are in order. *Office automation* is usually taken to mean the introduction of technology into an office to "automate" it, an analogy taken from the automation of factories. This basic conception is correct, but by no means complete. Simply placing a word processor in the middle of a busy office does not constitute automation. The technology must be used, and, in order to fit the factory analogy, must somehow improve the *productivity* of the office. Figuring out how best to use the available technology, and determining the value of any benefits derived therefrom, are current research topics.

There are many approaches to the problem of bringing technology into an office. In the 1950's and 1960's, office automation meant what is now known as data processing. Since data processing simplifies certain kinds of office work, it certainly meets the above definition of office automation. One current approach to office automation is to extend data processing to include such items as source data capture and end-user oriented systems. But the techniques that data processing employs and the types of work for which it is best suited are limited. Data processing traditionally focuses on fixed, highly structured, data intensive applications while most offices tend to be text oriented, interactive, and changing. Therefore, traditional data processing techniques do not appear to be the best way to approach office

automation.

Another approach to office automation is to mechanize the *tasks* performed in the office. In this approach, secretaries and clerks are provided with tools, such as word processors, electronic filing cabinets and electronic mail to aid in the capture, manipulation, storage, retrieval, reproduction and communication of information. While certain benefits can be gained by giving secretaries and clerks more powerful tools with which to accomplish the old tasks, this approach has the disadvantage of assuming that the current operations are optimal. Studies have shown that the benefits of automation come as much from the rationalization or restructuring of office tasks as from the introduction of technology. In addition, this approach does not address the needs of principals (managers, professionals, or knowledge workers) who account for a large portion of an office's labor costs.

A third approach to office automation is to provide the knowledge worker with a better working environment, that is, to augment his personal abilities with appropriate tools. In this approach, a knowledge worker or a group of such workers may be provided with such tools as personal databases, computer aids for composing, spelling correction and document sharing, computer conferencing, and the sharing of information. The major problem with this approach is that it still focuses on the surface tasks of such a person's work, rather than on the actual content.

Yet another approach to office automation is decision support. A decision support system seeks to provide decision makers with tools that actively assist them in accessing and analyzing information. These systems are highly problem-specific, tailored to answer "what if?" questions about a particular domain. In addition, these systems are designed to support an unstructured or semi-structured decision process. This approach does begin to address the substance of some types of office work, but offices, and the people in them, do much more than make decisions in specific, narrow domains.

The approach to office automation that will be used in this thesis is stated best by Hammer and Sirbu in *What is Office Automation?*. They say

Our perspective on office automation is based on a view of the office as a place of business, not as a site for document handling and information processing. The purpose of every office is to realize a *mission*, to implement some business function that can be expressed in terms of the goals and needs of the organization

of which the office is a part. The existence of this office function is inevitable and axiomatic, even though it may be disguised at times by people's emphasis on their day-to-day tasks and activities. The essence of office work, which must serve as the basis for any effective measure of office work and office productivity, should not be confused with the artifacts of current office operation. It is the rare office whose goal and function it is to produce letters. More likely, the office exists to purchase goods, to manage the human resources of the organization, or to approve payments and claims against an insurance policy. Letter-writing, record maintenance, communicating, and the like all play roles in accomplishing these functions; however, they are only the superficial aspects of office work, the means used to realize an end. Moreover, they are coincidental and inessential, since under a different set of circumstances alternative means might be feasible and even preferable. Our focus is on the purpose of office work; the function itself, rather than any particular implementation of it, is foremost in our priorities. [25]

## 1.2 Office Analysis

An approach to, or a general theory about, office automation does not specify what to do to automate an office. Within the larger context of improving the performance of an entire organization there are many issues that must be addressed. These issues range from making a strategic plan for office automation, to deciding when to automate a particular office, to specifying the form and type of data to put into a database for that office. Obviously, these problems, and the many others that may be encountered, are very different and so require different solutions. This thesis presents one possible solution to a particular class of problems within this general context.

In order to understand the set of problems that are addressed, one must first understand the office automation process. Office automation, as applied to an entire organization, is often thought of as the process of developing a strategic plan for automation and understanding the overall automation needs of the organization. This thesis does not address either of these issues. Rather, the methodology presented here is intended to be used as a tool in automating individual offices.

The automation process for a particular office often starts with the decision to consider automation. The office is examined to obtain the information necessary to decide whether or not to automate. This decision often requires that a system be designed and cost justified. System design includes choosing the technology, choosing a vendor, and deciding

specifically how the new system is to work. Once the system has been designed and justified, it must be purchased and installed in the office. This is usually known as implementation. Implementation includes a variety of activities that range from installing the hardware and software to training office personnel to use the new system. The system will continue to change after implementation as individual users find new uses for it and these uses are adopted by the rest of the office. In addition, the office may change, resulting in changes to the system which require repeating all or most of the process.

The series of problems addressed by this thesis are those that involve the initial understanding of how the office works and what should or could be changed. The thesis presents an Office Analysis and Diagnosis Methodology (OADM) to help the office analyst with this stage of the automation process. The result of an OADM study is a description of the current operations of the office, a list of problems or opportunities for change in the office, and most, if not all, of the quantitative data necessary for cost justification. OADM does not tell the analyst how to do a system design, although it provides the necessary information, nor does it address implementation issues.

### **1.3 Other Methodologies**

Since the problem addressed by OADM is a common one, it is not surprising that other methodologies have been developed to deal various parts of it. The methodology that is most relevant to OADM is the Office Analysis Methodology (OAM) [57, 55] developed in the Office Automation Group of the Massachusetts Institute of Technology's Laboratory for Computer Science. Since OAM is an ideological parent of OADM it will be discussed in detail in chapter 2.

Another similar office model and methodology has been proposed by Ellis and Cook [17, 12, 18]. It is based on the notion of Information Control Networks. This approach represents the flow of control and information in an office as a network and applies network theory. The model and methodology are designed to help understand how to restructure office procedures and so address a different stage of the automation process than OADM.

Other approaches have been suggested by Bauman and Coop [4] and Ladd and Tsichritzis

[34]. Both of these approaches look primarily at tasks rather than higher level procedures. Bauman and Coop structure the office around the definition, organization, assignment, staging, and scheduling of work. They say nothing about what the work is, what it is trying to accomplish, or why it is important. Ladd and Tschritzis model the office in terms of abstract forms and their flow through the office. While this approach is similar to the model used by OADM in some ways, it appears to be limited to fairly routine processing. The process of recruiting new companies for MIT's Industrial Liaison Program could not be described in this model.

# Chapter Two

## Background

In order for OADM to make sense, the reader must be familiar with a few key concepts. These concepts will be discussed in this chapter and include the function/procedure model of office work, the Office Analysis Methodology, Critical Success Factors, and problems, symptoms, and opportunities.

### 2.1 An Office Model

OADM uses the same model of the office as OAM. This model is best described in *Analysis and Specification of Office Procedures* by J. Kunin [32]. However, for the sake of clarity, those portions of the model which are relevant to this thesis will be summarized. The model shows that there is structure in an office. An office will have a mission. It will have functions and procedures. It will have control over some parts of its environment but not over others. The model incorporates these ideas into a structure of office work that emphasizes understanding the office in simple, high-level, terms.

#### 2.1.1 Focal Object

Rather than understanding the office in terms of paper flow, or job description, the model focuses on the *object*, an entity that may or may not have a tangible embodiment. An object is not a document, although it may be associated with one or more documents, nor is it a physical item such as a typewriter. Rather, an object is an abstract idea, something that is of interest in, or that is central to, the functioning of the office. Objects are usually associated with a series of activities, for example, in ordering supplies, the object of interest is the request for supplies. Note that while this request is usually represented by a requisition form, the request may also be verbal or electronic. The current implementation should not be confused with the abstract object. Some other series of activities with their associated

objects might be:

- processing travel vouchers: trip
- sales solicitation: proposal
- salary review: employee
- university admissions: application
- insurance broking: risk

Each of these objects will have its own physical representation. For the admission application this may consist of the application form, the letters of recommendation, test scores, a grade transcript, some entries in various lists about the completion of, or decision on, the application, and so on. The single abstract object known as the application includes all of these. Even if the physical form were totally changed, the idea of an application would still remain. The best test for an object is to think about whether it would change if it were implemented differently. If it would not, then the entity is probably an object. An office may handle many instances of an object at once, as for example in the admissions office where, at any given time, many applications are in various stages of completion.

### **2.1.2 Functions**

In many cases a set of office procedures fits into the framework of a *function*. A function concerns the management of objects over time, and has three parts:

- an initialization phase: creates a particular instance of an object,
- a management phase: controls the objects during their lifetimes, working primarily in response to external events
- a termination phase: disposes of a particular instance of an object.

A function may connect the business operations of several offices, since objects may be created in one office, managed in other offices, and terminated in still others. For example, a student loan may be approved, that is, brought in to being, by a Student Financial Aid Office, but managed from the preparation of the loan document through the final payment of the loan by another office, the Student Loan Office.

### 2.1.3 Procedures

Office operations are described in terms of *procedures*, which provide structure for activities that are performed on objects. A procedure description indicates what is to be done and when to do it. Functions provide a framework for procedures, indicating when the procedures are to be performed. Each function has at least three procedures, an initiation procedure, one or more management procedures, and a termination procedure.

Every procedure has a *focal object* which is the object with which it is concerned. The procedure is organized in terms of the history of the object and the goals for processing the object. The procedure describes what happens to the object if all goes as it should. Looked at in this way, most office procedures that are usually obscured by implementation details, become quite simple processes. A procedure description emphasizes the "main-line" and separates out the special cases. This makes it easy to get an overview of the procedure, provides a simple structure onto which one can build more detail, and helps to distinguish the current implementation from the higher level goals. The "main-line" is just a series of desired state changes of the focal object.

The primary difference, then, between functions and procedures, is that functions manage objects, while procedures change the state of objects. A function describes the entire life cycle of an object. A procedure describes the steps that are required to effect some change in the object. For example, one procedure in the Admissions Office might move an application from the "request" state to the "completed" state.

A procedure expresses the progress of its object through a succession of stages, known as *states*, beginning with some starting state. A state represents a point at which no further activity can take place until something happens, an *event*. When the event occurs, some work takes place to move the object to the next state. This work is the *step*. A procedure usually begins with the *null* state. During any state, different events may occur leading to different steps and different subsequent states. Examples of two procedures are:

- Letter of credit
  - \* receive application (event)
  - \* process application (step)



- \* wait for approval (state)
  - \* receive approval (event)
  - \* issue letter and inform client (step)
  - \* wait for payment request (state)
  - \* receive payment request (event)
  - \* process issue payment (step)
  - \* done (state)
- Grant extended sick leave
    - \* receive request and doctor's letter (event)
    - \* verify letter; decide on request; complete, send, file forms (step)
    - \* done (state)

Events usually fall into one of several categories. These categories include:

- explicit command by someone
- date/time, absolute or relative
- receipt (or non-receipt) of a communication
- change in status of an object
- initiation or completion of some activity

Often some particular aspect of the object itself will require that it be processed in some alternate way. For purposes of clarity, such alternatives are expressed as modifications to the procedures called *variations*. A variation is an *a priori* object-based deviation from the normal step/event/state sequence. For example, at MIT, the applications of foreign students are treated somewhat differently from the applications of students who are citizens of this country.

It is sad but true that the course of a procedure seldom runs smoothly. An event may not happen, a signature may not be where it is required, a meeting may be canceled, or a

proposal may be withdrawn. All of these are *exceptions*. An exception is an occurrence that prevents a procedure from continuing in the normal way and that requires some response. Most of the complexity of office work, and of procedure descriptions, derives from the intermingling of exceptions and the "main-line". For this reason, in describing a procedure, the "main-line", or idealized case, is described first, then the usual difficulties. The word "usual" is important, since it is impossible to anticipate or specify all possible exceptions. The primary difference between variations and exceptions is that variations stem from some attribute of the object, while exceptions come from other causes.

An exception may occur at almost any level. It may apply only to a particular activity within a step, or it may apply to an entire procedure. Exception types that often occur include:

- timing constraint violations
- lost document
- backout
- cancellation

There are also certain general exceptions which can be "meta-procedural" in nature, such as

- missing personnel
- information unavailable
- backout: change a decision made earlier
- cancellation: terminate procedure abnormally

## **2.2 Office Analysis Methodology**

The Office Analysis Methodology (OAM) was designed to collect information based on the model of the office described above. The methodology produces a description of the current operations of an office, and tells the analyst how to go about obtaining the information for that description. OAM is based on the functional model of the office that emphasizes the business function as the primary unit of study. This section describes OAM and its limitations. An approach to overcoming these limitations is discussed in section 2.3.

### 2.2.1 Outline of OAM

OAM starts by telling the analyst how to approach the office. It discusses the reasons for doing an analysis of an office and how these different reasons can result in different approaches to the office and different problems while doing the study. For example, a study performed because upper management has said that an office is to be automated requires that the analyst work hard to achieve rapport and a helpful, friendly relationship with the office staff, while a study that is done at the request of the office manager and with the help of a person from the office requires less effort in these areas.

The next step in an OAM study is to meet with the office manager. This meeting has several purposes. The first is to lay a groundwork for the study. The analyst explains what OAM is and outlines the amount of time and effort that will be required from office personnel, typically 2-3 hours each. The analyst should also be certain that the exact scope and purpose of the study are defined. The next step is for the analyst to ask about the office itself: the mission, the internal structure, its place in the organization, what other offices it communicates with, and so forth. Finally, the analyst should make arrangements to have the manager tell the office staff about the study and let them know who the analyst is.

The analyst then interviews the office staff, looking for procedures, objects and functions. Each interview takes about an hour, and the analyst uses the model of the office to direct the interview. OAM provides a lot of detail about interviewing techniques. After the first few interviews, the analyst starts writing a first draft of the description. After each interview, the analyst will add to, or modify, the description according to the information obtained. When all of the interviews are finished, the analyst completes the description, then circulates it back to be read by the people who were interviewed. A few days later, the analyst goes back to do a second round of interviews, looking for mistakes in the description, adding material that was not obtained in the first round of interviews, and asking about exceptions and variations to procedures.

The interview, circulate description, and interview again, pattern is repeated until the analyst has obtained a complete description of the office agreed upon by all of the people who have been interviewed. Theoretically, the description should be complete after two rounds of interviews, but in practice the analyst often has to go back to a few of the people for a third interview. When a consensus is reached, the analyst gives a copy of the final description to

the manager, then interviews the manager again. At this interview, the analyst asks for any comments on the description and about any general exceptions that apply to the office as a whole. Once the manager's changes and data are incorporated into the final description, the process is finished.

### **2.2.2 Limitations of OAM**

OAM is more useful in some types of offices than others. In particular, it works best for offices that have at least some structure. This is not to say that it needs as much structure as most of the data processing techniques. In fact, studying an extremely routinized operation, such as payroll, will not make use of many of the capabilities of OAM. However, offices that are totally unstructured, such as those whose sole purpose is to work on special projects, will not be easy to study with OAM and the results will be unsatisfactory. In addition, even within a semi-structured office, some office personnel, particularly managers, will have fairly unstructured jobs. The standard OAM interview will fail here, since there will be no structure to guide the interview and no way to find the information specified by OAM.

Another limitation of OAM is the amount of effort required to perform an OAM study in a large office. In an office with people doing more than about 20 different jobs, an OAM study may take weeks. The time required to interview all the people, preferably two for each kind of job, and the problems of scheduling all the interviews, result in sufficient elapsed time that the office may change during the study period. In addition, the amount of information that the analyst must absorb and organize can saturate the analyst's ability to do so. Fortunately, most large organizational units can be broken into smaller ones that are of a reasonable size for an OAM study.

One final limitation of OAM is that it takes a descriptive, rather than a normative, approach to understanding office work. While describing the current operations of an office may be useful for some purposes, the lack of any normative material can make determining how to change the office very difficult. While the first step in any change is to understand the current situation, the next step is to decide what to change about it. Without any information about what is wrong or what could be changed, OAM does not contribute to any further parts of the process.

## **2.3 Theory**

OADM builds upon OAM. The new material and the theories on which it is based are described in this section. The changes, such as the change in attitude toward questionnaires, are discussed first, followed by an explanation of theoretical material that is truly new in OADM.

### **2.3.1 Changes**

One of the basic assumptions underlying OAM is that the complexity of office work, at the level on which OAM operates, requires interviews as the only reasonable tool for an analyst to use in understanding an office. Previous work on OAM has suggested that this assumption is incorrect and that questionnaires or other data gathering instruments may be useful in certain areas. However, these other data gathering methods have not been incorporated into OAM and their use has not been tested. OADM takes the approach that while questionnaires cannot be used to understand the structure of an office in terms of the function/procedure model, they can indeed be used to gather background information and quantitative data. OADM incorporates and tests the use of questionnaires and logs for these purposes.

Another modification to OAM involves the data that are gathered about the intention behind the work performed in an office. OAM suggests, although it does not emphasize, that the analyst collect information about why each procedure and procedure step is performed. OADM does emphasize this material and requires the analyst to obtain this information for each function, procedure, and procedure step. While this is not a major theoretical modification, it should strongly influence the usefulness of the resulting description.

A third modification to OAM involves the incorporation of the concept of Critical Success Factors [50, 7] developed by Rockart and Bullen of MIT's Center for Information Systems Research. They suggest a methodology for analyzing what factors a manager considers crucial to the performance of her job. OADM adapts this material to look at what factors are crucial to the performance of an office. These factors then help identify leverage points, that is, those places where improvement in operations will most improve the effectiveness of the entire office.

While the changes that have been described, along with other, smaller, changes in emphasis

or procedure, would be enough to create a new methodology, they are only minor modifications when compared to the last change. OAM explicitly takes a descriptive approach, that is, the result of an OAM study describes the current operations of an office without comment as to whether the operations are good or bad. The advantage of this approach is that it avoids having to define what good or bad procedures mean. The problem with the approach is that most people who use the methodology are interested in "improving" office operations. This means, by definition, that some judgment must be made about the current operations. OAM provides very little help in this area. In fact, OAM was initially developed with the idea that there would be a second methodology, to be developed at some later date, which would go from the description to the system design, thereby helping the analyst to make these judgments. Thus far, attempts to develop the second methodology have failed. One reason for this failure may be that information necessary to determine what the problems are in an office is missing from the writeup. In an attempt to address these problems, OADM has incorporated the notions of symptoms, problems, and opportunities.

### **2.3.2 A New Theory**

In some of the offices that have been studied, there have been cases where what seemed like problems were not, in fact, the real problems at all. For example, in the Office of Sponsored Programs, the officers who are responsible for the various programs were found to spend a significant amount of time talking to each other on the telephone. The obvious technical solution to a situation like this is to put in an electronic mail system. That way, the shadow time lost in dialing, busy signals, leaving messages, etc. would be eliminated and the officers could deal with questions from other officers as they have time, rather than interrupting their current activities to do so. However, further investigation in that office found that the reason for all this conversation was that the officers were trying to find precedents for the research contracts that on which they were working. If a database of previous contracts, appropriately arranged for easy access, were installed, a lot of the communication between officers could be eliminated. Eliminating communication always sounds dangerous, but in this case, a lot of time, that the officers themselves would rather spend doing other things, would be saved. This is an example of the symptom of a problem being absolutely clear, while the actual problem itself remains obscure.

A *symptom* is anything that that analyst or someone in the office feels is not ideal. The

definition of ideal, or of what is wrong, depends very much on the judgment of the people who involved. Offices are so varied, and the circumstances vary so much, that there can be no absolute definition. This is a problem with introducing normative ideas into the methodology. For example, in the case above, some of the officers complained that they spent too much time on the telephone. Others did not mention it. Those who did not mention it probably did not mind spending time calling their fellow officers. To them, it was not something in need of improvement. In this case, the analyst made the judgment that the calling was detracting from other, more productive work, and the judgment seems reasonable.

A *cause* is the reason why symptoms occur. The cause is determined by asking why the symptom occurs, then why that is so, and so on, until the question becomes meaningless or unanswerable. This introduces another area for judgment on the part of the analyst. Some analysts would have stopped after the first answer in the example above. Asking why the officers were talking to each other might have seemed meaningless, but, in fact, it was not. If the analysis process can be completed, and causes can be found on which everyone involved agrees, the addition to the office analysis process will be immense. As with treating a sick patient, it is usually better to treat the source of the problem than the symptom.

Finally, there may be aspects of the office which everyone agrees are functioning in the best possible way given the current implementation, but which a new implementation would improve in some way. These are *opportunities*. The identification of opportunities will depend not only on the analyst's judgment, but on knowledge of the available options for change. In the case of office automation, this means that the analyst should be aware of the possible technologies and their uses. This is another change from OAM where the assumption was that the analyst need know nothing about automation technology. While this is something of a detriment, the benefits of this innovation seem sufficient to warrant testing it in OADM.

# **Chapter Three**

## **The Methodology**

This chapter is intended to be a manual describing the use of OADM. It presumes that the reader is familiar with the material presented in chapter 2, but does not require understanding of some of the more theoretical issues that have been discussed. Included in the methodology below are not only the new ideas that have been presented so far, but also the results of additional experience with OAM that have not been written about elsewhere. This additional material includes:

- forms for organizing the analyst's data
- team work
- methods for approaching large offices

The methodology serves three purposes. These are establishing a good working relationship with the office manager and staff as a prelude to further work; preparing a complete description of the current operations of the office; and gathering information that will be necessary for the cost/benefit analysis and design stages of the automation process. The methodology provides as much guidance as possible in techniques for creating a positive atmosphere with the office staff. Since initial approaches are a key factor in this area, most of this material is discussed in the section about getting started. The remaining material is an integration of the methods and theory needed to obtain current information and information that will be used later. In order to help the analyst understand the motivations behind the various parts of the methodology, every attempt has been made to indicate which purpose each part serves. As an aid to general understanding, the analyst should note that the function/procedure model, and therefore any parts of the methodology which relate to it, is used primarily for the description of current operations. Those parts of the methodology which do not seem to fit into the function/procedure model are usually included for the purpose of obtaining the information that will be necessary later in the process.



