



The Space Congress® Proceedings

1968 (5th) The Challenge of the 1970's

Apr 1st, 8:00 AM

Mind Organization: Key to Efficiency in Space Age Management

William F. Ghana

Convair Division of General Dynamics

Follow this and additional works at: <https://commons.erau.edu/space-congress-proceedings>

Scholarly Commons Citation

Ghana, William F., "Mind Organization: Key to Efficiency in Space Age Management" (1968). *The Space Congress® Proceedings*. 2.

<https://commons.erau.edu/space-congress-proceedings/proceedings-1968-5th/session-16/2>

This Event is brought to you for free and open access by the Conferences at Scholarly Commons. It has been accepted for inclusion in The Space Congress® Proceedings by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.

MIND ORGANIZATION

Key to Efficiency in Space Age Management

by:

William F. Chana
Convair Division of General Dynamics
San Diego, California

DOES THE PROFIT A COMPANY MAKES RELATE ITSELF TO ITS FORMAL ORGANIZATION? AS YOU STUDY THIS QUESTION, YOU SOON COME TO THE REALIZATION THAT TO ATTAIN MAXIMUM PROFIT YOU HAVE TO START BY THINKING MINIMUM. CAN THE TASK BE ACCOMPLISHED WITH FEWER PEOPLE? CAN THE NUMBER OF PARTS BE REDUCED? CAN THE BURDEN BE MINIMIZED? YOU MUST KEEP THE WORD "MINIMUM" ON YOUR MIND TO REAP MAXIMUM PROFITS.

Summary

MIND organization is a concept of using a specific MINimum number of functional DEpartments.

MIND organization uses common functions and disciplines to encourage communication, promote harmony, and strengthen the bond between a corporation's headquarters, its divisions, plants, test sites, large program offices, small project offices, and its customers' own program/project offices. It is a concept that can be adopted by a company as organization policy.

Cost incentive contracting, total package procurement, and program/project management emphasize the need for early consideration of all systems criteria. This means that the functions and disciplines required to administer, conceive, build, and support a total system must be recognized by the responsible manager early.

The manager must have equal appreciation for (1) business management, (2) technology management, (3) logistics management, and (4) production management and the disciplines that fall within each of these

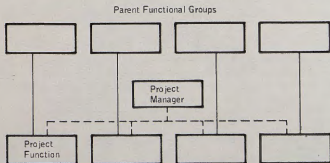
functions. This early recognition and appreciation is a prerequisite to delivering quality performance systems on schedule within budget.

Executive organization structure must match management objectives, and managers must operate to well-understood charters. This paper suggests a way of making this happen.

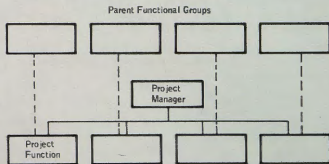
Experience Observations

We learn from our experiences... yet we must carefully observe and analyze our past to single out those experiences that can be used again to improve operating methods. To better understand what experiences might lead to improved management, I have carefully observed and analyzed my own.

My observations indicate that there can be several satisfactory forms of organization. For example, you can have a matrix organization, as shown in Figure 1, where staff members work for and receive direction from their project manager but they report directly to



Matrix Organization
Figure No. 1



Project Organization
Figure No. 2

and obtain their pay checks from a parent functional group.

On the other hand, there is the classical project organization, as shown in Figure 2. In this case staff members report directly to and work directly for their project manager. They obtain their functional guidance indirectly from a parent group, sometimes located thousands of miles away.

Other forms of an organization structure can be a mixture of the matrix and project organization.

Experience Analysis

My analysis reveals that these variations in organization have very little effect, if any, on team spirit, motivation or getting the job done on schedule within budget. The greatest beneficial effect seems to come about when the authority of the project manager is made clear to him, his staff, his subordinates and his peers.

The greatest negative effect comes from either the existence, the non-existence or the duplication of certain functional responsibilities at various organizational levels. Also, the combinations and mixtures of unrelated functional tasks contribute to inefficiency.

Although experience is valuable, it in itself does not completely qualify a person to establish what he might think is the ideal organization. Personal experiences must be augmented.

To provide a substantial part of this augmentation, there are many books, papers and seminars that outline the principles of management and management organization. Their contents are based on extensive studies and decades of historical facts covering both successful and unsuccessful business experiences. A few of these are listed at the conclusion of this paper as suggested reading.

Many of the thoughts expressed in this paper find their origin in such documentation.

