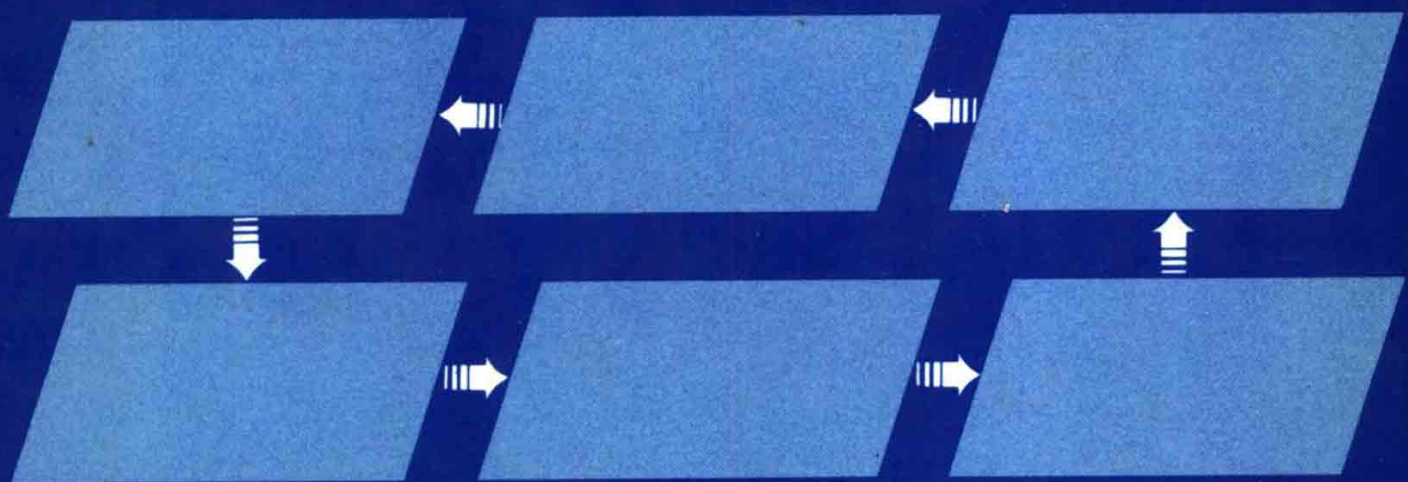


MATRIX MANAGEMENT SYSTEMS



HANDBOOK

Edited By
DAVID I. CLELAND

MATRIX MANAGEMENT SYSTEMS HANDBOOK

Edited by

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VAN NOSTRAND REINHOLD COMPANY
NEW YORK CINCINNATI TORONTO LONDON MELBOURNE

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Library of Congress Catalog Card Number: 82-24827
ISBN: 0-442-21448-0

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Manufactured in the United States of America

Published by Van Nostrand Reinhold Company Inc.
135 West 50th Street
New York, New York 10020

Van Nostrand Reinhold Company Limited
Molly Millars Lane
Wokingham, Berkshire RG11 2PY, England

Van Nostrand Reinhold
480 Latrobe Street
Melbourne, Victoria 3000, Australia

Macmillan of Canada
Division of Gage Publishing Limited
164 Commander Boulevard
Agincourt, Ontario M1S 3C7, Canada

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging in Publication Data
Main entry under title:

Matrix management systems handbook.

Includes index.

I. Matrix organization—Addresses, essays,
lectures. I. Cleland, David L.

HD58.5.M39 1983 658.4'02 82-24827
ISBN 0-442-21448-0

Preface

The purpose of this handbook is to provide managers and professionals with a reference guide for the design and implementation of matrix management systems in their organizations. The book will be useful for supervisors of matrix operations in contemporary organizations, and for those professionals responsible for applying matrix implementation techniques in such organizations. In addition, the book will help all persons—students, managers, professionals—who require concise reference material on the various matters related to matrix management systems.

Managers and professionals alike need to keep abreast of changes in the structure and management of contemporary organizations. A key characteristic of today's organization is the growing use of some variation of "matrix management," which emphasizes a team approach to the management of organizational activities. The project management context of matrix management may include a project as large as the Alaska oil pipeline. At the other extreme, managing a small research project in a laboratory may involve project management techniques. Project management is firmly established today in corporations and in governmental and educational organizations. Team management is also found in other applications such as task forces, product management, product development teams, people involvement teams, Quality Circles, task teams, plural executives, satellite teams, project center management, new venture management, etc. Current management literature groups all these team-related efforts under the generic title of "matrix management." This handbook provides a pragmatic explanation of what matrix management is all about.

Like any new concept, matrix management continues to emerge. While many authors have published in the field, a reference book has not been made available. Thus this handbook satisfies a need for a reference source that combines synergistically the many theoretical and practical ideas about matrix management that have appeared in recent years.