The discussion of the methodology which follows is organized, roughly, into the following sections:

- **Getting Started.** A discussion of reasons for undertaking a study, the constituencies in an office and how to approach them, who should do the study, and the suggested unit of study.
- **The Manager Interview.** A discussion of the items to be covered in the manager interview including the scope of the study, the expected ultimate outcome of the study, basic data to be gathered about the office as a whole, whom to interview, and information to gather about the manager's job.
- **The Interview and Description Process.** How to conduct an interview, what information to gather in the interview, how to prepare and administer the quantitative questionnaire and the procedure log, how to format the description and other related documents, the use of various analytic aids, the interview cycle, and many other relevant issues.
- **The Final Review.** Presentation of the final results to the manager. Also a discussion of how the information gathered will fit into the next steps of the process.
- **Other Issues.** A discussion of issues which are relevant to the methodology but which do not fit easily into one of the above categories. These include the continuation of the automation process, uses for additional types of questionnaires, use of the methodology in studying large organizations, and the use of forms to aid the analyst.

### **3.1 Getting Started**

A study of the type described in this methodology may be undertaken for a variety of reasons. The office in question may have been identified as a site for a pilot study. Alternatively, people within the office may have requested that the study be performed, perhaps as part of a larger effort to improve the functioning of the office. Or possibly the office has been identified by people elsewhere in the organization as one that is a problem area and which should be "improved". Whatever the reason for the study, it will have an effect on how the office personnel perceive the study, and, therefore, should have an effect on how the study is performed.

Even before most studies begin, certain expectations are formed about the result of the study

and the analyst should know what, if any, particular results are expected for this study. These results may be phrased in terms of equipment (we're going to buy a word processor), organizational structure (we're going to eliminate this department), organizational image (we're going to show that this department uses state-of-the-art technologies), or in terms of productivity (we have to handle more clients with fewer people). Improved office productivity is the most common goal. Since initial expectations often influence a study, each of these goals will have very different effects on the study to be performed. For example, if the study is undertaken to determine the best use for a word processing system, then the people who commission the study will probably want to see more data about document production and less data about communications. A study undertaken to find ways to improve organizational image may focus more on possible uses for new technology than on ways of reorganizing office work for better productivity. Without knowing the goal of the study from the start, the analyst may emphasize other aspects the study, thereby causing the study not to meet the expectations of those who commissioned it.

The analyst should always remember that the study does not stand alone, but rather is a part of a larger process. This will be true, with very few exceptions, no matter what the reason for the study. The larger process will be one of change, and the entire study will be only one step in the process of change. Office personnel are alert to change and since they are usually very wary of it, the analyst should work hard to create a positive atmosphere, setting the stage well for the changes that are likely to follow the study.

### **3.1.1 Office Constituencies**

In performing the study, the analyst will find that there will be a variety of constituencies, each with its own concerns and needs. In most cases there will be three major constituencies:

- office personnel
- office manager
- senior management

Each constituency will be discussed separately, looking at the issues that are likely to be of concern.

In those academic fields where experiments are performed on humans, the notion of *informed*

*consent* has arisen. This concept, developed to protect people involved in experiments, states that they have a right to know that they are being experimented upon, and to know the nature of the experiment. In many ways, a study is like an experiment and informed consent should certainly apply. What this means is that anyone who is involved in the study should know that a study is being performed, who is performing it, and why. The types of information that this study collects can be obtained with the participant's full knowledge of the study and keeping the participants unaware of the study is unnecessary, not to mention unethical.

Office personnel, the first of the three constituencies, may perceive that there is a great deal of risk associated with participating in the study. After all, the study implies change, and change is often very threatening. There are a number of ways to reduce this perception of risk and all of them should be employed. One method has already been discussed, that is, informing the participants about the study. Seeing a strange person talking to other people in the office for no apparent reason is much more threatening than having been informed that a study is being conducted. Perhaps the best way to reduce the perception of risk, however, is to emphasize that the office personnel will be involved in the entire process of change. Even if they have not been involved in the steps that lead to the decision to undertake the study, they should certainly be involved in any future decisions. In addition, the methodology itself provides opportunities for all of the participants to review and correct the findings. This reduces the perception of risk by giving the participants some control over the results.

Dealing with the office manager will involve certain other issues. Primarily, is this a study that she wants or needs? If the study, or the entire automation process, has been forced on her by others in the organization, then the answer is probably no. As one can imagine, this can make performing the study very difficult. The best techniques here are to point out how this study will benefit the manager herself, and to be as polite and considerate of her concerns as possible. Another concern of the office manager will be the effects of the study on the operations of the office. The manager will be the one who will have to smooth any ruffled feathers caused by the study, and the one who will have to deal with any interruptions to the work flow in the office. She will also be the one who will have to implement any changes suggested by the study.

Senior management may or may not be a part of the study environment. If, after the study is complete, major changes are to occur, these may require the support of senior management.

Depending on the organizational environment this support may be easy to obtain or it may be impossible. Senior management may consider the study a special project. This guarantees support for any changes that may follow, but runs the risk that the senior manager will interfere unduly in the study process. The analyst should be aware of the possibilities and should make a point of understanding the role of senior management in any particular study.

### **3.1.2 The Study Team**

The next question that arises is who will do the study. We have referred to "the analyst" throughout the discussion thus far, implying that there is only one and that that person comes from outside of the office. None of these implications is necessarily true. The study may be performed by a single person or by a team, by a person from inside the office, or by an outsider. Each of these options has its benefits and its problems. There are, however, certain skills that anyone performing a study of this type should have, including:

- analytic ability
- organizational sensitivity
- system perspective
- understanding of office work
- good communication skills
- sensitivity to people
- combination of tact and persistence

It may be very difficult to find a single person who has all of these skills, and this is one of the arguments for a study team. On the other hand, some such individuals do exist, as well as others who can be trained to have the skills that they are missing.

If a team composed of people with a variety of complementary skills is formed, they must then decide how to divide the work. There are any number of possibilities, depending on the composition of the team and the style of interaction to which they are accustomed. However, a few methods are known *not* to work: having more than one interviewer for a particular interview seems to intimidate the interviewee, and having a lot of strange people invade an office all at once, also does not seem to produce good results. One division of labor that

seems to work well has one, or perhaps two, people doing the interviews, then discussing them with another member of the team who helps with the analysis. However it is done, the work must be divided up carefully since the amount of communication required in order for the team members to work together effectively can easily become enormous.

Another consideration is whether to have the analyst come from inside or outside the office. On the one hand, an insider will have a certain amount of expertise about the functioning of the office. She will already know the office personnel, the vocabulary that is unique to the office, etc. On the other hand, she may not have much experience with studying offices and will probably have to be trained to use the methodology. There are other considerations as well. An insider, performing a study on top of regular duties, may not have enough time to do a good job. An outsider may have a certain prestige that will help to inspire trust. Having an insider do the study, or be on the study team, may help to create powerful allies in the office, but it can equally easily set up internal jealousies that may jeopardize future progress. All of these considerations must be taken into account.

### **3.1.3 The Unit of Analysis**

The ideal object of study is a functional group. That is, to study one function from beginning to end, regardless of what offices it may cover, and most functions do cover several offices. Since the object of an automation effort is to improve the business function, studying an entire function with an eye to improving it is obviously the best thing to do. However, a complete functional group usually extends beyond the practical scope of a study, either requiring too much effort or going beyond the part of the organization that has been authorized for study. The analyst must, therefore, realize that a single office may carry out

- a complete function
- several functions
- part of a function
- parts of several functions
- any combination of the above

But just realizing that there are many possible ways for functions to map into offices is not

enough. Functions may prove very hard to define and the definition may depend on the scope of the study and the entire automation effort. For example, in studying the MIT Admissions Office, one may decide that that office carries out most of an entire function: admitting students to MIT. The function starts with the procedure for sending applications to prospective students, continues through the phases of processing a completed application, and ends with the procedure for admitting a new student. On the other hand, in the context of a larger study of MIT, one may conclude that the entire admissions process is simply the initial portion of the function of keeping track of students. This function would start with the admissions procedure, continue with the procedures for keeping track of student's academic progress, graduation, and alumni activities, and end when the former student dies or is lost by the Alumni Office. Either of these analyses is correct, and the appropriate one to choose depends on the context of the automation effort.

Finally, even if the current context is constrained, other studies may be, or may have been, performed that would help to provide integration opportunities. One way of studying an entire function that covers several offices is to put studies of individual offices together. Even though some improvement to the entire function may have already been obtained by improving those parts of the function which are in the respective offices, further improvements may be possible through analysis of the interfaces between the offices and by looking for opportunities for integration. Thus, part of understanding the context of the study is knowing about other studies that may be of relevance to this one.

## **3.2 Overview of the Study Process**

The study process consists of the following 11 steps:

1. Prepare and send background questionnaire.
2. Review questionnaire results and any other background material about the office that may be available.
3. Meet with the office manager.
4. Interview the staff.
5. Produce the draft documents.

6. Prepare and administer quantitative questionnaire.
7. Iterate the interview process.
8. Produce the final documents.
9. Review the study and options for improvement with the office manager.
10. Present options for improvement to the office staff and obtain feedback.
11. Prepare a plan for future action.

This overview assumes that a fairly simple office is being studied. Changes in the procedure for those variations that include complex or large offices are discussed at the points at which they apply.

### **3.3 Meet With the Manager**

The first few steps of the study process all involve the manager and are treated as one step in the following section. For the purposes of this methodology, the office manager is the person to whom all other people in the office report, either directly or indirectly. Throughout most of this section, the assumption is made that there is one manager in the office. However, some larger offices may have several layers of management. In this case, the analyst should start with the office manager, then work her way down the organizational tree, interviewing each of the managers. The analyst should interview each manager as if the part of the office that reports to the manager were an entire office and the manager were the office manager. Naturally, since the analyst will have background information from previous interviews, some questions will not have to be repeated. In addition, the analyst may want to have a definitive discussion with the office manager about how the study will be presented to the office staff, then go over the results of this discussion with the other managers. The problem of deciding whether a person is a manager who should have a manager interview or a nonmanager who should have a standard interview is a difficult one that the analyst will have to resolve for herself.

### 3.3.1 Before the Interview

In order to make the best use of the analyst's and manager's time, it is often useful to provide the manager with a list of written questions to which she should respond before the interview. This list can take the form of a questionnaire, or it can simply be incorporated into a letter. The questions should be ones which the manager can easily answer in written form or ones which may require a small amount of research by the manager before she can answer them. The idea is to gather, in advance, as much as possible of the following kinds of material:

- |                        |  |
|------------------------|--|
| <b>Organization</b>    | This includes the internal organization chart of the office and some information as to where the office fits into the larger organization. Most managers can answer this question by simply providing the appropriate organization charts.   |
| <b>Staffing</b>        | How many people are there in the each part of the office? In a small office this question is not useful since one box on the internal organization chart will represent one person. However, in larger offices where the chart may not show every person in the office, the additional information is necessary to understand the relative sizes of the parts.   |
| <b>Geography</b>       | What is the physical layout of this office? Are all of the personnel in the same general area or is part of the office separated physically from the rest? If the office is separated, why? Where are the parts? How far apart are they?   |
| <b>Forms</b>           | What are the important forms in the office? The manager can probably delegate this one. The analyst should ask for a copy of each important form and a brief explanation of how it is used.  |
| <b>Databases</b>       | What are the important databases in the office? What are their approximate sizes in some measure that seems reasonable? Briefly, what kinds of information are in each database and how are the database used? How are they stored? As paper files? On computers? Microfilm? Other technologies? The analyst's knowledge of the entire organization and the types of technologies that it is likely to use will have to guide these questions. |
| <b>Data Processing</b> | Does this office interface with any kind of centralized data processing system? If so, what kinds of information does the office send to, and receive from, data processing? What reports does the office receive and, briefly, what are they used for?  |
| <b>Technology</b>      | Does the office currently use any computer-based systems? If so, what are the systems (manufacturer, system name, size, etc)? Briefly, how are the used? Does the office make use of any other technologies? If so, what   |



are they and for what are they used?

|                         |  |
|-------------------------|--|
| <b>Job Descriptions</b> | What are the different job titles in this office? The analyst should ask for copies of job descriptions if they are available.   |
| <b>Budget</b>           | What are the principal non-salary expenditures in the office? How much is spent on each? What is the total office budget?  |
| <b>Mission</b>          | What is the basic mission of the office?   |
| <b>Functions</b>        | What are the major functions performed by the office? The analyst should remember that the manager will not know the definition of function that is used in the function/procedure model and will answer this question in terms of her own understanding of the word. The answers, therefore, will not be the functions that will be developed later. Nevertheless, the manager's answer to this question can help to give a useful picture of the office. |

The purpose for asking these questions is to obtain background information about the office. Some of this information would otherwise be obtained in the interview with the manager while the rest would come from the interviews with the office staff. Having the information before the interviews will help to reduce the length of the interviews and will help the analyst to feel less confused during the first few interviews with the office staff.

### **3.3.2 The Interview**

The meeting with the office manager is extremely important. This meeting has many objectives including:

- establishing ground rules for the study;
- understanding the functions and resources of the office;
- verifying the organizational context;
- identifying key personnel for interviews;
- and gathering data for use in later cost/benefit analyses.

Although the manager interview is treated as a single interview throughout this methodology, it is often, in fact, two interviews. The first interview is required to establish the ground rules, and the second interview is used to obtain the factual information. Both of these parts are

discussed below. If the circumstances indicate that two interviews will be necessary, then the list of background questions suggested in the previous section should be given to the manager after the ground rules have been discussed. The responses should be received and the analyst should have a chance to look at them before the next interview occurs, since they will have a direct effect on the information to be gathered in that interview.

### **3.3.3 Ground Rules**

The first goal of the interview is to establish the ground rules for the study. This includes a number of items, some of which may vary depending on the exact context of the study. The overall purpose of this portion of the interview is to guarantee that the analyst and the manager are working from the same information and assumptions. It is worth going through each of the recommended topics carefully to be sure that there is no possibility of misunderstanding.

The very first step is introductions. The analyst should introduce herself, perhaps giving some additional information about her background and her position in the company. This is an obvious action but its inclusion or lack thereof can have important consequences. By introducing herself, the analyst is laying important groundwork for further friendly interaction. People who will not introduce themselves appear rude, and those who seem unwilling to divulge any information about themselves often leave the impression that they are unfriendly. It will be important for the manager to like and trust the analyst, so the analyst should always try to be open, polite, and friendly.

The next step is to describe the general format of the study. This includes going over the manager interview, the interviews with selected staff members, the administration of the quantitative questionnaire including the use of the procedure log, the distribution of the draft description, the additional interviews with the office staff, and the production of the final documentation. The analyst should be sure that the manager understands that the products of this study are a description of the current operations of the office and a list of the problems and opportunities in the office. The study's purpose is to understand the office and its problems, not to evaluate the performance of the office staff. The analyst should be sure that the manager understands this distinction because if the office staff believe that their performance is being evaluated, the study results may not be accurate. The analyst should

then go over the kinds of actions that might result from the findings of this study.<sup>1</sup> The reason for going over the study process, its results, and its consequences is to ensure that the manager has accurate information about what to expect. In addition, a manager who is well informed is more likely to have a positive feeling about the study than one who lacks complete information. Presumably, if the office manager requested the study, she already supports it. The analyst should be sure, however, that the manager has reasonable expectations about the products of the study.

The next step, which is strongly related to the previous one, is to indicate the level of effort that will be required from the manager and from the office staff. From the preliminary information, the analyst should be able to estimate how many people will have to be interviewed.<sup>2</sup> Two or three total hours of interview, split between two interviews, are usually needed for each person. In addition, the entire staff may have to complete a questionnaire, and the people who are interviewed will have to read the draft description. The manager should be given this information, along with some indication as to the length of the study. The manager may object that the level of effort required for the study seems excessive. If so, the analyst should point out the importance of obtaining complete and accurate data before attempting to change anything in the office. The analyst should also emphasize that the study will not interfere significantly with office operations and that the reason for telling the manager what the study involves is to allow her to plan for what little disruption might occur.

Once the analyst has given the manager some idea of what is involved in doing the study, the manager should be able to evaluate how the study will impact the office. The analyst should, therefore, ask at this point whether this is a good time to do the study. The previous material should not have been presented as if it were unchangeable, but rather in the context of, "This is what a study of this type usually takes, and here is when looks like a good time to do it. Does this fit with the resources that you have available?" It sometimes happens that, unbeknownst to those who scheduled the study, the office in question will be undergoing

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<sup>1</sup>These will vary depending on the original purpose for doing the study, the patterns of change in the organization, the results of the study, and many other factors. However, with the understanding that the actions can be stated only generally and are subject to change, the analyst should still be able to give the manager some information about what might follow the study.

<sup>2</sup>This will be a very rough estimate that indicates that everyone, or all but a few people, or half of the people, or only a few of the office personnel, will have to be interviewed.

some sort of peak work period or other upheaval that will make it impractical for a study to be conducted at that time. The analyst should, therefore, check to be sure that the proposed study period is indeed a practical one.

The next item on the agenda will be to elicit more information about the context of the study.

This requires a few, fairly simple questions, such as:

- Is this office currently involved in any other studies?
- Are there any major changes in the office expected in the near future that will effect the results of this study? A re-organization, a changing of the office mission, or anything similar?
- Have there been any major changes recently which might effect the study?

The purpose of these questions is to probe for factors which may effect the study, but of which only the manager is aware.

At this stage in the interview, the analyst should also make clear what the manager's responsibilities will be. These usually include the initial interview, introduction of the analyst to the office staff,<sup>3</sup> filling out the quantitative questionnaire, review of the final documents, and participation in the final choice of options.

Aside from the initial interview, the most important of these will be the presentation of the study and the analyst to the office staff. Exactly how the study and the analyst are presented to the office personnel will depend on the circumstances. The three important points are first, that the office personnel should be aware of the study, its purpose, and likely ultimate outcome, second, that everyone involved understands that the study is *not* a performance evaluation, and third, that the office personnel be aware that the analyst is working with the full approval and support of the office manager. The most important of these points is that the study is not a performance evaluation. Some managers may see the study as an ideal opportunity to find out about the performance of office personnel, particularly as it relates to the identification of problems in the office. The analyst should make clear that the purpose of the study is to improve the entire office and that using the study to evaluate individual

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<sup>3</sup>Or informing the staff of the study, or notifying the staff of the upcoming interviews, or whatever the particular situation calls for.

performance will defeat its purpose. It is extremely important that both the manager and the office staff understand this principle. Evidence of the manager's support and approval of the analyst and the study can easily be given in a small office by having the manager introduce the analyst around at the end of the interview. In a larger office, the manager may choose to send a memo saying that the analyst will be asking to speak with certain people.

Ideally, the office personnel will already know that an effort is underway to improve the functioning of the office, and the study can be presented as simply another step in that process. However, since the study is likely to be one of the first steps in the process, it is entirely likely that the ground work will not have been laid. In this case, the analyst must discuss with the manager the best way in which to present the study and the entire automation effort to the personnel. An important issue is the role of the office personnel in the effort. In order to avoid alienating the entire staff, and in order to take advantage of their specialized knowledge of the operations of the office, they should be included in the automation effort and their needs and opinions should be heard. Since a study is usually the first step in a process of change, the manager should realize that her control of the change will be constrained by the behavior and attitudes of the office staff. [5] This is particularly true where automation is a possible outcome, since the office staff will be the ones who will have to use the new equipment and adapt to the new work procedures. Most managers will understand this immediately, but a few may need a little guidance.

Once the participation principle has been established, the presentation of the material should be discussed. Perhaps the most effective method, in terms of effort as well as feedback, is to present the idea at a meeting of the entire staff. The manager should describe the effort, make clear that the purpose of the study is to understand the entire office and that it is not an individual performance evaluation, emphasize the desire to include office personnel in all phases of the effort, and describe the benefits and costs that will be involved. This meeting can also be used to introduce the analyst and to allow the analyst to describe some of the basics of the study process. Holding a meeting does include the risk of confrontation and the possibility that the group may make a quick, collective decision against the effort. If a meeting is not appropriate for some reason, other presentation options include having the manager speak individually with each member of the office staff, having the manager prepare a detailed memo, or having the manager brief the people who report directly to her and having them discuss the study with their subordinates. But however it happens, *everyone* must be told.

### 3.3.4 Functions and Resources

Once the ground rules for the study have been agreed on, the analyst can go on to ask the manager some substantive questions. The best ones to start with are those concerning functions and resources since this information gives a good overview of the office. The analyst should ask about:

- the basic mission of the office,<sup>4</sup>
- the functions of the office,<sup>5</sup>
- the major resources of the office,<sup>6</sup>
- and the staffing levels for each function.

Most managers can give a good, concise answer when asked about the mission of their office, and the answer usually reflects the official position. It is important to have this information since, if the goal is to improve the business function of the office, the mission states the official purpose that, presumably, is to be improved. Even if the goal of the study is not to improve productivity, knowing the official mission of the office adds one more piece to the emerging picture of the office.

When asked about the functions performed in the office, many managers will refer to the organization chart. The manager will be able to state several functions and will be able to give a brief description of each. The analyst should not try to get too much detail about the functions, since that material will be better obtained by interviewing the office staff. In addition, the analyst should always remember that further analysis may show that the functions performed by the office are not exactly the same as those outlined by the manager. However, the functions do provide a hypothesis from which to work while doing additional analysis.

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<sup>4</sup> A good question to elicit this is, "In two or three sentences, what is the mission of this office?"

<sup>5</sup> Use the word function in asking the question, but remember that the manager will not understand it in the function/procedure technical sense defined in chapter 2.

