



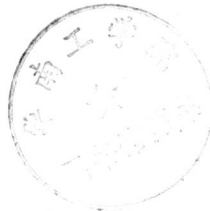
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Managing Research and Development

JOHN E. GIBSON

**School of Engineering and Applied Science
University of Virginia**



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Managing Research and Development

To Nancy

Preface

This book is designed to introduce technical people, especially engineers, to the basic aspects of managing research and development. The tasks of the technical manager break naturally into two major groups: personnel-oriented elements and technically oriented activities.

The technical manager is fortunate in working with highly trained and well-motivated professionals, and thus the problems and opportunities he or she faces are different from those found in many other managerial areas. Nevertheless, guiding the activities and the professional development of highly skilled, self-motivated people provides psychological challenges for which the newly promoted technical manager often is not ready. For example, it comes as a surprise to engineers, a nonintrospective group in general, that we occupy a special psychological niche. According to C. G. Jung's psychological classification, many of us are ISTJ types (introverted, reliant on sensory data, and thinking; we judge situations rather than merely perceiving them); yet this is a rare classification in the population at large. This fact, however, means that it is both possible and productive to discuss the psychological profile of the typical engineer and the typical engineering manager. Some of the common elements in an ISTJ profile, we find, normally aid in engineering success but can interfere with managerial success if not controlled and regulated.

Following a general overview of the text in Chapter 1, Chapter 2 discusses the psychology of the professional. Then in Chapter 3 this information is contrasted with the behavioral characteristics of the manager. Chapter 4 gives a description of the personnel-centered tasks of the manager, and finally this first part of the text closes in Chapter 5 with a discussion of various management styles and structure and small group dynamics.

The Jungian personality descriptors are adopted as a framework with which to introduce the engineering reader to behavioral analysis. The static behavior patterns of this framework help to illuminate tendencies, but I do not necessarily advocate it as a comprehensive theoretical ap-

proach. I use the ISTJ stereotype as a foil against which to play the interaction of the engineering professional and the engineering manager. It would be wrong for managers to approach engineering employees as though they were singularly ISTJ, and it would be wrong for engineers to reject the analysis as not applicable to themselves because their self-image is not singularly ISTJ. I hope the admonitions and coaching in this first phase of the text will be viewed as informal and helpful, as they are intended, rather than prejudiced and paternal, as they are not.

Good psychology and managerial style are not enough, however. In a more immediate and overriding sense, the R and D manager must be prepared to cope with the technical aspects of the job if he or she is to be effective. By technical, I mean matters such as planning, programming, and budgeting, benefit-cost analysis, venture analysis, and so on. These tasks seem more congenial to most technically oriented persons than do personnel-oriented tasks. In Chapter 6 I initiate the discussion of these technical aspects with an overview of R and D in the private sector of the U.S. economy. Here is included a summary of investment in R and D in various U.S. industrial sectors and the place of R and D in the corporate hierarchy.

When one discusses R and D in the public sector, as in Chapter 7, one is dealing with welfare economics. That is, the common weal requires that the welfare of the nation and all its citizens rather than any special group be considered. One cannot externalize costs. Furthermore, in the public sector it is difficult to develop a balance sheet in which an explicit bottom line shows rate of return on investment (ROI). Management of public sector R and D resists such accounting devices as are normally used in business in favor of a treatment using benefit-cost ratios as a basic measurement tool.

In Chapter 8, I return to the private sector to take up in more detail the question of analyzing possible new ventures for the enterprise, and I attempt to show how the R and D manager can make a contribution to this important question. Budgeting and planning methods form the subject of Chapter 9. The specific question of how one prepares a program package and its budget is discussed in detail.

Next, in Chapter 10 consideration is given to the specific problem of selecting those R and D projects to fund from a broad menu. R and D project selection is a special case of the allocation of scarce resources and has attracted a great deal of academic attention, but it does not yet yield to a purely analytic approach, even though some promising methods are now under development. Already in Chapter 8 an excellent evaluation procedure has been advocated, but here I attempt to put this problem in theoretical perspective.