The handbook provides both summary and detailed guidance for the many varieties of matrix management that have become popular in industrial, governmental, educational, and nonprofit organizations. Many of the authors have provided related bibliography for further reference. Senior executives will find this book useful in determining the potential opportunities for altering their organization toward a matrix form. Once matrix has been implemented or broadened, senior executives will find this book essential for improving the

management of the matrix process. For many managers, matrix management is either unknown or surrounded with a mystique that discourages experimentation in this modern management approach. This book should help these executives understand what matrix management can and cannot do for them.

The handbook provides information on both the theory and practice of matrix management. Primary emphasis is on the practical aspects of managing matrix systems. This pragmatism is based on a sound theoretical framework of management experience and thought.

Many people cooperated in producing this book. Their qualifications are stated in the biographical sketches that accompany the chapters.

Seven interdependent areas of matrix management systems are presented.

1. *Introduction to Matrix Management* provides a general framework for what matrix management is and how it evolved.

2. *Matrix Management Applications* deals with the different matrix forms in use today.

3. *The Matrix Culture* examines how values, beliefs, and attitudes of people are shaped by matrix management.

4. *Implementing Matrix Management* describes the problems and opportunities encountered, as well as some strategies to use, when starting up matrix systems.

5. *Matrix Support Systems* describes some of the more important supporting systems required to make matrix effective.

6. *Matrix Management Techniques* deals with several key techniques and approaches for making matrix work.

7. *Organizational Strategy in Matrix Management* provides guidance on how to vary organizational design and development to accommodate matrix management.

I thank the contributing authors for their practical presentations of what matrix management is all about. I am deeply indebted to Claire Zubritzky, who expertly administered the handbook. I also thank Dr. Al Holzman and Dr. Max Williams, who in the School of Engineering at the University of Pittsburgh continue to provide an environment in which the faculty can pursue—in their own way—the generation of knowledge.

DAVID I. CLELAND
Editor

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Section I

Introduction to Matrix Management

Clearly, matrix management is an idea whose time has come. The particular matrix form that can be used by today's managers depends on the circumstances in the environment that stimulate the need for some alternative organizational form. Section I of this handbook presents an overview of contemporary matrix management systems. Matrix management is viewed as a complex of alternative management and organizational forms designed to deal with the interdependencies, complexities, and change of current organizations.

In Chapter 1, David I. Cleland presents an overview of matrix management as a kaleidoscope of organizational systems. He discusses briefly the alternative forms of matrix management in use today. An operational definition of matrix management is provided in terms of structure, process relationships, and patterns of organizational behavior criteria which indicate that some form of matrix management exists.

In Chapter 2 John R. Adams and Nicki S. Kirchof discuss the practice of matrix management. The authors use the typical evolution of the matrix in an organization as a way to identify those conditions in an organization that require some organizational change. By examining the roles of the managerial participants in the matrix, Adams and Kirchof establish the differences between the requirement of the matrix and those of the more traditional organizations.

In Chapter 3 Milan Moravec uses the dual reporting aspect of matrix management as a focal point to examine the sum of the behavioral and organizational factors that contribute to, or detract from, high performance in making the matrix work. He points out the challenge of ensuring high productivity in the simple one-boss, one-worker situation that is compounded when the dual reporting relationship of matrix management is introduced.

1. A Kaleidoscope of Matrix Management Systems¹

David I. Cleland*

A kaleidoscope of matrix management systems is emerging in the theory and practice of management today. These systems appear to have one overriding characteristic—a departure from the classical model of management in favor of a multidimensional system of sharing decisions, results, and rewards in an organizational culture characterized by multiple authority-responsibility-accountability relationships.

This chapter provides an overview of the various management systems that have evolved in modern organizations, and will help illuminate the value of the matrix approach and demonstrate its flexibility in meeting the needs of different organizations.

PROJECT MANAGEMENT

Project management emerged in an unobtrusive manner starting in the early 1960s. No one can claim to have invented project management; its beginnings are often cited in the ballistic missile program or the space program of the United States. The origins of project management can be found in the management of large scale ad hoc endeavors such as the Manhattan Project, and—on a smaller scale—in the practical model provided by project engineering.

In 1961 Gerald Fisch, writing in the *Harvard Business Review*, spoke of the obsolescence of the line-staff concept and heralded a growing trend toward “functional-teamwork” approaches to organization. Also in 1961, IBM established systems managers with overall responsibility for various computer models across functional division lines. In the 1960s and 1970s a wide variety of organizations experimented with alternative project management organiza-

¹This chapter is adapted from the article by David I. Cleland, “A Kaleidoscope of Organizational Systems.” *Management Review*, December, 1981. Used by permission.