<sup>6</sup> A good question for this is, "Is there anything the office is responsible for managing or maintaining?" If that does not produce a good answer try asking specifically about databases, files, people, etc.

In contrast to the mission and functions, many managers are not entirely aware of the important resources in their offices. The analyst should ask the manager what the important resources are in order to see what she says. The resources listed by the manager will be important ones, but there may be other, equally important ones, of which she is unaware. In any case, the manager will give the analyst a starting point from which to work.

The analyst should not forget to ask about the staffing levels for the functions that were outlined by the manager. This information is important in suggesting the relative levels of effort that go into the functions. These figures cannot provide any definite conclusions about the office, but they can suggest hypotheses for further analysis. For example, a disproportionate staff level in comparison with the importance of the function, might provide a clue to an area that could use improvement.

The analyst should already have some idea, from the questionnaire, what the answers to these questions will be. The reason for asking the questions is to verify the information that the analyst has obtained and any hypothesis that the analyst may have made. Given this previous information, these questions should not take long to answer.

### **3.3.5 Organizational Context**

The next series of questions concerns the structure of the office and the organization to which it belongs. The information to be obtained includes:

- reporting relationships to higher management
- internal organization of the office
- staffing and support levels by job category
- key interfaces to other offices

No analyst can truly understand a part of the organization without knowing something about where it fits into the rest of the organization. An analyst cannot propose changes to the internal structure of an office without knowing the current structure. Staffing and support levels are necessary for later cost benefit analysis and as clues to potential areas of improvement. If operations are changed in this office, the change could affect other offices, so the analyst must know with which offices this one communicates most and the nature of

that communication. Most of the information for this section should be available from the background questionnaire so the analyst should simply verify that the information is correct and ask the manager if she has anything else to add. This section should not take more than a few minutes to complete.

### **3.3.6 Who to Interview**

The next step is to identify appropriate people for the analyst to interview. This will include people from within the office and people from elsewhere in the organization who have contact with the office. The analyst and the manager should work together to identify who these people will be. Using information from the background questionnaire, the analyst should have identified the kinds of people who should be interviewed. Based on this information, the manager can suggest individuals who meet the given criteria.

As the first step in identifying interview subjects within the office, the analyst should have tried to identify the different types of jobs in the office. If job descriptions were not available as part of the background information, the analyst will have to make educated guesses from the available data. The analyst will want to interview at least two people who perform each type of job. Note that job titles do not necessarily indicate what people are really doing. In many offices, there will only be one or two people doing any particular job. In these cases, the analyst may have to interview all of the office personnel. In other cases, however, there may be a fairly large number of people all doing much the same thing. This would be true of a sales organization where salesmen are divided by geographical region. In these cases, the analyst will only need to interview two or three of the people with similar jobs, enough to corroborate the results.

The analyst should tell the manager that the analysis process requires interviews with two or three people of each job type, pointing out that this does not mean job title, and should ask the manager who she would recommend. Ideal interview subjects are ones who have worked at the job for a year or two, long enough to be familiar with all of the cyclical changes, but who have not been in the job so long that it is second nature. The manager will know best who these people are. If the manager suggests that the analyst interview a significantly different number of people than she has earlier identified, the analyst should find out why. Job descriptions could be out of date or job titles could be misleading so that there are a different



number of job types than the analyst had expected. Alternatively, the manager may have used her special knowledge about the office to suggest that the analyst interview additional people. It may be that some of these people, while not ideal interview subjects, should be interviewed for political reasons. The analyst should be aware of these reasons.

The discussion so far has assumed that the office has only one manager. In larger offices, however, there are likely to be several layers of management. In this case, the analyst should interview all of the managers, using the manager interview format presented in this section. The analyst should make clear to each manager that all managers who report to her will have to be included on the list of interview subjects.

Once the interview subjects from within the office have been identified, the analyst should ask the office manager to notify them that the analyst will be asking for interviews. In order to avoid starting rumors, this notification should be given after all of the office personnel have been told about the study.

The questions of who to interview from outside the office is a little less clear. The answer will depend in part on the purpose and context of the study. In most cases, the analyst should interview the person to whom the office manager reports, some people in offices which interact closely with the office in questions, and some people in offices which use the products of the office. The reason for interviewing these people is that it is hard to get a complete picture of what the office does without knowing how its products are used. In addition, certain types of problem symptoms may appear only at the interface between offices or after a product has left the office that is being studied. Therefore, the purpose of these interviews is to determine the use of the office's products and to find out from a different perspective if the office seems to have any major problems that have not been uncovered by internal study. The manager is likely to ask why outside people must be interviewed, to which the answer is the reasons that have been given.

The analyst should know from the background questionnaire, with which offices the office communicates most. At this stage in the interview, the analyst should ask the manager which people within those offices communicate most with this office. The manager should be aware of large scale cooperation or communication with other offices and should be able to suggest contacts in those offices. However, the manager may not be aware of lower level

communication or may simply be wrong about who to contact. The interviews with people from outside the office will not take place until after the first round of interviews, so the analyst will have the opportunity to find out from the office staff about low level communication and/or current contacts. The principle reason for asking the manager about who to contact in other offices is that there may be communication that involves only the manager.

The analyst should ask next about which offices or other groups use the office's products.<sup>7</sup> Of all the people in the office, the manager is the most likely to be able to give a complete answer to this question. The purpose of interviewing these people is to look for problem symptoms that may not have been obvious from within the office. Since in some cases it will be difficult to interview these people, the analyst should discuss with the manager ways of obtaining the desired information and the benefit of having that information. The manager may be able to suggest other sources for obtaining the same information<sup>8</sup> or may be able to provide evidence that having the information would provide little benefit. Ideally, however, the analyst and the manager will derive a list of name for interviews or a plan for gathering the required information.

### **3.3.7 Success Factors**

The goal of the next section of the manager interview is to determine what factors are the most important to the success the entire office. These may be somewhat difficult to identify, particularly if the office manager has not given any thought to the question beforehand. Getting good information about these factors is very important, however, since they will be the basis for evaluating improvement to the functioning of the office after changes have been made. These factors are essentially the Critical Success Factors for the entire office [50, 7]. Questions that might help in determining these factors are:

- On what things in this office does the success of the entire office depend?

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<sup>7</sup>There may be people from outside the organization who are principle users of the office's products, for example customers in a customer complaint office. This complicates the matter of finding out what the users think of the office's products. A survey could be performed, but it might be costly or otherwise impractical. The benefit of knowing the results would have to be weighed against the cost of obtaining them.

<sup>8</sup>In the organization's consumer complaint office, for example, there may have been previous studies done evaluating the performance of the office. While studies would not provide information from the right viewpoint, they might still provide some useful information for much less cost.

- How do you know when the office is doing a good job?
- How do you know when you are doing a good job?
- How does your boss know when the office is doing a good job?
- How does your boss know when you are doing a good job?
- Where would a sudden disaster in this office hurt the most?
- What currently prevents this office from functioning its best? Why is that important?
- If you were unexpectedly out of contact with the office for several months, what would you first want to know about the office when you returned?
- If you had more hours in a day, what would you do with them?
- If there were more people in this office, what would you have them do?

### **3.3.8 Manager's Work**

The goal of the final section of the manager interview is to find out what the manager herself does. This will be the first step in actually understanding how the office works. This portion of the interview is likely to be difficult. The analyst does not yet have a good picture of the office into which to fit the manager's information, making it very difficult to be sure that complete information is gathered. In addition, the model of office work that is used in this methodology does not well describe managerial work. Nonetheless, the analyst should make an attempt to understand what the manager does.

Having spent most of the interview talking about the office, the analyst should make clear that this portion of the interview is about the manager's work and not about the rest of the office. The analyst can then start by asking the manager to list the kinds of things that she does. Many managers will have a hard time answering this question and will answer in terms of activities: meetings, travel, and so on. The analyst should explain that she is looking for a higher level description and might ask about things like budgeting, personnel issues, project management, and preparation of reports. The manager may then be able to give more detail about what she does for each of these topics. Even so, much of what a manager does involves dealing with the unexpected and is therefore very difficult to categorize [31].

One technique that the analyst may find useful for understanding what the manager does is to go over a day's activities. The analyst can take the manager through a recent day,<sup>9</sup> a half hour to an hour at a time, asking what the manager did in each time period. This includes the people with whom she spoke, the subjects that were covered, and the reasons for all activities. From looking at a day or two in this way, the analyst may be able to see patterns that will help to explain what the manager does. In general, however, even after the entire study is concluded, the manager's job will be the least understood part of the office.

### **3.4 Interview the Office Personnel**

The next major step in the interview process is to interview the office personnel. The method for determining who should be interviewed has been discussed in section 4.3.6. This section will discuss the details of doing an interview including what to do before the interview, how to conduct the interview, and what information is to be obtained.

#### **3.4.1 Before Each Interview**

The most important preparation for an interview is familiarity with all of the details that are currently known about the office. Results from the background questionnaire and the manager interview should be reviewed, as well as the material from any interviews that may have preceded this one. In particular, the analyst should feel as comfortable as possible with the vocabulary of the office including the names of important forms, databases, other offices of interest, etc.

The analyst should also review what she knows of the structure of work in the office. For the first few interviews this will be relatively little aside from the general outline of the office functions that was obtained from the manager.<sup>10</sup> For later interviews, the analyst should have a wealth of data to work with. The analyst should hypothesize about where the interviewee's work will fit into the procedures and functions of the office. These hypotheses can be

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<sup>9</sup>The more recent, the better the manager will remember it.

<sup>10</sup>And even this outline may not be correct. That is, after studying the office, the analyst may find it more meaningful to arrange the functions and procedures somewhat differently from those suggested by the manager.

informal but should be fairly specific. The hypotheses will be used in the interview to help direct lines of questioning. The analyst should, however, be careful not to allow hypotheses to interfere with data gathering. That is, people often hear only what they expect to hear and by forming hypotheses early, the analyst runs some risk of missing valuable data. Keeping this in mind, the hypotheses become a useful way to structure the interview.

The analyst should also review what is known about problem symptoms and causes in this office. A series of questions can be framed ahead of time, the answers to which will help the analyst decide what to ask about in the interview. Some of these questions are:

- Is this person likely to have any of the known problem symptoms? If so, which ones? Might the person be able to shed some light on the causes behind these symptoms?
- What are the interviewee's probable objectives in terms of her job?
- What is she likely to consider critical to her success in the job?
- What are some likely measures for her objectives and for knowing when she is doing well?

Most of these questions will be very hard to answer without actually talking to the person involved, which is, of course, the reason for the interview in the first place. However, if some tentative hypotheses can be formed, it will help in conducting the interview.

Preparing properly for each interview is important, especially for the first few. Adequate preparation will help to shorten the interview, will help the analyst to feel less overwhelmed with information, and will help to reassure the interviewees by showing that the analyst considers the study important enough to spend significant time on it.

And finally, the analyst should always make an appointment for the interview. In some cases this will be necessary in order to see the person at all. In cases where an appointment might otherwise not be made, it is a courtesy indicating that the analyst believes the interviewee's time, and therefore the interviewee, to be important. In general the analyst should be as flexible as possible about scheduling the interviews, always remembering that the interviewee is doing the analyst a favor by taking the time for the interview.<sup>11</sup>

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<sup>11</sup> Even if the interviewee has been flatly told to comply with the interview process, taking the attitude that consenting to the interview is a favor will help to produce a better feeling.

### 3.4.2 Conducting the Interview

Interviews should be conducted at the person's desk or in the person's office, with just the interviewer and the interviewee present. Having another person present can interfere with the flow of the interview and might prevent the interviewee from speaking freely. Holding the interview in the interviewee's own territory is a little item that will help the person to feel more at home. In addition, it gives the analyst the opportunity to observe the person's environment, which can be very educational.

As the first step of the interview, the analyst should introduce herself and review the purpose and format of the study. The analyst should emphasize that this study is *not* a performance evaluation but rather a study of the entire office. The two step interview process should also be emphasized, as providing an opportunity for correction and feedback by the interviewee. The goal of learning from the interviewee should be stated clearly.<sup>12</sup> The purpose of this part of the interview is to both be sure that the interviewee is fully informed about what is going on and what will be happening, and to be sure that the interviewee feels comfortable talking to the analyst. This initial contact, requiring little effort on the part of the interviewee, is the best time to start building rapport.

The rest of the interview has two parts. During the first stage the analyst will be asking about the current operations of the office, while during the second part, the analyst will be trying to obtain information about what can or should be changed. The parts may, in fact, overlap somewhat, but knowing that there are supposed to be two parts will help the analyst to organize the flow of the interview and, therefore, her notes.

In asking people about what they currently do, it is important to remember that one can easily get lost in the details. The best way to avoid this problem is to ask the interviewee to first describe, in general terms, all of the different kinds of things that she does. Once this broad view has been obtained, the analyst can then go back to ask about the details of each item.<sup>13</sup>

The analyst should try to fit the general items described by the interviewee into the picture of

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<sup>12</sup>It is amazing how many otherwise hostile interviewees become friendly and cooperative as soon as they perceive that the analyst truly wants to learn from *them*, and that they are the teachers.

<sup>13</sup>People are more willing to stick to the broad view first if they are told, when the broad picture is asked for, that each item will be discussed in detail later in the interview.

the office that is developing. If there is one item that seems likely to be related to a procedure or function about which the analyst already knows, she should make note of that and remember it for the later discussion of the details of that item. There is no particular order which is best for asking about the details of the general items. Since people usually mention the most important things first, taking each item in the order that was mentioned usually works well. However, if there seems to be some reason to change the order, the analyst should certainly do so.

In asking about the details of the interviewees job, the analyst should keep certain principles in mind. The first of these is not to jump in to the description too eagerly with many questions. No one likes to be constantly interrupted. The second principle is that the analyst should always have a mental model of how the office works. As the interviewee talks, the analyst should be trying to fit the information into this model. The analyst should be asking mental questions such as

- Is this activity part of a procedure that I know about? If so, where does it fit in the procedure? Does there seem to be a step missing somewhere?
- If the activity does not fit into a known procedure, what might other parts of this new procedure be? Is there someone to whom I have already spoken who might also participate in this procedure but who forgot to tell me about it? To what function does this procedure belong?

These are only a few of the questions, and are meant to give a flavor of the kinds of things that the analyst should be asking herself. The reason for keeping the model in mind is to check for the completeness of the data that are being gathered. The third principle, then, is that when the analyst does ask questions, they should always be phrased so as to check the validity of a hypothesis about the model. A fourth principle is to not probe for details beyond the individual's scope of action. While some people may really know what happens after an item leaves their control, most people will get at least some of the details wrong. It is much better to ask the person who is directly concerned about what happens next. The final, and perhaps the most important, principle, is that there is reason for everything and the analyst should know that reason. If the interviewee says that something is done, *always* ask *why* it is done. Nothing can be changed at a later date without some indication as to whether it is important and why it is important. All too often, what seems to be the reason, is in fact only part of the reason, and the other, unknown part, is vitally important to know about. For example, if a document is copied and saved, knowing why it is saved--for future reference, to provide an

audit trail, to serve as a legal contract, to conform to government regulations, etc.-- will be very important in knowing whether or not the document can be eliminated or the method of storage changed.

A common human characteristic is to either describe things in great detail or to generalize. Either one can detract from the interview. In order to avoid generalization, and to be sure that all of the details have been included, the analyst should ask for specific examples for each generalization. The best way to do this is to ask the person to describe a usual case of the activity in question. If this still produces generalizations, the analyst can ask the interviewee to describe a particular case that has happened in the recent past. To keep the interviewee from getting bogged down in special cases, the too-much-detail characteristic, the analyst should ask the interviewee to describe things as they should be. "What happens if everything goes right?" In other words, the analyst is asking the interviewee to describe the mainline of the procedure, although, of course, the interviewee will not know this terminology.

When the analyst feels she understands the interviewee's work as it should be, she should go on to the next stage of the interview, leaving the exceptions and so forth for the second round of interviews. In this next part of the interview, the analyst is looking for information about what is wrong in the office, what is not wrong but could be made better, how the interviewee knows when she is doing a good job, and what is important in being able to do so. There is no model into which to fit the answers in this part of the interview, and it is hard to know when the information is complete. However, the analyst can start with the following list of questions and try to elicit as much information as possible.

- Do you have any problems in getting your job done? If so, what are they? (If the interviewee asks what kind of problems, the answer is "whatever comes to mind.")
- If you had more time, what would you like to do with it? Alternatively, if what you currently do suddenly took much less time, what would you do with the rest of your time at work? (These questions should also be asked about any other resources that seem to be important.)
- If you were unexpectedly out of contact with the office for several months, what would be the first thing that you would want to know when you returned? What would be the next things?
- Are there any projects, or parts of your work, that you have been trying to do but,



for one reason or another, have not been able to? If so, what are they and why have you not been able to accomplish them?

How do you know when your work is going well? Is there some measure in the work itself (such as the number of customer complaints, or some other measure) that helps you to know when you are doing a good job? (Note that the analyst is not asking whether the person is or is not doing a good job, but rather how she would know when she does. This distinction can be important and may need to be made explicit to the interviewee.) What external measure do you use? Your boss' approval? The opinion of coworkers?

The analyst may not be able to obtain answers to all of these questions in the first round of interviews. The interviewee may need time to think about some of the questions, while others may take so long to answer that in the interests of time they may be better left to the second round of interviews. The analyst should make note of these items and conclude the interview.

The best amount of time for an interview is 30 to 90 minutes. If the interview takes less time, the analyst has not gathered sufficient data. No job is so simple that it can be adequately described in such a short time. On the other hand, an interview that lasts for more than about 90 minutes becomes very tiring for both the analyst and the interviewee. The analyst can easily start to suffer from having to assimilate too much information at once. It is much better to end the interview without having gathered all of the information described above and go back to collect it later, than to try to continue in a tired, overwhelmed state.

### **3.5 Observation**

Another useful tool for the analyst is observation. Self-reporting, the technique primarily used in this methodology, can be somewhat inaccurate, especially with regard to frequencies of events or activities. While the structure of the interview and the two round process are designed to overcome some of the problems of self-reporting, and do so rather well,<sup>14</sup> where ever possible it is best to try to confirm what the interviewees have been reporting with some direct observation.

There are several techniques for observing. For example, part of the reason for doing an

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<sup>14</sup>Helped by the fact that people are better at reporting the logical flow of events than the frequency of events.

interview at the interviewee's desk is to take advantage of interruptions. The analyst should encourage the interviewee to permit interruptions, and should watch and listen carefully, though unobtrusively, throughout an interruption. Naturally, if the interview starts to become too disrupted by interruptions, the analyst should encourage the interviewee to try to reduce the frequency.

Another technique for observation is to arrive early for interviews. If the office is somewhat open, the analyst can use the waiting time to watch office activities. Still another technique is for the analyst to take some time after an interview, with the permission of the interviewee, to go over her notes. This serves the double purpose of allowing the analyst to actually put her notes in order while the material is still fresh in her mind, and to watch what goes on. A final technique, the most obvious, is to schedule some time specifically for the purpose of observation, and to watch the office operations during that time. If, from the interviews, it becomes obvious that there is a period of the day or week that is likely to be most "typical", then that time should be chosen. In most cases, however, the time can be chosen fairly randomly, so long as it is not likely to be abnormal in some way.<sup>15</sup>

Since the purpose of the observation is simply to verify that the reports given by the interviewees are relatively accurate, the total observation time in an office need not be very long. The analyst should do enough observation to convince herself that there are no activities going on in the office that have not been described. Observation can produce several kinds of results. These can be categorized as:

- Different uses of time. People may be spending more time in one task, such as typing, than the types of work they have described would seem to indicate. The analyst should ask the people involved about what might be causing this. The usual answer will be that the activity is one that they had forgotten to tell the analyst about.
- Social organization. While many of the details of the social organization of the office can only be determined after much more extensive observation, some of the more obvious points may begin to appear even in the small amount of observation that is recommended. For example, observation may indicate that there is one person to whom the others turn for help with questions. If so, this person fills an important role in the structure of the office, and some note should

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<sup>15</sup>Common sense will indicate that certain times are likely to be bad almost anywhere, for example Friday afternoon in the summer, or the morning after a long weekend.

be made of it so that future changes can take it into consideration.

- Symptoms of problems. The analyst may observe that the office personnel spend significant amounts of time in doing certain fairly trivial tasks such as copying or filing. If so, this is certainly a symptom. There are other types of symptoms that may be observed, including odd communication problems,<sup>16</sup> and physical organization.<sup>17</sup>
- Data for change. The analyst should note those physical characteristics of the office that might cause problems for change. For example, many offices are extremely crowded and finding places to put terminals where they will be easily accessible by the people who need to use them can be a problem. If the office is already noisy, the addition of new office equipment could make the office unbearable. If the organizational structure of the office is to change, the physical structure may change as well. Depending on how the office is arranged, this may be easy or difficult.<sup>18</sup>

Observation may not be possible or useful in all offices. If the office consists of a number of people in closed offices with secretaries outside their doors, watching the doors is not likely to prove useful. Alternatively, there may be some historical, political, or social reason why direct observation would cause bad feelings in the office. In most cases, however, by using one or more of the techniques suggested above, at least some observation can be performed.

### 3.6 Interview Outside People

After most or all of the interviews have been performed with the office staff, the analyst should start interviewing people from outside the office. Most of these people will have been identified in the manager interview, but in the course of interviewing the office staff, it may have become apparent that other outside people should be interviewed as well. These additional people will meet the same criteria as those identified by the manager, that is, they will be people who use products of the office or who have frequent contact with the office.

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<sup>16</sup> Do people spend a lot of time talking to others for unexplained reasons?

<sup>17</sup> Do people leave their desks a lot to accomplish their work? Does the traffic pattern of the office seem congested? Is there a noise problem? And so on.