Finally, in the last chapter, I take a broader view and look at the corporate planning activity as a whole. Corporate long-range planning (LRP) is essential to provide a framework within which specific venture

analysis takes place. Long-range planning is not the exclusive responsibility of an R and D manager, nor is venture analysis, but R and D planning is a part of the overall corporate plan. Furthermore, if the R and D manager understands the systems approach to planning discussed here, there is the possibility of introducing this methodology as the overall planning method of the organization. This will permit the R and D manager to make an important contribution to general administration.

I hope that upon consideration, the logic of the chapter arrangement will be clear. I begin with the person and then consider his or her place in the organization. The arrangement is first holistic or contextural and moves from the general to the specific. This approach can annoy the experienced manager, since he or she is already inside an R and D organization looking out. It appeals to the student, however, since it starts on the outside with the student and only gradually moves into the organization. One could liken this approach to the concept of top-down structured programming now gaining currency in computer science.

John E. Gibson

Charlottesville, Virginia
February 1981

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PART ONE

Personnel Tasks



CHAPTER ONE

Introduction to Managing Professional People

1.1 INTRODUCTION

This chapter provides an overview of the text. But it is not quite an “executive summary,” since it does not extract the resulting conclusions of the text and present them in a compact format. Rather it attempts to set the stage by first describing the topics to be discussed in greater depth in later chapters. Then it discusses several minor topics that are not carried any further but which deserve at least a mention. These latter topics include a discussion of the background needed to appreciate management theory, the purpose of management textbooks and university courses in management, and a definition of management.

1.2 THE PSYCHOLOGY OF THE PROFESSIONAL PRACTITIONER

Psychologists have developed a so-called stereotype or pattern of behavior for various types of individuals by studying their typical reactions to test situations. These tests reveal that the technical professional is different from many colleagues in the work force. To start with, the engineer objects to the very classification of “worker.” He or she wants to be considered to be a part of the governance of the enterprise. Technical professionals are also different from persons recruited into an organization with a background in the liberal arts and sciences. The value set of these professionals is different, the expectations they have of manage-

ment are different, and the way they behave under a given set of circumstances is different.

The engineer has been trained to and is comfortable with a convergent pattern of thought. He or she seeks convergent problems and solves them using convergent techniques. The liberal artist on the other hand has been exposed to divergent thought patterns and has learned to react to problem situations in a divergent manner. The concepts of convergence and divergence are explored in some detail in Chapter 3.

The personal values adopted by many engineers, and the way they are trained often lead them to be insensitive to interpersonal interactions. Perhaps that's why, as a technical professional yourself, you may never realize how different engineers are from most other people until you become a manager and begin to have other nontechnical and nonprofessional people reporting to you. You will also see this difference in your relationships by watching other managers handling other kinds of people. You certainly see this in the behavior of managers of different backgrounds with respect to events in the outside world.

There have been several clashes in the recent past between society and representatives of technology in which actors on both sides of the controversy have behaved in ways consistent with their psychological stereotypes. For example, given the present managerial style in the auto industry one would expect rigid, authoritarian management, and one would predict a brittle response to government legislation. One would expect a subjective and emotional response to Ralph Nader. One would then expect society to produce a counterreaction to such rigidity, and then one might also suspect that both sides would be surprised at each other. Although psychology is by no means an exact science, it does have some elements that can help us understand these interpersonal interactions. No attempt is made to get the reader to become an expert psychologist in this text, but we do want to understand ourselves and people with similar as well as dissimilar modes of response a little better. This new understanding will be aimed at reducing the number of unpleasant surprises for ourselves in our professional interpersonal relationships and in helping us to avoid triggering off unpleasant responses in others by our own lack of skill.

1.3 THE PSYCHOLOGY OF THE MANAGER

Those who attempt to organize the affairs of an industrial, government, or academic research organization, whether in the private or public sector, generally develop a different mind set than they had when doing purely technical work. It is a commonplace observation that one's environment has an effect on one's personality and mode of behavior. This is surely true of an intense involvement in one's work environment.