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tional forms. At present, project management has reached a high degree of maturity and is widely used in industrial, educational, governmental, and military circles. A distinct literature has emerged dealing with the management of ad hoc projects in contemporary organizations.

PROJECT ENGINEERING

Project engineers are usually responsible for directing and integrating all technical aspects of the design/development process. Typically, a project engineer manages a product throughout the engineering process from initial design through the service life of a product. When a product design/development problem exists in a functional department, a project engineer is responsible for working with the functional department to correct the problem. In some companies the project engineering function is, in effect, the project management arm of the engineering department. In another context, project engineering involves the building of plants from the preliminary study through the design, procurement, erection, and start-up operation.

PRODUCT MANAGEMENT

Product management in one of its earliest forms appeared in the early 1930s when Procter & Gamble inaugurated brand management. Thus this form of matrix management has been with us for some time. Briefly, it assigns responsibility for a given product or brand to an individual. When product managers are so appointed, a matrix organization is created with a resulting product-functional interface.

In some cases these product managers are basically information gatherers on product performance and have little or no authority over the heads of the functional departments. In other situations, a product manager develops a product plan covering such matters as advertising, use of field sales force, research support, packaging, and manufacturing programs. He is then responsible for negotiating with the suitable functional departments for the support and costs of the product.

Such a plan, once approved by top management, forms the basis of the product manager's authority. Product managers typically represent top management on assigned products. In carrying out their responsibilities, they work across traditional functional lines to bring together an organizational focus, so that product objectives can be achieved.

INTERNATIONAL MANAGEMENT

Multinational companies are usually organized to do business globally on a matrix system of management. In these companies, responsibility for strategic

and key operating activities is divided among organizational elements as follows:

- *Product.* Responsibility concentrated in product or product line management with worldwide perspective.
- *Geography.* Responsibility concentrated within a specific territory such as a country.
- *Function.* Responsibility concentrated in an organization's functional specialty such as finance, production, marketing, or research and development.

In the international company there are usually two coordinated avenues of strategic planning: product and geography. Since decisions are shared, accountability for results is also shared in terms of product and geographic profitability through profit centers. Financial visibility by product, function, and geography is the norm in the multinational company.

A basic factor in international management that is significantly affected by matrix management is the traditional concept of the profit center, with its delegation of authority to one manager who is responsible for profitable results. To him, everything counts at the profit-center level, everything is measured there, and people are rewarded accordingly. Certain key decisions, such as product pricing, product sourcing, product discrimination, human resources, facility management, and cash management, are traditionally considered the profit-center manager's prerogative.

But in international matrix management, the profit-center manager will share key decision making with others. Some managers, accustomed to making these decisions on their own, find that sharing decision making with some other manager outside the parent hierarchy can be a "culture shock." For example, in product pricing in the international market, the profit-center manager will find it necessary to work with an "in-country" manager to establish price. Product-sourcing decisions may be made by senior marketing executives at corporate headquarters rather than by the profit-center manager. In practice, decision authority should be complementary. If the manager cannot reach agreement on these decisions, it may be necessary to refer the conflict to a common line supervisor for resolution.

TASK FORCE MANAGEMENT

Task forces are used by companies to deal with problems and opportunities that cannot easily be handled by the regular organization. Usually these problems or opportunities cut across organizational boundaries. A task force can be a powerful mechanism for bringing talent to focus on complex matters. When the objective for which the task force was organized is attained, the group disbands.

A task force composed of persons drawn from appropriate elements of an organization is used to deal with a short-term problem or situation. People are usually assigned to work on a task force on a part-time basis and find that they have to satisfy two bosses during this period—their regular supervisor and the task force leader. Since each member usually represents a different part of the organization and brings different viewpoints, goals, loyalties, and attitudes to the group, the job of integrating individual efforts is no small challenge for the leader.

PRODUCT TEAM MANAGEMENT

Product team management is a generic phrase that describes a relatively permanent product-functional matrix in which business-results managers overlay a functional resource organization. A team of people is organized and charged with managing a product or product line serving specific market segments. Other names used to describe this form include “business boards,” “business committees,” and “business heads.” Product team management is a form of permanent matrix where certain key managers on one part of the matrix structure are held responsible for the *results* of a product or product line. On the other side of the matrix, managers who head up specialized functional activities are responsible for *facilitating* the use of resources within the organization so that organizational goals are accomplished.