<sup>18</sup> Note that OADM does not really address the problem of facilities. Nonetheless, some information can be collected, particularly if there are obvious problems in this area.

The purpose of these interviews will be to determine the use and usefulness of the office's products and to look for symptoms or opportunities from a different perspective.

### **3.6.1 Before the interview**

Before each interview, the analyst should review her knowledge of the office to set the context for the questions. The analyst should think about how the person to be interviewed interacts with the office and should prepare a list of questions about that interaction. If the person uses some output of the office, the analyst should think about questions whose answers measure the usefulness and quality of the product. For example, if the person uses a report that the office produces, the analyst might ask questions about how the report is used, what would happen if the report were no longer produced, how the interviewee would change the report if change were possible, and so on.<sup>19</sup> Finally, as usual, the analyst should make an appointment to see the person.

### **3.6.2 Conducting the Interview**

The analyst should start, as always, by introducing herself and explaining the purpose of the interview. The analyst will need to explain the study and the reasons for it, since the interviewee will probably be unaware of the study. The presentation of the study will be important since without some care, unfounded rumors about studies of this kind could quickly start circulating throughout the organization. Since a OADM study may someday take place in the office of the interviewee, the analyst should strive to lay a good foundation.

The analyst should next explain exactly what kinds of things the interview will cover. If the discussion will be about a product or service of the office, the analyst should say so. If the purpose of the interview is simply to talk with someone who has frequent contact with the office to look for symptoms of problems, the analyst should stress the positive aspects of change for the office and the interviewee's role in helping that change. Once the area for discussion has been defined, the analyst should ask the interviewee what she has to say about that area. If this produces too general a response, or too undirected a response, the

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<sup>19</sup>The purpose of these questions is not to perform a complete value analysis [45] but rather to get a very rough idea about the usefulness of the product or service.

analyst should start asking questions that she has prepared. By keeping in mind the exact types of information that are being sought, the analyst should be able to structure the interview in a meaningful way.

An interview of this type should take about half an hour. The information being sought is limited and fairly specific. A significantly longer interview suggests that the analyst is getting irrelevant detail. While, for reasons of building rapport, the interview should be conducted in person, where this is not possible, this type of interview may be conducted over the telephone.

### **3.7 Analysis**

The analysis of the data obtained through the interviews should start immediately after the first interview. This analysis will consist of two parts. The first stage of the analysis will involve fitting the data into the step/event/state model. During the second stage, the analyst will be looking for less structured material which will include the causes of the problem symptoms observed in the office, measures of various types, and the intention behind the procedures.

#### **3.7.1 Procedure Analysis**

The procedure analysis should start as soon as the analyst thinks she has enough data to do so. This usually occurs after the first two or three interviews, but the exact timing depends on the complexity of the office and the amount of background that was available to the analyst beforehand. The analysis is closely tied to the draft description, and many analysts have found that the process of trying to fit the known material into the format specified by the description, forces them to perform the analysis. The format of the draft description is given in section 3.8. For those people who prefer to have organized material from which to write, the following types of lists, constructed as the interviews progress, may be of use.

- Office Functions and Objects
- Procedures for each function
- Mainline outline for each procedure

- For each procedure step, the following information:

- \* what event initiates the step
- \* what is done in concrete terms
- \* what terminates the step
- \* what are the timing constraints
- \* what are the inputs and outputs
- \* what are the sources and destinations
- \* which databases and "mental lists" are used
- \* how (and what) special equipment is used

- Databases and mental lists

After the first round of interviews, the analyst will not have all of the information that is required for a complete description. One of the purposes for doing the analysis is to find out what information is missing, so that it can be obtained during the second round of interviews. In addition to any material that may be missing from the lists above, or that may become obvious in writing the description, the analyst should identify exceptions to procedures or procedures steps. The analyst should then prepare a list of questions for the second round of interviews.

A few words about the analysis itself. The process of deciding how to divide the work of an office into functions, procedures, and so on, is a creative one. There are no rules that say if such and so occurs then it is a function, but if such and so else occurs then it is a procedure. If this were the case, then there would be little need for a human analyst. However, a thorough understanding of the model as presented in chapter 2, and familiarity with the examples that are given there should help the analyst to fit the data into an appropriate framework. In addition, the analyst should remember that there is no "right" analysis, but rather that the purpose of the analysis is to organize the workings of the office in a way that is simple and easily understood. The exact details of the analysis will depend to some extent on the context of the study, the goal of the study, and the context of the organization which is being studied. For example, as has been said before, the functions in the MIT Admissions

Office may be defined differently if one is looking at the office by itself or at all of MIT.

### **3.7.2 Other Analysis**

In addition to understanding *what* is done in an office, the analyst should know *how much* of it is done, *why* it is done, what its relative *importance* is, and what *problems* are encountered in doing it. This section considers these remaining areas of analysis.

The two easiest items to analyze are the questions of how much and why. For each of these, the analyst must simply obtain the answers to the following questions:

- Why is this function performed? What would the results be if it were suddenly not performed?
- Why is this procedure performed? How often? How long does it take? How many of the objects, about which this procedure is concerned, are in process at any given time? Are there periods when this procedure is performed more often, or less often, than usual?
- Why is this procedure step performed? What would happen if it were not performed? How long does this step usually take in both actual and elapsed time? How often does something go wrong, that is, how often does an exception occur, in this step?
- Why does this object exist? What would happen if it were eliminated? How many of this object are there at a time? How long does this object usually "live"?
- Why does this database exist? What is it used for? How big is it? How often is it accessed? Does it change size over time? What kinds of items does it contain? Text, numbers, paper, etc? How is the information stored? Electronically, files, microfilm, etc?

These questions are tied to the office model that was developed in the first stage of the analysis. The analyst will probably not have all of this information after the first round of interviews, but, as always at this stage of the analysis, the purpose of this list is to point out areas where further information needs to be gathered. A few final words about the importance of this material. Understanding why a thing is done will be vitally important in later stages of the automation process, if they come to pass, because nothing can be changed without understanding the implications of the change. Therefore, the "why" information must be gathered completely and thoroughly.

The remaining two areas for analysis are somewhat more difficult. To review, the importance of particular office activities or particular pieces of information must be understood for two reasons. First, without understanding what is important and what is not, changes could be made that would be disastrous. Second, if changes are to be made, then the best place to start will be in those key areas whose improvement will have the largest impact on the functioning of the office. This implies that one must know which areas have the most impact on overall office performance.

The next question that arises is how one determines the importance of various activities in the office. There are two answers to this questions. A function, procedure, or activity is important to the office if it is critical to the performance of the entire office. This idea derives from the concept of Critical Success Factors [50, 7] except that it is applied to the entire office, rather than to individuals. Some questions for the office manager which will elicit this information have been suggested in section 3.3.7. Additional questions for the office staff have been suggested in section 3.4.2. The analyst will have to sort through the responses to these questions, trying to determine what the success factors are for the office. These factors will qualify as areas of importance.

Another way of determining the importance of a function, procedure, or activity, is to look at its value to the organization. Various methods have been developed to do this, including Overhead Value Analysis [45]. These methods involve significant effort from a large portion of the organization, something which is outside of the scope of an OADM study. However, an attempt can be made to replicate OVA on a small scale. In the interviews with the people outside the office, as described in section 3.6, the analyst asks questions about the use of the products and/or services produced by the office. The responses to these questions can be used to estimate the relative values of the procedures, functions, and activities that produce these products and/or services.

The last step of the analysis process is to look for the problems which underlie the symptoms that have been observed. The symptom/problem model says that several symptoms can be the result of one problem, so that while each symptom will have a problem, there will be fewer problems than symptoms. The analysis consists of trying to determine the set of underlying problems. As with most analysis, this is essentially a creative process. The method to be used consists of asking *why* the symptoms occur. The method is iterative, in that once the



analyst knows why the symptom occurs, she should then ask "why" about the reason. The analyst will keep asking why until the answer becomes meaningless or unchangeable in the given context.

For example, the analyst might have found that certain forms are not being processed in a timely way. In the course of other interviews in the office, the analyst finds that this is because the person who is supposed to do it is never in the office. These symptoms would suggest that the analyst should ask why the person is never in the office. One answer might be that the person is having severe personal problems and has been working fairly short hours, with the knowledge of the office manager, until the crisis is over. This, then, would be the underlying cause, since asking about the person's personal problems is far outside the scope of the study. The changes that this problem might suggest could range from doing nothing because it is a temporary problem, to rearranging the work of some other people in the office so they can help with the backlog. Another reason for the person's absence could be that other parts of the person's job require the person's presence at other locations. The analyst could ask several questions here. Why does this other part of the job take so much time? Why is the person responsible for both these tasks? Has there always been a problem in this area or has something changed recently? If so, what? Eventually the analyst will reach a point where further questions are meaningless. The last reason reached will be the underlying problem.

The problem analysis process as outlined above cannot be performed completely at this stage of the study process. During the interviews, the analyst will have gathered information about symptoms from direct responses to questions, and from observation. The analyst should try to apply some common sense and her knowledge of the office to the symptoms to see whether she can think of any potential causes. Some of the answers may be obvious, and in many cases the interviewees will have given the reason. For some symptoms, however, the reason may not be at all obvious given the available information, so that at this stage it may not be possible to do much true analysis. The analyst can, nonetheless, think about who, in or out of the office, might know what is causing a particular symptom. The analyst should prepare a list of symptoms, people who can help with each symptom, and questions about each symptom, to be used in the second round of interviews. In addition, the analyst should prepare questions that will confirm or deny hypotheses the analyst has made about underlying problems.

Throughout this stage of the analysis, the analyst should remember that the definition of problems will depend on the judgment of the analyst and of the office staff. Unlike a pure description, which makes no value judgments, this part of the process is normative. The available alternatives, the personalities of the people involved, and the corporate environment will all contribute to the definition of some things as symptoms or problems while others go unnoticed. In many organizations, the assumption is made that most, if not all, employees should have a telephone. Its presence is not likely to be questioned. One can imagine another environment where the telephone is not so prevalent and where many symptoms relate to its presence or absence.

### **3.8 The Draft Description**

The draft description has two parts. The first is the description of how the office currently works and the second is a description of the problems encountered in the office. Both parts of the description have standardized formats which will be described below. If it is at all possible, the analyst should start writing the description as soon as she has finished the first two or three interviews with the office staff. Even if some of the material that is included in the early stages later turns out to be incorrect and must be changed, everything should be written down as soon as possible in order to avoid losing any information.

#### **3.8.1 Current Procedures**

The first chapter of the procedure description should have sections describing

- the mission of the office
- the organizational context of the office
- any special information about the overall physical environment of the office
- a brief overview of the major office functions

The purpose of this chapter is to summarize the background material that the reader will need to understand the function and procedure descriptions that follow. Most of the material for this chapter will come from the interview with the manager.

The next chapter is optional. It will describe any information that applies to the entire office and that requires a longer description than is appropriate to the first chapter. If this chapter is included, the material in it should be necessary to the reader's understanding of what follows, but not familiar to the reader. For example, in the Student Loan Office, a description of the different types of student loans, their sources, and timing requirements, immensely aids the understanding of readers who are not familiar with student loans. The analyst should consider the expected audience of the description, and what that audience is likely to know or not know. For example, data processing specialists who might use the description may not be familiar with the nature of the business process. The types of information that have been found useful to include in this chapter are

- information about the primary object, if the object has aspects that are important but not obvious to the expected readers, as in the student loan case above.
- information about a piece of technology that is important to the current functioning of the office but which may not be familiar to the readers. For example, a large online database system. In this case the analyst would describe the database, the information in it, and the typical uses of the information, always giving examples. This would be a longer and much more detailed description of the database than would otherwise be included, and this extended description would be done only if the database was of central importance to the entire office.
- historical information about the office. If, for some reason, the history of the office has had a very large effect on the way that the office currently works, then information about that history should be provided for the reader in this chapter.

In summary, this chapter is optional, and, if included, contains information about the environment of the office that is vital to understanding how the office works.

The next several chapters are devoted to the office functions. Within the chapters are sections for each procedure. These sections may vary from being a single paragraph for a very short procedure, to containing several subsections describing variations of a long and complicated procedure. For each procedure, the analyst should be sure to include not only what is done, but why it is done, and figures as to how many, how much, how long, etc. The structure for a procedure should be something like the following

- description of the procedure in simple step/event/state terms,
- comment on why the procedure is performed,

- explanation of any major exceptions associated with the procedure.

These three parts of the procedure description should be made as obvious as possible. Since it can be difficult to write clearly and still include all the necessary information, the analyst include quantitative information and descriptions of exceptions in whatever way results in the best prose.

For the sake of generality, procedure descriptions should refer to people by some descriptive job title rather than by name. For example, the person who is responsible for most of the accounting functions in an office might be referred to as the Accountant. The same person may also act as a special assistant to the office manager. In a procedure where she is acting in that capacity, she might be referred to as the Manager's Assistant. This formality serves two purposes. It avoids confusion between people and the roles that they play in the office. Two people, who share a role may choose to divide the work in a certain way. That division is an artifact of the current implementation and might change if the role is changed. The other reason for using titles rather than names is that one title can refer to several people who all fill the same role.

The last chapter of the description discusses the exception handling techniques that apply to the entire office. This information will be obtained from the manager in the final interview.

The description will have appendices. There are a number of possible appendices and which ones are included will depend on the purpose of the study. Some suggested appendices are:

- A list of the major databases, logs, and lists in the office. Information about each including the general size and format, the current physical form, the type of information included, and the typical use.
- Copies of the principal forms used by the office. These are often useful for reference.
- A glossary. This is particularly important if the office uses a large number of terms whose meanings are not obvious to readers from outside the office. The glossary can define the terms, which can then be used throughout the description.
- A table matching titles with people. Who does what in a procedure is indicated by the use of job titles. If work in the office is to be reorganized, it will be important to know which titles belong to which people.

- Results of the quantitative questionnaire. Since it may be difficult or inappropriate to include much of this information in the text, it should be put into an appendix.
- Samples of the questionnaire and log which constitute the quantitative questionnaire.<sup>20</sup> These will provide a basis for comparison across studies. In addition, questions may arise later that can be answered by reference to the original questionnaire.

### **3.8.2 The Symptom List**

The list of symptoms and causes within the office should be separate from the description of the current operations. The structure of the symptom list closely follows that of the description of current operations. The first chapter of the list should contain those items which apply to the entire office. The remaining chapters and sections should include only those symptoms and problems that apply to the function or procedure described in the equivalent chapters and sections of the current operations description. A problem symptom should be listed for each procedure or function to which it applies. In addition to the symptoms and causes, answers to questions about what would happen if the function or procedure were to be eliminated or improved should be included in the appropriate chapters and sections.

## **3.9 The Quantitative Questionnaire**

After enough analysis has been done to understand the basic structure of the office, the analyst should prepare and administer a quantitative questionnaire. The purpose of this questionnaire is to obtain the figures that will be necessary for cost justification of any changes to the office. In addition, answers to some of the questions may point out areas of the office which require further investigation.

The quantitative questionnaire has two parts, the questionnaire and the log. The questionnaire collects data about activities such as mail handling, typing, file storage, etc., and relies on self-reporting. The log collects data about the actual number of objects that are

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<sup>20</sup>The questionnaire and log are described in 3.9.

handled for each step of a procedure during a specified time period.

### **3.9.1 Questionnaire Preparation**

The analyst will prepare the questionnaire by reviewing the list of possible questions and ideas contained in Appendix C. Keeping in mind any expected changes that may follow the study, the analyst should select those questions that are applicable to the office being studied. Since the more specific the question, the more useful the answer, the analyst should rewrite the questions to make them as specific to the office as possible. For example, a question which asks generally about the use of databases might be rewritten to ask about each major database in the office. In addition, all questions should be asked within the context of a procedure. Some questions, such as those that ask about specific documents, are already in this form. Other, more general questions, such as those about communication, should be asked once for each procedure. The list of questions in Appendix C is intended to provide a starting point for the analyst, but it is by no means complete since it is impossible to anticipate every circumstance. Questions have been included which will provide quantitative data for the most common types of cost justification but if there are other useful quantitative measures for this office, appropriate questions should be included.

Since certain types of questions will be appropriate for only some of the office personnel, the analyst may choose to prepare several questionnaires. The most common division is to have one questionnaire for professionals and managers and another questionnaire for secretaries and clerks. However, there may be other groups in the office for whom a separate questionnaire would be appropriate.

When the questionnaire has been prepared, the analyst may want to test it on a few of the office personnel to be sure that the questions are easy to understand and unambiguous. After any final changes have been made, the questionnaire should be administered to the entire office staff, including the office manager.

### **3.9.2 Log Preparation**

While preparing the questionnaire, the analyst should also be working on the log forms. These forms can be designed to obtain several kinds of data and the analyst's first step will be

to decide what information to collect. The log can record the number of occurrences of events within a procedure, thereby recording the number of objects that entered a specific step within some time period. Alternatively, the log can follow particular objects through an entire procedure, showing the elapsed time at each stage of processing. A third type of log collects information about exceptions, including what they are and, by looking for patterns, their frequencies. The analyst should try to collect as much data as possible, but it may not always be possible to use all of the logs. The analyst should have some rough data from the initial interviews about approximately how long it takes for an object to go through a procedure and about approximately how many objects are in process at once. If an object takes many months to go through an entire procedure, then following individual objects may take too long. One alternative is to look at parts of the procedure. Another alternative is to not gather this information.

General outlines for the log forms, filled in with examples, can be found in Appendix C. The analyst should already have analyzed the structure of the office procedures with steps, events, and states as described in 2.1 and 4.7. Preparing the log forms is simply a matter of putting that structure into the correct headings on the page, making at least one log for each procedure. The analyst will also need to identify the appropriate people to keep the logs. These should be people who participated in the first round of interviews and should be the people who are performing the procedures. When the logs have been prepared, the analyst should give each log to the appropriate person with instructions about how to keep it. The time period for the log will depend on the office, but will probably be at least a week. The time should be chosen to be as typical as possible, not a holiday, for example. In addition, the analyst should try to arrange to have the logs kept between the rounds of interviews so that the results of the logs will be available for analysis before the second round of interviews. This way, if something unexpected appears on the logs, the analyst will have a chance to ask about it.

### **3.9.3 Analysis of Results**

Since the results of the questionnaire and the log are intended primarily to help with the cost justification process, there is relatively little analysis to be done. Where it is meaningful, the analyst may want to aggregate responses for the entire office. In particular, the results obtained from the logs may need to be put together to give an overall picture of the office.

The answers to the questionnaire and the data obtained from the logs should be incorporated into the description of current operations where they apply. However, having a coherent description is more useful than having a description that consists mostly of numbers, so any data that cannot be easily incorporated into the description itself should be presented in an appendix. In addition, for future comparison of studies of many offices, the questionnaires themselves should be put into another appendix.

Although it is not the main purpose of the questionnaire or log, their results can be analyzed in another way. The analyst should go through the responses looking for anything that is unexpected. For example, several people might respond that they use a certain piece of equipment that the analyst was not even aware existed in the office. When the analyst finds an unexpected result, she should make a point of asking about it in the second round of interviews. Another form of unexpected result might be to find that people say they are doing more of some activity than the analyst had expected. The analyst should try to determine whether the people really are spending large amounts of time on the activity and if so, why. Some of these results will simply point out holes in the analyst's understanding of the office while others may be, or suggest, problem symptoms. Where the results from the questionnaire and log do suggest symptoms, these symptoms should be included in the symptom list.

Finally, one other form of analysis that the analyst should apply to the questionnaire and log results is figuring out why the responses are as they are. For all of the responses, the analyst should be sure that she understands why. For example, the analyst should know why incoming mail and phone calls are handled as they are. Is it because that is how it has always been done? Is it because of a lack of personnel? Is it because the secretary provides certain necessary information? Because the person handles a large amount of confidential material? And so forth. The analyst should include this information in the appendix that contains the questionnaire and log results.



### **3.10 Iterate the Interview Process**

The next step of the methodology is to circulate the written description of current operations back to the people who were interviewed. The analyst should give the interviewees time to read the description before making appointments to see the interviewees for a second time. Some of the interviewees may not need a second interview if the analyst is confident that she has obtained all of the necessary data and if, after reading the draft, the interviewee agrees that she has no more to add. However, most of the people will have to be interviewed twice. The second round of interviews provides opportunities for the analyst to fill in holes in her data and for the interviewees to give feedback on the data that have been gathered so far.

The format of the second interview is very much like the first. The analyst should ask the interviewee for general comments first, before going over the specific comments. Once all of the interviewees' comments have been discussed, the analyst should proceed to ask the questions that she has prepared. These will usually include questions to gather information that may be missing about procedures, about how exceptions are handled in the procedure, and about what is causing symptoms. The analyst should always ask if the interviewee has remembered any additional details and should conclude the interview by asking if the interviewee would like to see the description again after the changes discussed in this interview have been made.

The interviews in the second round should generally be shorter than those of the first round. In a few cases, where the detail was simply too much for the first interview, the second interview may take a long time and the analyst may even have to go back for a third interview. But on the whole, the second interview should be enough to take care of the loose ends.

### **3.11 Final Review**

When the final version of the draft documents is complete, the analyst should send them to the office manager. After the manager has had time to read them, the analyst should make an appointment. There are several purposes for this interview. The first is to present the results of the study of current operations and to ask the manager about general exception handling for the office. The analyst should ask about what happens when general disasters strike the

office.<sup>21</sup> The analyst should also ask about what operational exceptions are brought to the manager, what she usually does about them, and whether there are any types of exceptions that she must refer to her boss. This part of the interview should not take long, since major exceptions usually come to mind quickly.

The second purpose of the interview is to be sure that the described intentions behind procedures are correct. It will sometimes happen that the office personnel will give a reason that is incorrect or out of date. In addition, if no satisfactory reasons can be given as to why a particular procedure is performed, the manager is the person to ask. The office manager is the final source of answers and authority about these questions.

The third purpose for the interview is to go over the problems/opportunities list. The manager may be able to give additional information that will explain the cause behind some of the unresolved symptoms. The manager may also be able to point out certain opportunities that the analyst has missed. However, the primary reason for going over this list is to see if the manager agrees with it, and to see if any steps have already been taken to correct some of the problems.

The final purpose for the interview is to discuss what the next steps will be. At this point, the usual next step is for the analyst, or someone on the analysis team who has knowledge of the current technology, to propose some possible technological alternatives to those problems for which they are appropriate. The analyst should discuss with the manager the nature of the rough proposal and which of the problems it should start to address. If the analyst can get an idea from the manager about the resources that can be devoted to the process, that will also help to constrain the choices of technology. In any case, the analyst should agree with the manager as to what the next step of the process will be.

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<sup>21</sup>What happens when several people at once call in sick? What happens when the computer system on which the office depends goes down? And so on.

## **3.12 Additional Comments**

This section is devoted to the discussion of a variety of largely unrelated topics that did not seem to fit in easily elsewhere.

### **3.12.1 Continuing the process**

The preparation of the OADM descriptions does not complete the automation process. The remaining steps include

- system design
- cost justification
- system selection
- development of an implementation strategy
- user training
- actual change to the new system
- development of procedures for modifying the system as necessary

OADM provides help for the first two steps, but does not address any of the others. One way to do system design is to collect a group of appropriate people and have a brain storming session. The people for such a group might include the office manager, the analyst, some representatives of the office staff, and appropriate technology experts, all of whom would be familiar with the office descriptions. Since system design is often influenced by external factors, system selection may go on in parallel. Once a system has been designed and/or chosen, it usually must be cost justified. OADM provides most of the quantitative information about the office that is required for this process. This information, combined with information about the proposed system and its impacts, can be used to determine whether or not the system can be justified. The system design, system selection, and cost justification processes are often iterative as various choices are evaluated, and often overlap.

### 3.12.2 More on questionnaires

Two kinds of questionnaires have already been discussed as part of the study process, a background questionnaire and a quantitative questionnaire. While these two questionnaires should be part of every study, there are other types of questionnaires that may be useful in special circumstances. One such questionnaire would be used to verify that parallel parts of an organization have similar structure. This questionnaire is constructed after an office had been studied. It is essentially a condensation of the description of current work, perhaps presented as a flow chart. The respondents would be asked to indicate areas where their work differs significantly from the structure that is presented. This questionnaire would be used to verify that several offices that are thought to be organized similarly, in fact, are. For example, if a company wanted to study all of its regional sales offices, a detailed study might be done of one. A questionnaire or form showing the structure of that office could be circulated, with appropriate instructions, to the other offices, to see if they are indeed similar. One would expect to see some differences, but the basic structure might be very much the same. If it is, then use of the quantitative questionnaire should provide sufficient information for further action without having to study the office in detail. If the office shows large areas of difference, then a study may have to be performed.

A similar type of questionnaire employs the same idea to be sure that many people with parallel jobs, for example accountant executives whose responsibilities are divided by area, actually perform them in much the same way. The analyst might interview a few of these people. If the analyst suspects that what the others do is not equivalent, but does not have the time or resources to interview all of the people, the analyst might prepare a questionnaire. This questionnaire would be based on the structure of work that the analyst had observed and the results would show whether the other people use that same structure. This type of questionnaire can also be used even if differences are not suspected to verify absolutely that there are no major differences. The overhead involved, however, is such that before this questionnaire is used there should be a good reason for needing the verification.

Another type of questionnaire that can be used in conjunction with an OADM study is one that is designed to help the analyst understand the social organization of the office. This is an area that is not emphasized in OADM, but that is nonetheless important in the process of planned change. The personnel departments in most organizations are knowledgeable in this

area and their expertise can be employed in trying to understand how various possible changes in the office will effect the office atmosphere and the attitudes of the office personnel.

If the analysis of symptoms, problems, and the quantitative questionnaire so warrants, the analyst may also want to devise further quantitative questionnaires or log forms. For example, if there is a problem with the use of a particular database, the analyst may want to create a questionnaire to find out more about the database and a log to find out about its actual usage. The objective would be to obtain much more detailed information than would be available from the quantitative questionnaire. This information would depend on the nature of the problem, but might include details of the organization of the database and patterns of use.

### **3.12.3 Large organizations**

There are several approaches that can be taken to studying a large organization with OADM. It is important to remember, however, that OADM is *not* designed to give a quick overview of a large organization. There are other types of methodologies that can do this much more quickly and easily than OADM. The occasion does arise, though, when the detailed functioning of an organization larger than a single office must be understood. Depending on the time constraints, this problem can be dealt with in one of two ways. The first way is to study each of the parts sequentially. This approach is best when there are limited resources for doing the analyses, and when elapsed time is not a major factor. Each office, or other appropriately sized piece of the organization, is studied separately by a small group of analysts. The analysts produce descriptions of the individual offices. At the end, a document may be produced which describes the entire organization, showing how the functions fit together, how the organization communicates with other organizations, and so on. Once the organization is completely understood, along with its overall goals and consistent problems, large and small systems can be specified which take advantage of the economies present in combining the work of several offices. One serious problem with this approach is that if the studies take a significant amount of time to complete, the details of the offices studied at the beginning of the process are likely to have changed by the end. If the process takes too long, and the organization changes quickly, the entire study can become out of date before it is even completed.

The second approach to studying entire organizations is to do many studies in parallel. This approach is appropriate if there are sufficient resources to do all of the studies at once and if the time constraints are short. In this approach, the organization is divided into pieces of a reasonable size for one person to study. This implies a need for a large number of analysts. OADM can meet this need, however, since it is designed to be easy to learn. If a sufficient number of untrained people, who have the right personal characteristics, can be found, they can be taught to use OADM. They can then study the offices in parallel, with the available trained personnel being used to monitor their progress and to help with any problems that may arise. Since the process of doing an OADM study has several easily definable stages, the task of monitoring the analysts can be made manageable. By making use of meetings after each stage to discuss what has been accomplished and what will be done next, the people who monitor the analysts can be sure that everyone is progressing as planned. These meetings can also be used to continue the education of the analysts. When the studies are complete, the analysts can meet to look for integration possibilities. Throughout the remaining stages of the automation process the analysts can serve as resources for information about their offices. The major problem with this approach is that the analysts who are doing the studies will only be doing one study. This means that the motivation for learning OADM and completing the study is quite different from that of an analyst who will be using OADM over and over again as one of a set of tools.

#### **3.12.4 The use of forms**

While the use of questionnaires, or forms, to be filled out by the office staff, has already been discussed, the use of forms to aid the analyst has not. Most of the forms that have been developed so far are intended to aid the analyst during and after the interview. There are two kinds of forms. Those that are actually used during the interview, and those that are used to help with the analysis process. The interview forms are really checklists that remind the analyst of all the things to ask during an interview. These forms can be tailored to a specific organization. Sample checklists appear in Appendix A.

The second type of form, found in appendix B, is used by the analyst to aid in the analysis process. These forms provide a place for the analyst to record information about functions, procedures, objects, exceptions, databases, and so forth. The analyst can use these forms as worksheets to aid in thinking about the structure of the office. The forms can also be used to

provide a record of what was learned from each person who was interviewed. If several analysts are working on the same office, or if a study is interrupted, to be started again at some later time, such documentation can be extremely valuable.

# Chapter Four

## Evaluation

Anyone can propose and develop a methodology, but is the methodology good for some purpose? This chapter will attempt to answer that question as it applies to OAM and OADM.

The designers of OAM proposed that it could be useful for several purposes. OAM could be used as a tool for:

1. Teaching analysis techniques to new analysts
2. Gathering the information required to decide whether or not to automate an office
3. Gathering the information required to rationalize or reorganize office work
4. Gathering the information required to design an automated system
5. Writing an office procedure manual
6. Collecting a library of consistent case studies for use by system designers

Since OADM is largely a superset of OAM, all of these purposes apply to OADM as well. The major difference between OAM and OADM is that OADM serves these purposes more completely than OAM. The following chapter will examine how useful OAM and OADM are for each of these purposes. For clarity, OAM will be discussed first, followed by a discussion of how the new material in OADM changes the conclusions reached about OAM.

### 4.1 Basis for Evaluation

There are several ways of evaluating how a methodology meets its objectives. The first is to look at the methodology to determine which pieces clearly apply to each objective. Based on the internal evidence of support within the methodology for each objective, a conclusion can be reached. Another way to evaluate a methodology is to use it, then examine the results, in as many ways as possible, to try to determine whether or not the methodology was



successful.<sup>22</sup> Both of these methods will be used in evaluating OAM and OADM.

#### 4.1.1 OAM

Evaluation of OAM and its objectives began in 1980 with a course. A number of companies were invited to send people to a free, 3-day course teaching OAM and the Office Specification Language (OSL). The primary purpose of this course was to persuade people to use and provide feedback on OSL. OAM was taught as a data gathering tool and supplement to OSL. Instruction in OAM consisted of two lectures, totalling about 4 hours, and a 3-hour workshop. The rest of the course was devoted to OSL and background information. However, the office model that is central to OAM is the same as the model used by OSL, so much of the course covered material necessary for OAM. The course was taught twice,<sup>23</sup> to people from 7 companies and from 5 different parts of MIT. The course was designed to encourage people who attended to get started doing studies using OAM and OSL.<sup>24</sup> Much, although not all, of the evidence for how well OAM serves the suggested purposes, was obtained from the results of this course.

True evaluation of OAM's usefulness as a tool for deciding whether to automate, requires that a number of studies be performed which result in such a decision. Evaluation of OAM as a tool for reorganizing office work and for system design require that changes occur as a result of the studies. All of this requires time. After nearly two years, enough time has passed and the results of using OAM should be clear. From following the results of using OSL, it was known which organizations had actually performed studies. Telephone interviews were done with people from these organizations about their experiences with using OAM and to find out whether the studies had been followed by any changes.

Of the seven companies that participated in the OAM/OSL courses, four actually did office studies. These companies were an insurance company ("A"), a research laboratory ("B"), a consumer products company ("C"), and a chemical company ("D"). Company "A"'s studies

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<sup>22</sup>For OAM and OADM, there are two stages of the automation process at which one can look for results: after the study has been performed, and after the implementation of any suggested changes has been completed.

<sup>23</sup>In November, 1980 and January, 1981

<sup>24</sup>For results of the course with regard to OSL see [32].

were not available for further inquiry. An employee from company "B" studied a graduate school admissions office and a volunteer organization's membership management unit. Companies "C" and "D" performed studies in their engineering divisions.

The analysts<sup>25</sup> who performed the studies were all interviewed. Additional feedback was obtained from managers who were associated with a number of the studies. Each of the analysts was asked the following questions:

- Did you find OAM useful? Would you use it again?
- Which ideas from OAM do you consider the most important?
- What would you change about OAM? What would you like to see added?
- After your trial of OSL/OAM, was the office that you studied automated? Why or why not?
- If so, did the OAM description or study influence the results? In your opinion, was the influence positive or negative?
- Have you, or other people in your organization familiar with OAM, used it for other projects? If so, what kinds of projects?
- Do you, or other people in your organization familiar with OAM, use ideas from OAM in doing studies? If so, which ideas?

The results of the studies show that OAM is useful for several purposes. Each study will be discussed under the purpose which it best illustrates. The analysts' general comments will also be included in the discussion of the purpose to which they best apply. A few comments and study results do not fit any one purpose. These have been included in 4.8 as general discussion.

#### 4.1.2 OADM

Evaluation of OADM is based on five studies performed at a major Central American bank.<sup>26</sup>

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<sup>25</sup>The term "analysts" is used to refer to the people who actually did the study and does not imply that these people had any training prior to the OAM/OSL course.

<sup>26</sup>Prior to this experience, one study was begun in the MIT Laboratory for Computer Science administrative offices. This study was not completed, however, due to a sudden turnover of personnel in the office.

At the time that the opportunity arose to test OADM at the bank, the bank was undertaking a massive automation effort and intended to use OADM to study several offices, perhaps as many as ten or twelve. This site was not ideal since bank personnel would have to be taught the methodology through a language barrier, but it was the best available due to the number of studies to be produced. A course was prepared, based on the then current state of OADM, and was taught to the bank personnel. Although the people who attended the course were supposed to have performed the studies, even the best laid plans fail. It turned out that the people who attended the course then taught the material to another group of people, summer students, who then actually performed the studies. This double transmission, along with the problems of translation from English to Spanish, makes it difficult to know how much of the material was successfully transmitted.

As part of a related effort, the bank had undertaken a study to determine the central facilities needs of approximately 40 offices, including those that were to participate in the OADM studies. The data for this study were gathered through questionnaires and followup interviews. Knowing that OADM studies would follow, the facilities questionnaire was designed to include some of the questions that would be asked on the quantitative questionnaire. This provided a test for the use of the quantitative questionnaire, but the test was not ideal since the facilities questionnaire was primarily designed for another purpose. In addition, the questionnaire preceded the OADM studies and so could not make use of knowledge about the structure of the office.

The first study to be completed was translated into English for comments. It was critiqued and returned to the bank. This feedback provided a chance to correct some of the material that had been lost in transmission. In the end, the results from five studies were made available in English. The results of these studies provide the basis for evaluation of OADM. Since OADM continued to develop after the bank studies were underway, a certain amount of what was learned from these studies simply confirmed that previous directions of development had been incorrect.<sup>27</sup> Most of the results, however, were inconclusive, due to the language barrier.

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<sup>27</sup> For example, in teaching the OADM course, it had become apparent that thinking of OADM as having several parts, OAM, success factors, symptoms and problems, and questionnaires, was misleading. The results of the studies showed this confusion. The various parts of OADM have since been integrated.

The external basis for evaluating OADM is limited by the fact that it is new. Not enough time has passed for the completion of any automation efforts that may follow OADM studies. In addition, since OADM is so new, relatively few OADM studies have been performed. However, sufficient experience has developed to allow evaluation of OADM as a teaching tool and to allow partial evaluation in other areas as well. The basis for internal evaluation, that is, the evidence presented by the methodology itself, has been available since the methodology was developed.

## 4.2 Teaching Tools

The original designers of OAM realized that new analysts often learn through a process of trial and error so that training a good office analyst can take time and may involve mistakes. If OAM is teachable and learnable, and can provide the analyst with a series of useful skills and tools, then the learning time, and the number of false steps along the way will be reduced. The questions thus arise, is OAM teachable and learnable? Does OAM provide the analyst with useful skills and tools? The first of these questions can be answered by attempting to teach OAM to a variety of people. The answer to the second question will depend on how useful OAM is for other purposes.

The OAM/OSL course taught OAM to a fairly large number of people and provided a chance to evaluate how easy or difficult OAM is teach and learn. At the end of the course, the attendees filled out questionnaires about course material and presentation. Although most of the questions were about the OSL part of the course, some questions did ask about OAM. These questions, and the answers where they could be summarized, included:<sup>28</sup>

- On a scale of 1 (poor) to 5 (excellent), indicate how much you feel you learned from the OAM lectures. (Avg. 3.5) The quality of the presentation. (Avg. 4.1) The effectiveness with which the material was presented.
- On a scale of 1 (poor) to 5 (excellent), indicate how much you feel you learned from the OAM workshop. (Avg. 3.3) The quality of the presentation. (Avg. 3.7) The effectiveness with which the material was presented.

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<sup>28</sup>The questions presented have been slightly reworded to accommodate the change of format.

- Please rate the pace of the OAM lecture on a scale of 1 (poor) to 5 (excellent). (Avg. 2.8)
- Please comment on the appropriateness of the time allowed to the OAM lecture. (more-2, less-7, OK-16) To the OAM workshop. (more-0, less-7, OK-14, other-4)
- How well do you think you understand the following aspects of OAM (answer on a scale of 1 (not at all) to 5 (very well)):
  - \* Organizing a study (Avg. 4.1)
  - \* Interview techniques (Avg. 4.2)
  - \* Writeup format (Avg. 3.7)
- Do you feel ready to start using OAM? (yes-22, no-0, mixed-3)
- What do you feel are the most and least important aspects of OAM?
- Would you recommend that others in your organization learn OAM? (yes-17, no-0, mixed-5, no answer-3) Why or why not?

Those questions that relate to the presentation of the OAM material can be used to judge how easy OAM is to teach. The course was one of the first presentations of this material. The lecture was carefully prepared but had not been polished. If the questionnaire respondents felt that the material was well presented, this would be a strong indication that OAM is easy to teach. The questions about comprehension of OAM can be used to determine how easy OAM is to learn. A few of the OSL questions which ask about basic concepts used in OAM must also be included in this assessment. The most relevant OSL question was one which asked respondents how well they felt they understood various OSL concepts including functions, procedures, focal objects, events, steps, states, and exceptions.

The responses to questions about presentation depended on the background of the respondent. Those who had experience in studying offices felt that the lecture was too slow and that the material could have been covered in much less time. This result is not surprising since the lecture was designed to teach people who had little experience studying offices. Those people with little experience considered the lecture to be adequate in length and pace.<sup>29</sup> Most people said that the workshop was of little use, but a few found it valuable for

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<sup>29</sup>This should not be taken to mean that OAM can be taught in 5 hours. The presentation of the office model is not included in this figure.

discussing problems that might be encountered in starting a study. The variation of responses could be due to variation in workshop leaders, but if the attendees were able to understand the material without the workshop, its failure may not be significant. These results indicate that OAM is easy to teach.

The responses to the comprehension questions showed that people had understood the OAM material and felt comfortable with it. Those people who had experience in studying offices considered most of the material to be common sense and thought that too much time was spent on it. Those who did not have experience felt that OAM was very informative and easy to learn. Everyone felt ready to use OAM and would recommend that others in their organizations learn it. Most of the people felt that they understood the OSL concepts. In addition, the instructors felt, based on the questions during the lecture and the responses in the workshop, that OAM had been well understood. Every result shows that OAM is easy to learn.

One other, smaller, experiment confirms this conclusion. The original OAM paper [57], at various points in its development, was given to a new graduate student and to a secretary, with instructions to do a study. In each case, the person was able to perform a complete study<sup>30</sup> with only a little guidance from more experienced people.

All of the arguments for the usefulness of a teachable and learnable methodology apply equally well to OADM. If OADM can be easily taught and learned, it can be useful tool for training office analysts. OADM has been taught to the bank personnel of the site where it was tested and the results of this experience, given the language problems and double transmission, provide an excellent test. No questionnaires were distributed after the course, but the results of the studies show how well, or poorly, analysts absorbed the material.

The results have been generally positive. The written descriptions seem to provide an adequate picture of the office procedures and the descriptions of the problems and opportunities within the offices certainly make points that were not obvious from the procedure description. However, the descriptions were lacking in several areas. They did not provide enough numbers for the reader to easily appreciate the relative scales of the activities

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<sup>30</sup>For one of these see [62]. The final description of the other is not available.

and problems. They also did not provide adequate information about either the factors that are critical to the success of the offices, or the relative importance of the procedures and activities. The descriptions did provide some information about why the procedures and activities were performed, but this information was not complete. In other words, while the analyst did not understand some of the material, most of OADM survived the various teaching barriers.

### **4.3 The Automation Decision**

Another possible use for OAM and OADM is as tools for gathering the data needed to decide whether or not an office should make use of new technologies. This decision requires several kinds of information, including information about: the current operating procedures of the office, the available technology and the usual results of its application, the problems with current operations or areas for improvement, the relative importance of office activities, and the quantitative figures necessary for cost justification. Neither OAM nor OADM addresses the issue of current technology. OAM provides information about the current operations of the office, but does not address the other types of information necessary to making the decision. OADM does collect the additional information and so should be a better tool for deciding whether or not to automate an office.

Despite the fact that OAM does not seem to provide sufficient information to make the automation decision, experience has shown that, at least in some cases, automation decisions have indeed been made on the basis of OAM studies. Perhaps the best example is that of a study by an employee of company "B" of a graduate school of management. The school of management study was undertaken to determine whether or not it should make use of computer technology. The conclusion reached by the analyst and the Dean of the school was that while there were some functions that could be automated, there were not any affordable and available hardware and software packages that would meet the school's current needs. In other words, automation could not be cost justified at the time. The analyst felt that OAM was extremely useful in this process, and, apparently, in this case it did provide enough information to make the decision.

Another example arose in company "D". Company "D" did several pilot studies using OAM.

The intention of these studies was not to automate the offices, but simply to try the methodology and specification language and to have some analysts gain experience in using it. One of the studies, however, caused the office in question to decide to automate. Apparently, the OAM study did not provide enough information to decide exactly what should be automated, but it did provide enough for everyone involved to realize that automation would be helpful. Additional data collection efforts were necessary before automation could really begin. The analyst concluded, however, that the written description was useful throughout the automation process, since it provided a common reference that could be used as a tool for discussion.

While OAM provides information about the current operations of an office, which sometimes clearly shows the need for automation, it does not provide any of the other information that is usually required for this decision. OADM is designed to better meet this purpose. In order to decide whether or not to automate an office, one usually needs to know how much it will cost and what the benefits will be. Through use of the quantitative questionnaire OADM collects most, if not all, of the data that are required for cost justification. Another part of the decision requires determining whether or not there are problems in the office that could be solved with automation. The most obvious problems will show in an OAM description, but other problems will not be apparent. OADM makes the identification of problems and opportunities explicit.

#### **4.4 Re-organizing Office Work**

The introduction of new technology is not the only change that can be made in an office. Many times, the most effective changes result from reorganization or rationalization of the way work is performed. One possible use of OAM and OADM would be to provide the information about current procedures and their problems that is necessary to begin this process. Both OAM and OADM provide descriptions of the current operations. OADM provides more detail, in certain important areas,<sup>31</sup> about current operations than OAM, as well as providing a list of problems and their causes.