For example, a chemical company with sales of \$2.3 billion had 24,000 employees in 26 countries. The company was organized into seven operating groups, each of which functioned like a separate company. But corporate controls were ineffective. Corporate management found that it lacked visibility in reviewing major projects, strategic programs, and other investment issues. Major expenditures contemplated by the group profit-center managers were rarely challenged. To bring corporate visibility to the decentralized operations, several management improvements were undertaken:

- A financial manager was placed at each plant and was assigned to report to both the plant manager and to the corporate controller—a form of matrix management.
- A computer terminal, placed near the chief executive’s office, gave daily, monthly, and quarterly sales data.
- Sixteen executives were identified as “business heads,” each with responsibility for a group of products that included product planning, investment, and product sourcing. These executives had no staff of their own; they functioned as the “eyes, ears, and legs” of the chief operating officer and reported directly to him. Profit/loss responsibility rested with the business heads; functional managers retained cost-center responsibility and provided services and technical support to the business heads.

The use of business head–functional support at this company has provided greater flexibility in establishing or discontinuing products. Strategic programs are given a more thorough corporate review; senior management has been freed from involvement in short-range operations that had taken up much of the chief executive's time. Truly strategic issues are now resolved from a corporate portfolio business viewpoint.

PRODUCTION TEAM MANAGEMENT

At the production level, teams of workers do their own work planning and control. In such a setting, the supervisor becomes a facilitator who helps the teams work out the details of assuming responsibility for the manufacture of the entire product.

The production team is used in many different situations in industry. For example, General Electric uses production teams of some 5 to 15 people to handle a particular responsibility of welding in a fabricating plant. The welders in the team are responsible for scheduling and planning their work load.

General Foods Corporation's Topeka pet-food plant has assigned production tasks to teams of 7 to 17 members. Each worker learns every job performed by the team, and receives pay based on the rate at which each job is completed by the team. There are no conventional departments, no time clocks, and no supervisors—just team leaders who work on equal terms with other team members.

TRW Systems Corporation has created semiautonomous work teams in one of its manufacturing plants. The workers assemble a product on a team basis rather than performing assembly-line tasks separately. Teams are allowed to schedule their own time, as long as they do the job.

Volvo auto has one auto assembly plant at Kalmar, Sweden, where workers are organized into groups of six or more persons working as teams. For example, one team of workers injects a sealing compound in all seams and installs sound-dampening insulation. They rotate the team's 15 functions so that no one gets fatigued or bored performing the same job. As Pehr Gustaf Gyllenhammer, Volvo's chief executive, contends, "We have to change the organization so the job itself provides more for the individual. We will never build another production line as long as I am in command at Volvo."

At GM's Fisher Body Plant No. 2 in Grand Rapids, Michigan, the 2000 employees have been organized into six business teams, each team being essentially a business unto itself with its own maintenance, scheduling, and engineering personnel. Currently, salaried employees at all levels participate in deciding how to meet their team's objectives, but team members paid by the hour are included in the decision-making process.

"The plant is much more effective now than before 1973, when the process began," says a GM spokesman in Detroit. But he adds: "The point isn't to improve productivity. It's to improve the quality of work."

NEW BUSINESS DEVELOPMENT TEAMS

Sometimes teams are used to develop new business opportunities. Occasionally they are organized on a permanent basis to conceptualize, develop, and provide an overview for new businesses. One company stated its policy on new venture development in the following manner:

new business venture teams will be organized within the company. Each team will be asked to identify problems, devise plans to improve the company's performance and implement those plans. By this process, management and professionals at all levels will become active participants in our new Business Systems. . . . our concept is to have key company personnel organized into teams to conceive, develop, and implement methods of improving our business systems.

In another situation a team approach was used to evaluate worldwide business opportunities in polypropylene. Through the efforts of the team a global, long-range plan for an emerging polypropylene business was created.

In the Microwave Cooking Division of Litton Industries, the organization has developed a task-team approach for new product development. Each team has a manager with representatives from several functional departments and top management participation, as required. For new product development within the engineering department, a team includes a design engineer, a stylist, technicians, drafting personnel, and quality and manufacturing engineers. A representative from marketing, buyers, and a home economist are also included. Specialists from industrial engineering, cost accounting, production management, and other specialties are added as needed during the life cycle of the project. The manufacturing function is organized into operating units as a self-contained task team responsible for all aspects of manufacturing a product series.

Litton Industries claims significant benefits from the task-team organization: increases in sales, market share, and profits. For outsiders and newcomers, the most striking feature of the company is the openness of the organization. The firm's receptiveness to new ideas and people, and its attitude toward sharing information, problems, and opportunities, make this apparent at all levels in the organization.

The General Motors Company adopted a form of matrix management in its engineering development community in 1974. Called a "project center," it represents one of the most significant changes in organizational approaches at General Motors since the profit-center decentralization concept in the 1920s and 1930s. The motivation for realigning the engineering divisions into a project center was a strategic change in the marketplace—in this case, the trend toward smaller automobiles. Project centers are used to coordinate the efforts