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<sup>31</sup>For example, OAM makes a point of never describing who does what. Rather, the description simply says what is done. If the description must mention a person, the reference is always to a role or title, not to a particular person. No mapping is given from title to office personnel. OADM also explicitly suggests the use of roles or titles, but it includes an appendix for listing who fills what role. The information is necessary if work is to be redistributed.



One particularly clear example of the usefulness of OAM in work reorganization comes from company "C". One office that was studied in the engineering department found that the process of doing the study showed that many of the procedures were unnecessarily cumbersome. The difficulty encountered by the analyst in understanding the procedures and the complexity of the description clearly illustrated their awkwardness. Changes were implemented over a period of time, ranging from the immediate introduction of a standardized travel arrangements request form to the eventual centralization of most files.

The previous example appears to be a somewhat extreme case in that the problems with current procedures were immediately obvious from the description. Most OAM studies give no indication as to what problems there might be with the organization of work in the office. The designers of OAM assumed that if enough information were supplied about office operations, then ways of improving the operations could be deduced. Experience has shown that this is extremely difficult. OADM addresses this problem by explicitly collecting information about problems and opportunity for change, taking advantage of the office staff's knowledge of the work. OADM also supplies additional information, such as lists of who does what, that will be useful in the process of changing procedures. Thus, while OADM still does not tell the analyst exactly how to go about redesigning office procedures, it does provide more of the information necessary to do so.

Even if OAM and OADM do not tell the analyst or office manager exactly how to reorganize, they do provide a starting point for the process. Additional evidence for this comes from the people who took the OAM/OSL course. All of the people who produced English office descriptions,<sup>32</sup> commented that the descriptions were particularly useful as a starting point for discussions with office personnel about how work could be changed and automation could be introduced. One analyst commented that much of the work performed by engineers could have been done by secretaries but that it was not until the work, and whether secretaries or engineers were doing it, was put onto paper that everyone agreed that this was so.

There are several methodologies that have been developed to help with procedure redesign. One such methodology is described by Main [38]. It suggests ways of representing

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<sup>32</sup>Some wrote descriptions only in OSL.

procedures steps<sup>33</sup> in a flow chart and methods for improving work flow. Another theory that has been proposed for rationalizing office work represents office work in terms of networks and from this looks for improvements. [12, 11]

## 4.5 System Design

System design is an important step in the automation process and one possible use for OAM and OADM would be as a tool to help in this area. OAM and OADM were never designed to be system design methodologies, that is, they were never intended to tell the analyst exactly how to go about designing a system for a particular office. OAM and OADM could, however, provide the information needed by the system designer including information about what problems the system needs to address, thus often implying what technologies to use, how large various pieces of the system need to be, and what peculiarities of the office the system must accommodate. OAM was designed to be the first step in the process of system design, providing the information about current operations that the system designer would need in the early stages of the process. From the information provided by OAM, the system designer would be able to determine what technologies might be applicable in the office, but would not have enough information to make even a rough system design. OADM goes further in providing most of the information, including what problems to address and figures for scaling and cost justification, that a system designer will need to make a rough system design.

In looking at how useful OAM and OADM are for system design there are really two questions. The first is, do OAM and OADM provide the information required for system design? That is, do OAM and OADM make the system design process easier? The second question is whether information provided by OAM and OADM improves or otherwise changes the resulting system design. One is a question about process, the other about results. Unfortunately, OADM is too recent to have resulted in any system designs. Examination of several offices that have done system design after an OAM study should help to answer these questions.

An early version of OAM was used to study the Industrial Liaison Office (ILO) at MIT.

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<sup>33</sup>These are not procedure steps as defined in the office model used by OAM and OADM, but the technique should work, perhaps with better results, for procedures and steps as defined by the functional model.

Although the study was undertaken for research purposes, after the study was completed, a decision was made to automate the office. The OAM study appears to have had little influence on this decision, but once the decision was made, the description of the ILO produced by the study was very useful. The description was included in the request for proposal that was sent to office systems equipment vendors, who found it helpful in trying to tailor a system to the office. The ILO staff found the description useful since it provided a common point of agreement from which discussions of change could proceed.

Company "C" was in the process of introducing automation equipment into its engineering division. The standard approach was to do simple automation of the current operations without doing a functional analysis or looking for other than the most obvious improvements. One office was studied using OAM.<sup>34</sup> According to the office manager, the study permitted the office to look at itself to see areas that needed improvement and provided enough information to indicate that the office should make changes to the standard system that would otherwise have been installed.

The second study by the employee of company "B", of a volunteer organization's membership unit, identified several areas where automation would be useful, but, due to budgetary and organizational restrictions, no changes were implemented. The analyst felt that the study provided enough information to make decisions about what should and could be changed. That nothing resulted from the study was apparently due to outside circumstance and was not a response to the study. When, sometime after the study, the national headquarters of the organization suggested that the local groups purchase a particular system, the analyst was able to refer back to the original OAM study to determine that the proposed system would not meet the needs of the local group.

These experiences seem to indicate that OAM is useful in the process of system design, if only in the initial stages. Although OADM is too new for any system designs to have followed studies, the additional information that it collects suggests that it will be even more useful than OAM, although it, too, does not provide a method for doing system design. The next question to ask is whether OAM and OADM have a positive effect on the outcome of the final system. The results of automation efforts that followed OAM studies can be examined to help answer

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<sup>34</sup>This office is the same the one from company "C" described in section 4.4.

this question.

In the engineering division of company "C", the standard automation effort included the introduction of word processing equipment. As a result of the OAM study several changes were made. Dictation equipment was purchased and personnel were trained to use it shortly after the study was completed. While this is not an example of functional automation, it does illustrate that OAM can suggest the need for new technologies. Another change that was considered involved the use of microfilm to store old files. A decision was made not to use this technology, but rather to institute a system of dating files and periodically expunging outdated ones.

Since the automation effort at company "D",<sup>35</sup> was prompted by the OAM study, and since there were no other simultaneous efforts that did not use OAM, no objective measures are available. However, the analyst did feel strongly that the results of the automation effort were different because of the study. In particular, the analyst felt that it was only by automating the office in a functional way that the automation could be cost justified.

## 4.6 Procedure Manuals

Since the description that results from OAM or OADM completely describes the current operations of an office, one possible use for the description would be as a procedure manual for existing staff members and as a training tool for new ones. From this point of view, OAM and OADM become methodologies for developing procedure manuals. The only information required for this purpose that might be missing from missing from an OAM description would be the reasons why procedures are performed. OADM does include this information. OADM also includes a lot of information that is not necessary for this purpose, including numbers that are intended for cost justification of automated systems.

Where OAM studies have resulted in automation or change, they cannot be used as procedure manuals. However, a few cases have arisen where OAM descriptions have been used for this purpose.

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<sup>35</sup>This study is described more completely in section 5.3.

The employee of company "B" has gone on to use a slightly modified version of OAM/OSL in studying military command and control operations. One study has been completed in this area. The description, in a modified OSL format, of how the operation works has been extremely valuable. The military personnel have found it useful since it provides a common set of well-defined terms that they can use in their every day work. The military command like it because reading it has ensured that all of the staff are working from the same model, so that different people will have similar reactions to the same situation. The military training institutions find the description valuable since they can use it as a training manual for new personnel. Two different training institutions now use the description in this manner.

In the office of company "C", where so many other changes took place, the description that resulted from the OAM study was used as a training manual for some time after the study. The office has a high turnover and the office manager found the description particularly useful in explaining to new personnel what the office did. Unfortunately, as more and more changes accumulated, the description became less and less useful until it was finally abandoned altogether.

## **4.7 Case Studies**

The last of the possible uses for OAM and OADM would be to help achieve "the improvement in our understanding of office work that will derive from a growing base of comparable studies in a standard format." [57] Presumably, that improvement in understanding could result in the development of better automated tools for the office, as well as improvements in methodologies for studying offices. OAM and OADM both provide a standard format for office descriptions. Unfortunately that is not all that is required for this purpose. A large number of studies, of a variety of different kinds of offices, must accumulate before interesting comparisons can be made. A number of studies have been performed at MIT since OAM was developed, [29, 51, 62, 63, 69, 68] but the sample is still small and the environment is not sufficiently varied. One of the purposes of teaching the OAM/OSL course was to start to gather additional studies, but, unfortunately, only a few studies resulted from the course. The potential stills exists, however, for interesting comparisons if enough studies do accumulate.

## 4.8 General Comments

In an attempt to achieve an overall assessment of OAM, analysts were asked in the telephone interviews what they liked best about OAM, what they like least, and whether they would use OAM again.

The most common criticism of OAM was the lack of quantitative data. This was almost always mentioned in conjunction with a comment about the lack of a questionnaire. Many of the people seemed to feel that the study should gather more quantitative data, and questionnaires were often suggested as a useful tool for this purpose. In addition, a few people thought that some of the data gathered in the interviews could be obtained more easily by using a questionnaire. OADM addresses these problems with the background and quantitative questionnaires.

Another criticism, although not a common one, was that the description, with its several drafts, is overly time-consuming to write. One analyst, however, said that while writing the descriptions was time consuming, it was very necessary since it allowed the delegation of effort. One analyst performed the study, while another worked with the office to find and implement a solution. Without the detailed description, this would have been much more difficult. In addition, the description allowed the same analyst to pick up the project again after a period of time when the details of the project might have been forgotten. Given the importance of the description in system design and work redesign, and the necessity of providing feedback to the office staff, the time required to produce a description seems justified.

On the positive side, all of the people who used the methodology liked the function/procedure and step/event/state ideas. They almost all commented that the idea of abstraction, rather than looking just at tasks, had been very valuable. This was certainly one idea that each analyst seemed likely to use in doing almost any study. In addition, most of the people who used the methodology said that they liked the step/event/state model because it provided a way to structure the interviews. One analyst in particular said that by using that model she was able to structure interviews in ways that produced useful results, rather than random data. She said that she has successfully used this idea in interviews for other types of studies, and was particularly pleased to have added the concept to her repertoire.

Company "D" will probably will not use OAM, exactly as it was presented, again. However, further questioning revealed that the major ideas from OAM, in particular the function/procedure model, the step/event/state model, and the two round interview, had been incorporated into already existing corporate methodologies. Company "C" has just completed its first, non-functional, stage of automation. The results of the test of OAM there were so positive that OAM, or more likely OADM, will be the analysis tool used in the next, functional, stage of automation. The analyst from company "B" has left the company and is now working independently, using a variation of OAM as one of his tools.

# Chapter Five

## Conclusions

Designers of any methodology hope that it will prove useful for some purpose. Enough results have been obtained to determine whether or not OAM and OADM are useful for their intended purposes. These results also indicate areas for further research. This chapter discusses the conclusions that can be drawn from experience with the methodologies and those areas where further research could prove interesting.

### 5.1 Usefulness

Experience with OAM and OADM shows that they are clearly useful for teaching analysis techniques to new analysts. People without much experience in studying offices were easily able to learn OAM and the studies that they performed were, by available measures and within the constraints of the methodology, as complete and useful as those performed by more experienced analysts. That the major principles of OADM were communicated across languages and through one repetition by nonusers seems to be major validation of the premise that OADM is teachable and learnable. All available evidence indicates that OAM and OADM admirably serve the first purpose for which they were designed.

OAM and OADM are not so clearly useful for deciding whether or not to automate an office. In some cases, the decision is obvious from an OAM description. In most cases, however, OAM does not provide enough information to perform the cost justification that is usually a part of this decision. OADM corrects this fault, gathering most, if not all, of the quantitative information that is required, as well as information that allows the analyst to determine leverage points for automation and some of the consequences that will result from changes in the office. Neither OAM nor OADM provides the analyst with a methodology for making the decision but OADM, and to a certain extent OAM, are useful tools that provide the information required for the decision making process.



Much the same conclusion applies to OAM and OADM with regard to restructuring office work. OAM provides very little of the information, beyond a simple description of current operations, that is required to rationalize office procedures. OADM indicates why procedures are performed, provides useful quantitative data about volumes, length of time in process, etc., and matches the names of office staff with the roles that they play in procedures. Neither OAM nor OADM provides guidance about how to actually go about restructuring procedures, but that was never the intention. OAM and OADM are data gathering tools whose purpose is to provide the information required to carry out other stages of the automation process. OADM, then, does serve this purpose well.

OAM and OADM were also intended to gather the information required for system design. OAM provides too little of the quantitative information and none of the normative information required for this process. OADM does provide this information. However, even OADM does not provide all of the information that a system designer might need. For example, OADM does not provide enough detail for the system designer to determine the exact format of any specialized forms, menus, or screens that may be part of the new system. The automation process is iterative. It would be too much to ask of any methodology that it anticipate the general structure of an automated system to gather the exact data that will be required for detailed system design. OADM gathers data for the first round of system design that specifies system architecture, size, and general use and, based on the deficits observed in OAM, serves this purpose well.

Experience with OAM shows that the descriptions it produces are useful as training and procedure manuals. While this use is somewhat orthogonal to the other possible uses, it is still one that the designers had anticipated. Since OAM produces a description of current operations, it is not surprising that it is useful for this purpose. This area, however, is the only one in which OAM may be more useful than OADM. While OADM does produce more complete descriptions of the office, it also gathers data that are not really necessary for a procedure or training manual. In particular, while some quantitative information is useful for this purpose, the quantitative data collected by OADM probably constitutes overkill. The information about problems and opportunities in the office is also not required. However, with some adaptations along the lines that have been suggested, OADM could serve as a methodology for writing an office procedure manual.

Finally, while experience has not provided enough case studies to determine whether they will be useful to the system designers of office automation vendors, the internal evidence indicates that, should enough studies accumulate, OAM and OADM will serve this purpose as well. Both OAM and OADM have standard description formats. The information about problems and opportunities in various offices may allow system designers to observe patterns for which standard solutions can be devised.

## 5.2 Further Research

Although OAM and OADM are useful for the purposes intended by their designers, and while OADM expands the limits of OAM, the methodologies do not solve all of the problems in this field. There are many areas which would require further research in order to expand the usefulness of OADM. One of the most obvious directions for further research is to expand the methodology into the areas of procedure restructuring and system design. Better understanding of these processes is required before OADM can be modified to them. Some work has been done in the area of procedure redesign, most notably by Ellis and Cook [17, 18, 12], but none from the functional approach. Analysis and adaptation of existing techniques would be an excellent starting point for work in this area. Given the rate of change of office system technology, understanding the system design process may be difficult and developing a methodology to aid analysts in the process may be impossible. However, further investigation in this area is required even to prove or disprove that premise.

One of the most severe limitations of OADM is that it does not really address the issue of understanding managerial work<sup>36</sup>. OADM is best suited to understanding semi-structured procedures. Most managerial work appears to lack even the minimum amount of structure required by OADM. However, this conclusion may result from a lack of techniques for finding structure or from the lack of a model which would impose structure. Further research into both of these areas could greatly improve the usefulness of OADM.

Another limitation of OADM is that it does not attempt to understand the social structure of the office. Ideally, changes should be made in such a way that they minimize disturbance to

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<sup>36</sup>As opposed to professional work which OADM handles well

interpersonal interactions. Without understanding the pattern of interactions, this is very difficult to do. Presumably, work exists in this area in other disciplines which could be applied in the context of office automation. Further work in this area would certainly benefit OADM.

Finally, while OADM is addressed to the problems of automating offices, many of the techniques could be applied to the problem of understanding office work for the design of better office systems. This would require a change in emphasis and perhaps some changes in the types of data gathered. Further work along this line would have the benefit of expanding the uses for OADM.

Despite these limitations and the need for further work, OADM remains a useful tool in a variety of areas. It can be used to train office analysts, to write procedure manuals, and, perhaps most importantly, it provides a methodology for collecting the information required in later stages of the office automation process.

# **Appendix A**

## **Interview Checklists**

The following checklists are designed to help the analyst remember what to ask in an interview. A few are lists of other useful information. These lists are *not* intended to serve as interview forms or questionnaires. Rather, they are included as aids to the analyst's memory.

### **Study Process Steps**

1. Prepare and send background questionnaire.
2. Review questionnaire results and any other background material about the office that may be available.
3. Meet with the office manager.
4. Interview the staff.
5. Produce the draft documents.
6. Prepare and administer quantitative questionnaire.
7. Iterate the interview process.
8. Produce the final documents.
9. Review the study and options for improvement with the office manager.
10. Present options for improvement to the office staff and obtain feedback.
11. Prepare a plan for future action.

## Background Questionnaire Topics

- Organization** This includes the internal organization chart of the office and some information as to where the office fits into the larger organization. Most managers can answer this question by simply providing the appropriate organization charts.
- Staffing** How many people are there in the each part of the office? In a small office this question is not useful since one box on the internal organization chart will represent one person. However, in larger offices where the chart may not show every person in the office, the additional information is necessary to understand the relative sizes of the parts.
- Geography** What is the physical layout of this office? Are all of the personnel in the same general area or is part of the office separated physically from the rest? If the office is separated, why? Where are the parts? How far apart are they?
- Forms** What are the important forms in the office? The manager can probably delegate this one. The analyst should ask for a copy of each important form and a brief explanation of how it is used.
- Databases** What are the important databases in the office? What are their approximate sizes in some measure that seems reasonable? Briefly, what kinds of information are in each database and how are the database used? How are they stored? As paper files? On computers? Microfilm? Other technologies? The analyst's knowledge of the entire organization and the types of technologies that it is likely to use will have to guide these questions.
- Data Processing** Does this office interface with any kind of centralized data processing system? If so, what kinds of information does the office send to, and receive from, data processing? What reports does the office receive and, briefly, what are they used for?
- Technology** Does the office currently use any computer-based systems? If so, what are the systems (manufacturer, system name, size, etc)? Briefly, how are the used? Does the office make use of any other office technologies? If so, what are they and for what are they used?
- Job Descriptions** What are the different job titles in this office? The analyst should ask for copies of job descriptions for the various jobs if such descriptions are available.
- Budget** What are the principal non-salary expenditures in the office? How much is spent on each? What is the total office budget?

**Mission**

**What is the basic mission of the office?**

**Functions**

**What are the major functions performed by the office? The analyst should remember that the manager will not know the definition of function that is used in the function/procedure model and will answer this question in terms of her own understanding of the word. The answers, therefore, will not be the functions that will be developed later. Nevertheless, the manager's answer to this question can help to give a useful picture of the office.**

# Manager Interview

## 1. establish ground rules for the study;

a. introductions

b. format of study

c. required effort

d. good time to do study?

e. context

- Is this office currently involved in any other studies?

- Are there any major changes in the office expected in the near future that will effect the results of this study? A re-organization, a changing of the office mission, or anything similar?

- Have there been any major changes recently which might effect the study?

f. manager's responsibilities

g. presentation of study to staff

## 2. understand the functions and resources of the office

a. mission

b. functions

c. major resources

d. staffing levels for each function

## 3. verify the organizational context

a. reporting relationships to higher management

b. internal organization of the office

c. staffing and support levels by job category

d. key interfaces to other offices

**4. identify key personnel for interviews**

**a. within the office**

- number
- experience

**b. outside the office**

**5. gather data for use in later cost/benefit analyses**

**a. success factors**

- On what things in this office does the success of the entire office depend?
- How do you know when the office is doing a good job?
- How do you know when you are doing a good job?
- How does your boss know when the office is doing a good job?
- How does your boss know when you are doing a good job?
- Where would a sudden disaster in this office hurt the most?
- What currently prevents this office from functioning its best? Why is that important?
- If you were unexpectedly out of contact with the office for several months, what would you first want to know about the office when you returned?
- If you had more hours in a day, what would you do with them?
- If there were more people in this office, what would you have them do?

**6. manager's work**



## Hypothesis Questions

### 1. Symptom/Problem (before interview)

- Is this person likely to have any of the known problem symptoms? If so, which ones? Might the person be able to shed some light on the causes behind these symptoms?
- What are the interviewee's probable objectives in terms of her job?
- What is she likely to consider critical to her success in the job?
- What are some likely measures for her objectives and for knowing when she is doing well?

### 2. Function/Procedure (during interview)

- Is this activity part of a procedure that I know about? If so, where does it fit in the procedure? Does there seem to be a step missing somewhere?
- If the activity does not fit into a known procedure, what might other parts of this new procedure be? Is there someone to whom I have already spoken who might also participate in this procedure but who forgot to tell me about it? To what function does this procedure belong?

## **Symptom/Problem Questions**

- 1. Do you have any problems in getting your job done? If so, what are they? (If the interviewee asks what kind of problems, the answer is "whatever comes to mind.")**
- 2. If you had more time, what would you like to do with it? Alternatively, if what you currently do suddenly took much less time, what would you do with the rest of your time at work? (These questions should also be asked about any other resources that seem to be important.)**
- 3. If you were unexpectedly out of contact with the office for several months, what would be the first thing that you would want to know when you returned? What would be the next things?**
- 4. Are there any projects, or parts of your work, that you have been trying to do but, for one reason or another, have not been able to? If so, what are they and why have you not been able to accomplish them?**
- 5. How do you know when your work is going well? Is there some measure in the work itself (such as the number of customer complaints, or some other measure) that helps you to know when you are doing a good job? What external measure do you use? Your boss' approval? The opinion of coworkers?**

# Procedure Analysis Checklist

1. Office Functions and Objects

2. Procedures for each function

3. Mainline outline for each procedure

4. For each procedure step, the following information:

- what event initiates the step
- what is done in concrete terms
- what terminates the step
- what are the timing constraints
- what are the inputs and outputs
- what are the sources and destinations
- which databases and "mental lists" are used
- how (and what) special equipment is used

5. Databases and mental lists

6. Intention and volumes

- Why is this function performed? What would the results be if it were suddenly not performed?
- Why is this procedure performed? How often? How long does it take? How many of the objects, about which this procedure is concerned, are in process at any given time? Are there periods when this procedure is performed more often, or less often, than usual?
- Why is this procedure step performed? What would happen if it were not performed? How long does this step usually take in both actual and elapsed time? How often does something go wrong, that is, how often does an exception occur, in this step?
- Why does this object exist? What would happen if it were eliminated? How many of this object are there at a time? How long does this object usually "live"?

- Why does this database exist? What is it used for? How big is it? How often is it accessed? Does it change size over time? What kinds of items does it contain? Text, numbers, paper, etc? How is the information stored? Electronically, files, microfilm, etc?

## **Appendices**

- 1. A list of the major databases, logs, and lists in the office. Information about each including the general size and format, the current physical form, the type of information included, and the typical use.**
- 2. Copies of the principal forms used by the office. These are often useful for reference.**
- 3. A glossary. This is particularly important if the office uses a large number of terms whose meanings are not obvious to readers from outside the office. The glossary can define the terms, which can then be used throughout the description.**
- 4. A table matching titles with people. Who does what in a procedure is indicated by the use of job titles. If work in the office is to be reorganized, it will be important to know which titles belong to which people.**
- 5. Results of the quantitative questionnaire. Since it may be difficult or inappropriate to include much of this information in the text, it should be put into an appendix.**
- 6. Samples of the questionnaire and log which constitute the quantitative questionnaire. These will provide a basis for comparison across studies. In addition, questions may arise later that can be answered by reference to the original questionnaire.**

# Appendix B

## Analyst Forms

### B.1 Guide to using the Checklists

#### Introduction

The Checklist package is designed to be used by someone familiar with the methodology. Its purpose is to

- Help organize the notes taken during an interview
- Remind the analyst of the function/procedure model
- Provide an organized place to record information for use in the writeup

The material is organized into two groups, one for the first interview with the office supervisor and one for subsequent first-round staff interviews.<sup>37</sup>

#### Manager interview

The manager forms have places for recording the mission of the office, the major functions and resources, the office organization, and communication with other offices.

In the table for listing the functions used to carry out the mission, the "Why?" column is for use when a function does not seem to fit the basic mission. The "Major documents received/created" columns should interpret documents in the most general sense. Examples might be "application file" or "payroll form." "How long" means how long has this procedure been implemented, and "# people" means how many people work on this function. The last column, "Names", should be used for recording the names of one or two people to interview for that function. The office organization chart will usually be obtained from the background questionnaire. If so, just make sure that the information requested on that page is clear from

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<sup>37</sup> Some of the forms should be layed out horizontally on larger paper for actual field use.

the chart. If not, make use of the page to sketch a chart. The next table is for identifying lines of communication. Space is provided for listing communication with other offices and a description of, or reason for, that communication.

### **Staff interview**

The staff forms are organized as a main checklist and a series of tables. The second page asks for a breadth-first survey of the main responsibilities of the employee. As the functions and procedures to which the responsibility belongs are identified, the analyst should fill in the appropriate columns.

Details of the office structure are recorded on the following tables. Procedures should be documented on the "Procedure details" sheets, one per sheet. Space is provided for a more elaborate description of the procedure and listing the tasks that are used to perform it. Three other tables are used for recording certain types of "objects" found during the interview. The most general is the communications table. The table can be used for an input or an output--the analyst should complete the relevant fields for each communication. The other two, logs and databases, are more specific and contain columns for recording certain kinds of quantitative data.

Sometimes it is difficult to decide whether something is a database or communication object. Receipt of a communication may cause, among other things, an update to a database. The communication itself may also be filed in some way. It is also possible that the communications, when filed, become a database in themselves. If such confusion arises, the analyst may want to record the item as both a communication and a database, making clear the relationship between the two.

## **B.2 Checklist for manager interview**

### **Basic information**

Office name:

Interview with:

Interview date:

Official job title:

Reports to:

Length of time:

- With company:

- With this office:

- At this job:

### **Office mission**

What is/are the mission, charter, or purpose of this office?

How long has this office existed?

Has the purpose been pretty much the same over the years?

If it has changed, how recent is that change?

What was it previously?

### **Main functions**

What are the major resources in the office?

How is the mission implemented? What are the main steps, or functions?



| <u>Description</u> | <u>Why?</u> | Major<br>documen.<br>received | Major<br>documen.<br>created | How<br>long | #<br>people | <u>Names</u> |
|--------------------|-------------|-------------------------------|------------------------------|-------------|-------------|--------------|
|--------------------|-------------|-------------------------------|------------------------------|-------------|-------------|--------------|

## Organization Chart

Get or draw an office organization chart. This should be the *formal* organization. Also show:

- to whom (or to what office) does the manager report?
- who (or what office) is above that?

## Day-to-day organization and communication

Indicate below with which offices this office communicates. Get the name and a brief description or a reason for the communication.

| <u>office</u> | <u>communication</u> | <u>description<br/>or reason</u> |
|---------------|----------------------|----------------------------------|
|---------------|----------------------|----------------------------------|

## **B.3 Checklist for staff interviews**

### **Basic information**

Office name:

Interview with:

Official Job title:

Job role name:

Interview date:

Reports to:

Directly supervises: name and job title

Length of time:

- With company
- With office
- At this job

Typical education, training requirements for people in this position:

Turnover rate for this position:

### **Brief description of position**

## Major responsibilities

List below the major responsibilities this position has. Try to find the office function and procedure to which it belongs.

| <u>Description of responsibility</u> | <u>Function/Procedure</u> |
|--------------------------------------|---------------------------|
|--------------------------------------|---------------------------|

## B.4 Procedure details

Interview with:

Job title:

Date:

Office:

Responsibility name:

Description:

Special environment or equipment used:

| <u>Initiating</u><br><u>Conditions</u> | <u>Action</u><br><u>Taken</u> | <u>Terminating</u><br><u>Conditions</u> | <u>Time</u><br><u>Const.</u> | <u>I/O</u> | <u>Database</u><br><u>Used</u> |
|--|-------------------------------|---|------------------------------|------------|--------------------------------|
|--|-------------------------------|---|------------------------------|------------|--------------------------------|

## B.5 Databases

Interview with:

Job title:

Date:

Office:

Complete this table for each databases maintained:

| Name | Media | Fields | How<br>Sort. | Source<br>Update | Freq.<br>Update | Freq.<br>Access | Size |
|------|-------|--------|--------------|------------------|-----------------|-----------------|------|
|------|-------|--------|--------------|------------------|-----------------|-----------------|------|

## B.6 Logs .

Interview with:

Job title:

Date:

Office:

Complete the following table for each log used in the office:

| Name | Media | Fields | Logging<br>Event | Freq. | Action when<br>Completed | Archive |
|------|-------|--------|------------------|-------|--------------------------|---------|
|------|-------|--------|------------------|-------|--------------------------|---------|



## B.7 Communications

Interview with:

Job title:

Date:

Office:

Complete this table for each communication - document, message, computer printout, whatever:

| <u>Name</u> | <u>Fields</u> | <u>Media</u> | <u>From/<br/>To</u> | <u>Freq</u> | <u>Action<br/>Taken</u> | <u>How<br/>Filed</u> | <u>Sent<br/>To</u> | <u>#<br/>Copies</u> | <u>Freq</u> |
|-------------|---------------|--------------|---------------------|-------------|-------------------------|----------------------|--------------------|---------------------|-------------|
|-------------|---------------|--------------|---------------------|-------------|-------------------------|----------------------|--------------------|---------------------|-------------|

# Appendix C

## Questionnaires, Logs

The following is not intended to form a usable questionnaire, but rather to provide a menu of topics, ideas, and questions that can be used to tailor a questionnaire to a particular organization. Each item or series of items has an annotation suggesting the use of responses to that item. The analyst should choose items for the final questionnaire based on the annotations and the structure of the office. Each question should be asked within the context of a procedure. For example, if a procedure involves significant amounts of travel, questions about travel should ask about travel for purposes of that procedure, rather than about travel in general. The exact format of the questions on the final questionnaire will depend on the ultimate use of the information, the organizational style, and the available formatting facilities.

The questionnaire material is divided into two sections. The first section collects information about tasks and equipment with little regard to the structure of the office and depends on self-reporting. The second section provides a format for a log to record the actual instances of objects in process.

### C.1 Quantitative Questionnaire

In addition to selecting from the questions below, the analyst should obtain some biographical information about the respondents. Exactly what should be asked will depend on the situation. The analyst might ask for name, position, work experience, time with the company, and so forth. This information is not directly relevant to the automation or reorganization process, but is useful for identifying the respondents and for giving them some easy warmup questions to answer. Alternatively, the analyst can ask anonymous questions about age, sex, perhaps job title, etc. Again these questions serve no immediate purpose, but they may prove useful for post-implementation studies of responses to the automation process. And finally, the analyst can choose not to ask for any background information.

The questions that follow were derived from a number of sources, particularly *Office Automation* by Lieberman, Selig, and Walsh [36] and *Office Automation: A Comparison of In-House Studies* by Sirbu et al [56]. Some of the questions are obviously intended for managers and professionals while others are appropriate to secretaries and clerks. The analyst will have to use appropriate judgment in choosing questions for the various office constituencies and should feel free to reword questions to fit particular situations. The questions listed here are intended merely to provide ideas about how to obtain certain kinds of useful information.

There is no significance to the order of the following topics.

## **Equipment**

1. *The answers to the following question will provide the analyst with a complete inventory of the equipment present in the office and will show whether or not the equipment is being used. If equipment is found of which the analyst is unaware, she should certainly find out how and why it is used. Other questions that may be suggested by responses to this question include:*

- *Why do you have this equipment if you don't use it? Is it leftover from some previous way of doing things? Would you like to use it? Is there something preventing you from using it? Do you know how to use this piece of equipment?*

- *Why would you like to have this equipment that you don't already have? What would you use it for? Do you know how to use it? Have you ever had it in the past in this office? If so, why is it no longer here?*

*One area of possible change in the office is to remove unused and unnecessary equipment, better utilize underused equipment, and bring in new equipment that will help to improve the way things are done. The answers to this question will provide data that is necessary to make these changes.*

Fill in the blanks with the appropriate letters in regard to the following equipment:

- a. Located in my office and I use it.
- b. Located in my office, but I do not use it.
- c. Have access to and I use it.
- d. Have access to but do not use it.
- e. Equipment not available, but would use if it were.

f. Equipment not available and would not use it.

- — telephone
- — mechanical telephone-answering device
- — speaker phone
- — intercom
- — calculator or adding machine
- — computer terminal
- — Telex or TWX
- — individual dictation unit
- — dictation system (one with a remote recorder)
- — individual transcribing unit
- — facsimile or telecopier
- — copier
- — video display or CRT typewriter
- — magnetic card, tape, or memory typewriter
- — manual, electric, or correcting typewriter

## Services

1. *Outside services are another likely area for change in an office. It may be cost effective to look for alternatives, technological or otherwise, for services that are used a lot. On the other hand, an office may be performing some activity that could be done more cost effectively by an outside service. Or other changes that are proposed for the office may affect the use of outside services. Without knowing what services are currently used, these issues cannot be addressed. The following question asks about what services the respondent uses. The answers, on the whole, should not surprise an analyst who has completed the first round of interviews. This question serves as a check on the data that the analyst has gathered in the course of understanding how the office works. The analyst should be sure that she understands how and why these services are being used.*

Check the following business services you use from other companies. For each one that you use, indicate approximately how many times per week or per month you use it.

- — messenger service (per week) (per month)
- — graphics/composition (per week) (per month)
- — printing (per week) (per month)
- — consultants/professionals (per week) (per month)
- — computer time (per week) (per month)
- — typing service (per week) (per moth)
- — office temporaries (per week) (per month)
- — other (specify, including frequency of use)\_\_\_\_\_

2. *The following question simply provides more detail about the source of messenger services. If the office warrants it, similar questions could be asked about any of the services listed above. Knowing whether the service is provided by an external company or by another portion of the same organization can affect decisions about changing these services. For example, if the office being studied is the largest user of a service provided by another organizational unit, eliminating the need for that service is likely to have political repercussions.*

If you use messenger services, what percentage of the time do you use each of the following? (the total should equal 100%.)

- — internal company messengers
- — messengers provided by an outside service
- — other (specify)\_\_\_\_\_

## **Information Retrieval**

1. *Respondents may find the next question hard to answer. Some questionnaires ask instead about how people look for information, by phone, in files, etc., but the method of search is much less interesting than the object of the search. The following question should elicit situations in which necessary information is chronically unavailable. The analyst should be aware of these cases, but if not, should follow up to find out what the information is and why it is not available.*

List any information that you need to perform your job but for which you must

often search. \_\_\_\_\_

2. The next two questions are designed to determine whether external access to information in the office is required. The answers to these questions will influence the architecture of any system that may be installed in the office. The first question simply asks about general need. The second question is more specific. The analyst can substitute a list of the known databases in an office for the request to name databases and can ask the respondent to indicate how often she needs to access to each while away from the office. One key piece of information that cannot be easily gathered on a questionnaire is the importance of having access to the databases.

How often do you need to access a database while away from the office? (Check one.)

- frequently
- sometimes
- seldom
- never

3. Which files, manuals, reports, or other data sources that are kept in the office do you need to access when you are away from the office?

- Names? \_\_\_\_\_
- How often for each? \_\_\_\_\_
- Are you usually looking for a specific kind of information? \_\_\_\_\_  
If so, what? \_\_\_\_\_

4. Manuals are often targets of automation. Many manuals require constant revision or are continually referred to. These manuals may be candidates for online storage or revision. Other manuals are of little use and can be eliminated. In order to decide **whether** to do anything about manuals and **what** to do, a complete list of manuals must be obtained, along with information about how often they are referred to and/or revised, their lengths, and their importance (a manual may be referenced infrequently but that occasional reference may be extremely important). The following question will generate a complete list of manuals used in the office, along with the frequency of use. The answer will also show which manuals are not being used. The analyst can then collect information about the length and importance of those manuals for which it seems necessary.

List the manuals you refer to in your job (a manual is a collection of

procedures/guidelines, organized in a specific manner and usually enclosed in a binder--e.g., secretaries manual, standards and procedures manual, operating manual) and indicate approximately how often you refer to each: \_\_\_\_\_

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## Communications

This section contains questions about all forms of communication, particularly mail and telephone.

1. *The next several questions ask about outgoing mail. If some substitute for conventional document distribution is under consideration (for example, electronic mail or facsimile) the answers to the first few questions will provide rough figures that can be used for cost justification. In order to determine the savings from the new technology, one must estimate the reduction in current distribution methods. Estimating a reduction implies knowing current volumes. In addition, unusual responses to these questions, for example, a large number of hand carried documents, may suggest areas for further investigation. Other questions ask about alternative ways of preparing outgoing mail. One question asks about the necessity of return receipts. The answers to these question will be important in designing a new system.*

On the average, how many pieces of outgoing mail do you send in a day?

2. What percentage of outgoing documents are distributed by each of the following? (The total should equal 100%.)

- \_\_\_\_ % hand carrying
- \_\_\_\_ % internal mail, this location
- \_\_\_\_ % internal mail, other company locations
- \_\_\_\_ % external mail (postal service)
- \_\_\_\_ % TWX (teletype to teletype transmission)
- \_\_\_\_ % facsimile or telecopier
- \_\_\_\_ % messenger service
- \_\_\_\_ % other (specify) \_\_\_\_\_

3. For approximately what percent of the documents in the previous question do you need confirmation of the receipt?

4. If your secretary had more time, could your secretary prepare drafts of certain

correspondence or other documents that are well-defined or routine in nature?  
(Yes/No) If so, please list categories of these documents. \_\_\_\_\_

5. Is your secretary already preparing draft replies for some categories of correspondence? (Yes/No)

6. *The next several questions ask about incoming mail. The first three questions may be most appropriate for secretaries who handle mail for their principals. The remaining questions can apply to anyone. The first question asks about how incoming mail is handled. The answer to this question may effect system design and feasibility. For example, if a secretary routinely attaches relevant files to incoming mail, an electronic mail system that does not allow some reasonable equivalent may be of little use. The analyst should be sure to understand why the mail is handled in a particular way and the importance (or lack thereof) of doing so. The answers to the next two questions provide valuable figures for cost justification. The remaining questions ask about documents that are received but not used. The analyst should follow up on these questions since they suggest areas that are ripe for change. Follow up questions might include finding out why the person receives the unused material, why the material is not used, and the cost of the material.*

What do you do with incoming mail? (Check appropriate responses.)

- do not handle
- deliver unopened
- open
- time-stamp
- log
- read for information
- highlight
- attach route slip
- attach relevant files for action
- handle request personally
- answer letter personally

7. On the average, how many pieces of incoming mail do you handle a day, excluding magazines, brochures, advertisements, newspapers, etc.?



8. Do you perform mail-handling tasks for people besides your principal(s)?  
(Yes/No)

9. What kinds of documents that you receive do you read and discard, or read, file,  
and never use again? \_\_\_\_\_

10. What percent of the incoming information published by the company do you not  
need in order to do your job?

11. Does the information in the previous question consist of one or more of the  
following? (Check the appropriate responses.)

- letters or memos
- reports (specify) \_\_\_\_\_
- manuals (specify) \_\_\_\_\_
- other (specify) \_\_\_\_\_

12. *The answer to the following question provides a number useful for cost  
justification and system design in an office that uses the specified equipment.*

On the average, how many times a month do you or your secretary send/receive  
documents via facsimile or telecopier?

13. *The next two questions collect basic information about telephone configurations.  
If any modification to the telephone system, or to the number or physical  
arrangement of office personnel, is being considered, the answers to these  
questions will be necessary.*

How many telephone numbers ring on your phone?

14. Please list the extension numbers and the names of the parties, placing an A to  
the right of names of people who answer their own phones, and an H to the right  
of names of people whose phones you answer.

15. *The next questions ask about telephone calls. If modifications to the phone  
system or the introduction of answering machines are being considered, the  
answers to many of these questions will be necessary. The answers to questions  
about origins and destinations of calls and types of messages may be important  
in justifying electronic mail or messaging systems. There is overlap in the content  
of certain questions since some are clearly intended for secretaries or  
receptionists while others are intended for principals.*

Approximately how many incoming phone calls do you take/receive in a day?

16. Of the incoming calls:

a. How many can you handle yourself?

b. How many require messages for other people?

c. What percent of messages you take fall into each of the following categories? (The total should equal 100%.)

- \_\_\_\_ % please call

- \_\_\_\_ % will call again

- \_\_\_\_ % a message of substance (caller state the problem, question, etc.)

17. On the average, how many messages do you take for your principal(s) in one day while he or she is (they are) out of the office or on the phone?

18. Does anyone cover your phone while you are away from your desk? (Yes/No)

19. Estimate the average amount of time each day that your phone is not covered by anyone.

20. Do you answer your own or are your calls screened by a secretary or the switchboard?

- \_\_\_\_ answer own phone

- \_\_\_\_ calls screened

21. Of your incoming phone calls, what percent are from each of the following? (The total should equal 100%.)

- \_\_\_\_ % people in your own department, this location

- \_\_\_\_ % people in other departments, this location

- \_\_\_\_ % people at other company locations

- \_\_\_\_ % external parties

- \_\_\_\_ % international, external

- \_\_\_\_ % international, internal

22. On the average, how many messages are left for you in a day while you are out of

the office or on the phone?

23. What percent of messages you receive fall into the following categories? (The total should equal 100%.)

- — % please call
- — % will call again
- — % returned your call
- — % a message of substance--something other than "please have him call me"

24. What is your opinion of recording devices for leaving messages? (Check your response.)

- — they are useful and I like them
- — they are useful but I do not like them
- — they are not useful and I like them
- — they are not useful and I do not like them
- — no opinion

25. On the average, how many outgoing phone calls do you place in a day?

26. What percentage of your phone calls are placed by each of the following? (The total should equal 100%.)

- — % you
- — % your secretary
- — % other parties (specify) \_\_\_\_\_

27. Of your outgoing phone calls, what percent are to each of the following? (The total should equal 100%.)

- — % people in your own department, this location
- — % people in other departments, this location
- — % people in other company locations

- — % external parties
- — % international, external
- — % international, internal

28. If you cannot reach a person, what percent of the time do you do each of the following? (The total should equal 100%.)

- — % leave a call-back message
- — % leave a message
- — % call the person back when you are able to
- — % go see the person instead
- — % other (specify) \_\_\_\_\_

29. On the average, how many outgoing calls do you make in a day?

30. About how many of these outgoing calls do you place for other people?

31. What percentage of your principal(s) calls do you place?

32. *The usefulness of the answers to the next two questions may not be immediately obvious. However, if a change is contemplated in the office that will drastically change the form of communication used by office personnel, there may be strong reasons why that change should not be made. For example, there may be a good reason, overlooked by the system designers, as to why most communication by particular people is verbal. The fact that the communication is verbal and that it is determined by the job will show in the answers to these questions. It will then be up to the analyst to determine why it is so and if it is important. If it does turn out to be important for verbal communication to continue, then without this question, the analyst might not have realized its importance and a mistake might have been made.*

Different people spend relatively different amounts of time in verbal or written communication. What percent of your communication time is: (The total should equal 100%.)

- — % verbal
- — % written

33. The mode of communication in the previous question is: (Check one)

- completely determined by the job
- primarily determined by the job
- about equally determined by job and preference
- primarily determined by personal preference
- completely determined by personal preference

34. *The next two questions are intended to determine the respondent's attitude towards various types of communication. The answers to these questions have relevance only in that people who truly prefer one form of communication may be reluctant to use another. If sentiment throughout an office goes against a particular form of communication, then it may be difficult to successfully implement changes that require extensive use of that form of communication.*

If you need to exchange information with someone, your preferred mode of communication would be: (Check one.)

- instant written communication
- instant verbal communication

35. If you need to exchange information with someone, your preferred mode of communication would be one of the following.

- % personal
- % phone
- % video conference
- % in writing
- % other (explain) \_\_\_\_\_

## **Travel**

1. *The following questions ask about travel. If changes are being made that might affect the need for travel, (for example, if electronic mail or video conferencing are being made available, and other conditions are correct, the amount of travel may be reduced) then figures about the current rate of travel may be required for cost justification. In addition, if office personnel often need access to certain kinds of information while traveling, this will effect the design of the automated system.*

*The first few questions are very general. The primary use for these questions would be to get rough figures for the entire office about the rate of travel. The questions about travel destinations, reasons for travel, and use of information while traveling will be more useful. The question about reasons for travel should be tailored more specifically to the particular office. The categories given here are by no means complete and the more specific the data, the more useful it will be. The question about databases accessed while traveling should also be tailored to the particular office. The form given below is useful to find out whether or not data from the office is actually used during travel. If the analyst already knows that this is the case, the questions should ask about each of the databases that have been identified for the particular office.*

How many times do you travel to other cities in an average year?

2. On the average, how many days are you away on each trip?
3. What percentage of your business travel is devoted to each of the following?  
(The total should equal 100%.)
  - — % internal locations nationally, own company
  - — % internal locations internationally
  - — % external locations nationally, another company
  - — % external locations internationally
  - — % other (specify) \_\_\_\_\_
4. Do you often travel to the same location(s)? (Yes/No) If so, please list those locations and the reasons for going there. \_\_\_\_\_
5. What percent of your business travel is for each of the following reasons? (The total should equal 100%.)
  - — % sales/marketing
  - — % professional meetings/conferences
  - — % product support/installation
  - — % other (specify) \_\_\_\_\_
6. While traveling, how often do you need information from your office? (Check one.)
  - — frequently

- sometimes
- seldom
- never

7. How often do you need to access a database while away from the office? (Check one.)

- frequently
- sometimes
- seldom
- never

## Calendar

1. The following questions concern calendars. Some of these questions will provide information about calendar usage which may be needed for cost justification of an automated calendar system. Answer to the other questions will provide information necessary for selecting or designing such a system.

Check the kind of calendar(s) you keep.

- month at a glance
- week at a glance
- daily
- none
- other (specify) \_\_\_\_\_

2. Who maintains your calendar? (Check one.)

- I do
- my secretary does
- my secretary and I do
- not applicable
- other (specify) \_\_\_\_\_

3. Do you carry a calendar with you when you are away from the office? (Yes/No)
4. Approximately what percent of the entries on your calendar does each of the following constitute? (The total should equal 100%.)
- — % scheduled meetings
  - — % scheduled telephone calls
  - — % deadlines
  - — % reminders
  - — % phone numbers and addresses
  - — % birthdays and nonbusiness events
  - — % other (specify)\_\_\_\_\_
5. On average how many entries are contained on your calendar each day?
6. Approximately how many times a day do you refer to your calendar?
7. What percent of the entries made on your calendar are rescheduled?
8. What percent of the entries scheduled on your calendar are made in each of the following periods? (The total should equal 100%.)
- — % six months or more in advance
  - — % three months in advance
  - — % one month in advance
  - — % two weeks in advance
  - — % one week in advance
  - — % one day in advance
  - — % the same day
9. Do you refer to your calendar for information from past entries? (Yes/No)
10. Do you keep a duplicate of your principal(s) calendar? (Yes/No)



## Information Storage

1. The following questions ask about various forms of information storage, particularly files and their use. Questions about the size of databases or files and forms of storage technology (microfiche, microfilm, paper files, online computer systems, etc.) used by the entire office should have been asked in the background questionnaire. The purpose of the following questions is to find out the mechanics of how the files are used and maintained. A few questions at the end ask about other types of information such as manuals, lists, and logs. The first two questions ask about the kinds of files kept in people's offices. The answers to these questions will be important for system design. Personal and confidential files must be treated differently from general files of various forms.

Do you maintain files in your office? (Yes/No)

2. What percent of the files you maintain in your office fall in each of the following categories? (The total should equal 100%.)

- — % active files, which will eventually be filed elsewhere
- — % confidential files kept under lock and key
- — % personal files
- — % archival files, which could be filed elsewhere
- — % files you have pulled from elsewhere and which you will replace of have replaced
- — % duplicates of material that are also filed elsewhere
- — % personnel
- — % other (specify) \_\_\_\_\_

3. The next question asks about how files are used. The question, as presented here, is rather general, but its answer will help with system design. It will be important to know whether files are used in the office or taken elsewhere. Using specific information about the office, more detailed questions, that are not shown here, can be asked about the frequency of reference and change to particular databases. The answers to these questions will be necessary for cost justification.

Why do you need to access files, either in your own office or from your secretary or another area? (Check the appropriate responses.)

- — for reference and use in the office

- for reference and to take to other locations
- make hard copy and forward
- update
- discard
- other (specify) \_\_\_\_\_

4. *The next series of questions asks about the mechanics of using files. The analyst should be sure to understand why files are accessed in a particular way. The information will be necessary for system design.*

Do you personally pull and use files for which your secretary is responsible? (Yes/No)

5. Who is responsible for replacing files you or your secretary has pulled for your use?

- your secretary
- clerk
- whoever pulled the file

6. When files shared by several people are pulled, is there a check-out procedure indicating to others the locations of these files?

- yes
- no
- don't know

7. Do you personally pull and use the files for which other secretaries are responsible? (Yes/No)

8. Who is responsible for replacing files that have been pulled?

9. *The following questions concern filing procedures. The answers to these questions relate somewhat indirectly to system design. New filing procedures may need to be developed for the new system. Knowing whether filing procedures currently exist and who is aware of them may help in introducing the new procedures.*

Do you use a standard filing procedure? (Yes/No)

10. Has your group developed standard filing systems and procedures that are followed by each person? (Yes/No)

11. Which of the following applies to files in your area with regard to reviewing them, discarding them, or sending them to archive storage?

- written guidelines/procedures
- no written guidelines/procedures
- guidelines given verbally by your principal(s)
- self-initiated without guidelines
- files are not reviewed/purged
- do not know

12. Is your principal(s) familiar with your filing procedure? (Yes/No)

13. Are you familiar with your secretary's filing procedure? (Yes/No)

14. *The remaining questions ask about other types of information, including manual and lists. The answers to these questions will help with system design and cost justification. The analyst may need to ask additional questions about lists or logs that are to be changed.*

How many internally published reference manuals do you routinely use in your work?

15. How many copies of manuals are you responsible for keeping up to date?

16. Which of the following lists, logs, or quick reference files do you keep? (Check the appropriate responses.)

- telephone numbers (approximate number of names)
- address lists (approximate number of names)
- mail log (approximate number of entries)
- equipment records (approximate number of records)
- other (specify, giving approximate size) \_\_\_\_\_

## Calculation

1. *The following questions concern calculations. The answers to these questions will tell the analyst whether a calculation package is necessary and will provide figures necessary for cost justification.*

Does your work require calculations? (Yes/No) If so, how many hours a week do you spend doing calculations?

2. What percent of your calculations are done by each of the following? (The total should equal 100%.)

- % calculator
- % adding machine
- % paper and pencil
- % computer
- % other (specify) \_\_\_\_\_

3. Do you ever calculate while on the phone? (Yes/No) If so, does this happen:

- frequently
- occasionally
- rarely

4. What percent of the results of your calculations are incorporated into each of the following: (The total should equal 100%.)

- % text document (letter, memo, etc.)
- % bills/receipts/other forms
- % spread sheets
- % other (specify) \_\_\_\_\_

## Typing

1. *The following questions concern typing. These questions are not intended to provide significant help with system design. Entire questionnaires have been*

designed to determine the exact needs for various kinds of typing support.<sup>38</sup>

These questions are intended to help with cost justification and to provide a flavor of the types of things one might want to ask. The analyst should also ask specific questions that are tailored to the office regarding major typing tasks (manuals, reports, etc.) and major typing needs (technical typing, tables, etc.). Automation of typing can produce improvements in turnaround time and in quality. Since quality is hard to measure, most of the following questions ask about turnaround time.

From the time you finish dictating or writing a letter, a report, or other matter, how long (in hours) does it take on the average before the typed version is back on your desk?

2. What percent of your letters are in final form on the first typing?

3. What percent of your written work must you have back on your desk in each of the following times? (The total should equal 100%.)

- — % less than one hour

- — % one to three hours

- — % four to eight hours

- — % the next day

- — % two or more days

4. What percent of your written work would you like to have back on your desk in each of the following times? (The total should equal 100%.)

- — % less than one hour

- — % one to three hours

- — % four to eight hours

- — % the next day

- — % two or more days

5. What percent of your written work do you have back on your desk in each of the following times? (The total should equal 100%.)

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<sup>38</sup> See, for example, the checklist, Functions and Considerations, prepared by the MIT Office Automation Planning Committee [48].

- % less than one hour
- % one to three hours
- % four to eight hours
- % the next day
- % two or more days

6. What percent of your written work has to be received by the addressee in each of the following times? (The total should equal 100%.)

- % less than one hour
- % one to three hours
- % four to eight hours
- % the next day
- % two or more days

7. What percent of the documents that you produce are originated by each of the following? (The total should equal 100%.)

- % dictating to a machine
- % dictating to a secretary
- % writing longhand
- % composing at a keyboard
- % other (specify)

8. What percent of your typing results from the following? (The total should equal 100%.)

- % machine dictation
- % shorthand
- % longhand
- % typewritten copy

- % self-composed
- % other (specify) \_\_\_\_\_

9. What percent of the typing for your principal(s) is handled by each of the following? (The total should equal 100%.)

- % you
- % other secretaries backing you up
- % word processing center
- % home office word processing center
- % temporary secretaries
- % outside services

10. From the time you receive a dictated or drafted letter or other matter, on the average how long (in hours) does it take before it is back on your principal's desk in typed form? (Note: One day equals eight hours.)

11. What percent of the material that you are given to be typed is in final form on the first typing (i.e., not edited and put through another draft)?

12. When your typing workload builds up, who resolves the priority of which documents you should work on first?

- you
- your principal
- group manager
- designated secretary
- no one
- other, please explain \_\_\_\_\_

13. How many documents or manuals more than ten pages in length do you type or make revisions to during the year?

- more than 3 per month
- 2 or 3 per month

- 1 per month
- 6 per year
- 3 per year
- none

Please list these documents or document categories. (Include Name of document or general category, Number of documents in category, Approximate number of pages per documents, Approximate number of pages per document revised each year following the original publication of the document.)

14. Are there any other documents you type that are updated from month to month, quarterly, or annually in which *most* of the text stays the same from one typing to the next? (An operating report in which a new column is added every three months would be an example of such a document.)

- more than 5 such documents
- 3 or 4 such documents
- 1 or 2 such documents
- none

Please list these documents or documents categories. (Include Name or general category of document, Number of documents in the category, Approximate number of pages per document, frequency of revisions (i.e., daily, weekly, monthly, quarterly, annually, etc.).)

15. Is any material that you type sent to be photocomposed? (Yes/No) If yes, please list the documents. (Include Name of document, Number of pages, Frequency of document publication.)

16. Please indicate if you do very much of the following specialized typing applications.

- Statistical typing
- Statistical typing wider than 11 inches
- Chemical formulas
- Mathematical equations



## **Presentations**

1. *The following questions ask about presentations. If changes are anticipated that will effect the production of presentation materials, the answers to the following questions will provide figures necessary for doing cost justification of improvements. In addition, if work is to be reorganized, knowing who does what in this area may be important. None of these answers should surprise the analyst and the analyst should be sure to understand the reasons for any that seem unusual.*

How many times a month do you attend meetings in which you must present information?

2. When presenting information, what percent of the time must you use visual aid (charts, transparencies, foils, slides)?

3. If you use visual aids, what percent of the time do you use each of the following? (The total should equal 100%.)

- \_\_\_\_ % flip charts
- \_\_\_\_ % transparencies/overhead projectors
- \_\_\_\_ % display on heavy card stock or poster board
- \_\_\_\_ % slide projectors
- \_\_\_\_ % other (specify)\_\_\_\_\_

4. What percent of your flip chart visual aids are made by each of the following? (The total should equal 100%.)

- \_\_\_\_ % you
- \_\_\_\_ % your secretary/administrative assistant
- \_\_\_\_ % another principal
- \_\_\_\_ % graphic service/outside service
- \_\_\_\_ % other (specify)\_\_\_\_\_

5. What percent of your transparencies are made by each of the following? (The total should equal 100%.)

- \_\_\_\_ % you

- — % your secretary/administrative assistant
- — % another principal
- — % graphic service/outside service
- — % other (specify)\_\_\_\_\_

## Copying

1. *The next several questions are about document copying. The answers to these questions will be necessary to cost justify any changes to the current arrangements.*

On the average how many copies do you make a week?

2. On the average, how many copies of documents that *you* type do you make?

3. What percent of your copies are made by each of these methods?

- — % carbon paper
- — % copier
- — % copysettes
- — % print shop

4. What percent of the documents that you copy do you have to collate?

## Work at Home

1. *The following questions concern work at home. Changes that are made in an office may effect the work that office personnel do at home. These changes may range from allowing people who so choose to do more work at home, to reducing the need for office personnel to work additional hours at home. The analyst is not likely to have obtained the answers to these questions from the interviews, so these questions are likely to be valuable in many situations. The analyst should be sure to understand why people are working at home and exactly what they are doing.*

*The question about activities is appropriate in this context since people are unlikely to perform entire steps of procedures at home. However, where it seems appropriate, the analyst should change this question to ask about particular procedure steps.*

Approximately how much time per week do you spend working at home? (Hours)

2. What percent of your work at home is in each of the following categories? (The total should equal 100%.)

- \_\_\_\_\_ % reading
- \_\_\_\_\_ % writing
- \_\_\_\_\_ % dictating
- \_\_\_\_\_ % calculating
- \_\_\_\_\_ % telephoning
- \_\_\_\_\_ % typing
- \_\_\_\_\_ % face-to-face meetings, business
- \_\_\_\_\_ % copying
- \_\_\_\_\_ % computer programming
- \_\_\_\_\_ % other (specify) \_\_\_\_\_

3. What percent of your current in-office tasks could be done at home if you had adequate support equipment?

4. Would you prefer to do this work away from the office if you could?

5. Do you have a typewriter at home? (Yes/No)

6. How many hours a week do you spend typing at home?

7. List the specific kinds of typing you do at home: \_\_\_\_\_

### **Tickler**

1. *The answer to the following question will tell the analyst whether or not a tickler facility would be useful in a proposed system. If this area of inquiry seems important, many of the questions that were asked about the calendar can also be asked about the tickler, particularly those that deal with frequency of use, time-frame covered, and time span of entries.*

Do you have a reminder system (follow-up or tickler) to check on work in progress, or a "to do" list? (Yes/No)

## Supervisor/Supervisee Communications

1. *The following questions ask about how assignment of work is communicated between a secretary and a principal. The answers to these questions are important for system design. For example, if a system is to be installed which provides for online sharing of documents and a common form of communication between a secretary and principal is notations on documents, a problem could arise. Some other acceptable way must be found for this communication.*

How does your secretary develop an understanding of your work? (Check the appropriate responses.)

- he/she doesn't
- written instructions on work
- incoming mail
- outgoing mail
- overhearing your interactions with others
- face-to-face interactions with you
- other (specify) \_\_\_\_\_

2. How do you develop an understanding of your principal(s) work? (Check the appropriate response or responses.)

- written instructions on work
- incoming mail
- outgoing mail
- overhearing your principal's interaction with others
- face-to-face interaction with your principal
- other (specify) \_\_\_\_\_

3. How does your principal(s) give instructions for your work? (Check the appropriate response.)

- gives them in person
- writes them longhand

- calls on the phone
- calls on the intercom
- dictates them
- other (specify) \_\_\_\_\_

## **Problem Areas**

1. *The following questions ask about potential problem areas. The answers to these questions may suggest areas for further investigation and potential change. The analyst should be aware of most of the problems, but asking this question provides a second check. The two questions are very similar, but the first is intended for principals and the second for support staff.*

Indicate which office facilities, services, and/or operations listed below are major problem areas that repeatedly interfere with the effective performance of your job.

- scheduled meetings in your office
- scheduled meetings at other locations
- unscheduled meetings
- typing service quality
- typing service turnaround time
- general secretarial service other than typing
- dictation equipment and services
- facsimile or telecopier service
- information retrieval from files by your secretary
- information retrieval from files by you
- general maintenance of files
- incoming phone calls
- outgoing phone calls
- receiving phone messages

- — number of interruptions
- — time and facilities for writing
- — scheduling of activities
- — time and facilities for calculation or computation
- — facilities and service for copying
- — availability and convenience of needed equipment
- — travel
- — space
- — staff support
- — external business services
- — internal mail

2. Indicate which activities, services, and/or facilities listed below consume much of your time, present difficulties in getting your job done, or are areas where you would like to see major improvements.

- — scheduling meetings in your principal's office
- — scheduling meetings at other locations
- — scheduling conference or project workrooms
- — typing load
- — dictation equipment and services
- — facsimile or telecopier service
- — information retrieval from files (yours or files of other departments)
- — locating information not normally filed in your area
- — general maintenance of files
- — incoming phone calls
- — outgoing phone calls

- taking phone message
- number of interruptions
- time and facilities for reading
- time and facilities for writing
- time and facilities for calculation or computation
- facilities and service for copying
- availability and convenience of needed equipment (list equipment needed)
- support and cooperations of your principal(s)
- support and cooperations of other secretaries in your area or department
- mail within the home office
- mail to/from branches/laboratories/subsidiaries
- manuals (preparing, maintaining, distributing, etc.)

## Miscellaneous

1. *The following questions cover a variety of areas. Many of these questions are appropriate only in certain limited situations and it will be up to the analyst to decide if they will provide additional useful information for a particular office. Other questions are designed to help identify problem areas or areas that could change.*

Do you have peak work-load periods? (Yes/No)

If yes:

- When?
- How Long?
- What are the reasons?

2. Do you do any overtime work?

- yes, occasionally

-  yes, frequently

-  no

3. Please list any tasks you now do that could be delegated if more support were available.

- Tasks that could be delegated \_\_\_\_\_

- Estimated number of hours you could save by delegating these tasks (hours/day, hours/month) \_\_\_\_\_

- To whom could these tasks be delegated? (Secretary, Administrative Specialist) \_\_\_\_\_

4. List the most important activities that you would accomplish with the time made available from delegating the tasks listed above, and your best estimate of the value of these.

- List of Activities

- Estimated Value of Activities (Expense Reductions, Staff Reductions, etc.)

5. Can you type? (Yes/No)

6. Have you felt hesitant about using your secretaries for non-typing support in the past because they are too busy and overloaded?

-  yes, frequently

-  yes, occasionally

-  no

7. What percent of the day is your secretary needed but is not available to you for support tasks?

8. List activities your principals perform which you feel you could now do and help them be more effective. \_\_\_\_\_

9. List activities your principals perform which you feel with *additional training* you could do and help them be even more effective. \_\_\_\_\_

10. Have you ever been trained in one or more of the following? (Check the applicable responses.)

-  stenography



- transcription from machines
- computer terminal operation
- keypunch
- facsimile or telecopier operation
- computer programming
- automated typewriter operation (for example, Vydec, WANG, IBM)
- other equipment, systems skills, etc. (specify)

11. How much working time on an average day do you spend away from your desk?

12. Which of the activities listed below do you perform while away from your desk?  
(Please check those items that apply.)

- copying
- TWX
- facsimile or telecopier
- meetings or conversations
- reception
- errands
- libraries
- searching for people
- getting supplies
- visitor escort
- training sessions
- cashier
- picking up and delivering mail
- covering someone else's desk

- telephone switchboard
- other (specify) \_\_\_\_\_

13. Are there any groups in other geographic locations that you work with in jointly preparing or coordinating documents where you find yourselves sending revisions back and forth via the mail, cable, or facsimile machine? (Yes/No) If yes, please describe. \_\_\_\_\_
14. What work do you have that requires confidential secretarial support? \_\_\_\_\_
15. Please describe any problems/comments/suggestions related to maintaining or improving lists (e.g. mailing, employee, customer), logs, and other recorded data.  
—
16. Briefly describe below projects, activities, or responsibilities that you would like to take on or initiate, and give a brief description of the benefits that would result.

## C.2 Procedure Logs

The following forms show the general structure of the log in bold type, sample headings in regular type, and sample completion in italics. The first log follows individual objects throughout their history. A separate log must be made for each person who handles the object throughout its history. In the example given, a clerk in an admissions office is responsible for responding to requests for applications and for filing test scores as they are received. These two steps appear on the log which she will complete. Other office personnel will receive logs which show their steps in the process. The id must be unique and the log must be completed over a period at least as long as the normal life of the object.

### Elapsed Time Log

| <b>Object ID</b> | <b>Event</b>   | <b>Step</b>       | <b>Event</b>       | <b>Step</b>  |
|------------------|----------------|-------------------|--------------------|--------------|
| <i>Name</i>      | <i>Request</i> | <i>Send Appl.</i> | <i>Test Scores</i> | <i>Filed</i> |
| <i>Smith</i>     | <i>10/2</i>    | <i>10/3</i>       | <i>12/10</i>       | <i>12/14</i> |

The second log is designed to obtain data about the actual number of objects processed through a given step. The columns of additional relevant information will depend on the nature of the step.

## Volume Log

| <u>Time</u> | <u>Event</u> | <u>Step</u> | <u>Other info</u> |    |          |
|-------------|--------------|-------------|-------------------|----|----------|
| Date        | Request      | Send Appl.  | Int'l             | US | Same Day |
| 10/2        | 14           | 12          | 2                 | 12 | 12       |

The third log gathers data about particular exceptions and their frequencies.

## Exceptions

| <u>Time</u> | <u>ID</u> | <u>Exception</u>   |
|-------------|-----------|--------------------|
| Date        | Name      | Exception          |
| 10/1        | Smith     | address incomplete |

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