A Different Look

The following then is a somewhat different look at a concept of organization already recognized by certain educators and management experts. It is a concept that both seasoned and unseasoned managers, at all levels of an organization, in both small and large companies should consider.

Management Objectives

In 1959 Lt. Gen. B. A. Schriever said, "The nation's survival depends more on proper management of ballistic missile programs than on technology." This emphasis on efficient management is true today as we race to the moon, and it will be equally true as the future unfolds even greater challenges.

A basic management objective is to efficiently and effectively apply technical competence, logistics capability, and production techniques to deliver goods and services — at a profit — for the mission the customer needs to accomplish. Management should always be striving to reach an organizational structure designed to satisfy this basic objective.

Some of the goals of an efficient organization are effective communication with well-defined paths of information transmission, well-proportioned span of management control, proper delegation of authority and no duplication of work.

The MIND organization concept gives full consideration to these management objectives, and has as its primary aim the attainment of maximum long term profits.

Organization Flexibility

It is wrong to assume that an organization must always be organized around the personalities, abilities, or idiosyncrasies of people. It is actually more logical to fit qualified people into an organization. But, flexibility in organization is also important because changes in personnel and temporary emphasis on certain needs means that there will always be variations to a desired ideal.

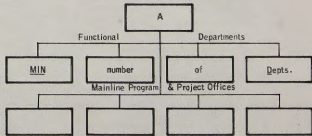
Thinking Minimum

How can a company make a profit? Surprisingly enough as we study this question we come to the realization that to attain maximum profit we must gear ourselves to thinking MINIMUM. That is, we must accomplish the task with fewer people. We must reduce the number of parts. We must minimize overhead costs.

Thinking "BIG" is required in some hardware cases like the Saturn launch vehicles and the forthcoming Jumbo Jet transports. But in terms of management, thinking "BIG" is not a requirement. In terms of management, thinking "MINIMUM" must constantly be emphasized if a company is to reap maximum profits.

Minimum Department Concept

The MIND organization centers on the requirement of thinking minimum. It is a concept of using a specific MINimum number of functional Departments as shown in Figure 3 below.



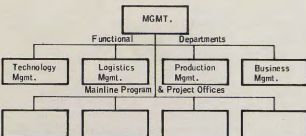
Minimum Department Concept
Figure No. 3

The concept of minimum functional departments is equally applicable to corporate, division, plant, program, project, off-site base and work level organizations. Minimum levels of authority, desirable span of control and balance of function and project efforts become by-products. Direct or indirect functional guidance is acknowledged and accepted. Delegation is encouraged. Duplication is discouraged. Minimum confusion and minimum overhead result.

Four Basic Functions

If you stand back, take a positive look at it, and at the same time tighten your management belt, you will see that it is conceivable to have an organization structured to a minimum of just four basic operating functions.

This is the key to the MIND organization concept. Industrialists and educators point out that a quality product can be produced on schedule and within budget if an organization possesses and controls four basic ingredients, namely: Knowledge, Material, Labor and Capital. Each is of equal importance. Organizationally these ingredients can be expressed as TECHNOLOGY, LOGISTICS, PRODUCTION and BUSINESS management, as shown in Figure 4 below.



Four Basic Functions
Figure No. 4

Solid Foundation

To build a stable organization that will firmly support top management, each of the four functions must have a solid foundation. Each must have a matching set of building blocks to effectively and efficiently accomplish its increment of the total task. The specific identity and number of organization blocks under each of the four basic functions are, of course, related and proportional to the nature and the volume of a company's business. A typical set of building blocks is shown in Figure 5.

Mirror Image

MIND organization is most effective when it starts at the highest level of management and is reflected as a mirror image throughout all succeeding levels of effort as shown in Figure 6 on the following page.

MANAGEMENT			
Technology Mgmt.	Logistics Mgmt.	Production Mgmt.	Business Mgmt.
Marketing	Purchasing	Mfg. Res.	Finance
Engineering	Spares	Planning	Contracts
Testing	Indus. Eng.	Tooling	Data Mgmt.
Program Control	Material Control	Fabrication	Legal
Customer Service	Dispatch Control	Final Assembly	Community Relations
Configuration Mgmt.	Trans. & Traffic	Production Check-out	Industrial Relations
Quality Control	Shipping & Receiving	Plant Maintenance	Value Control
Technology Data Center	Logistics Data Center	Production Data Center	Business Data Center

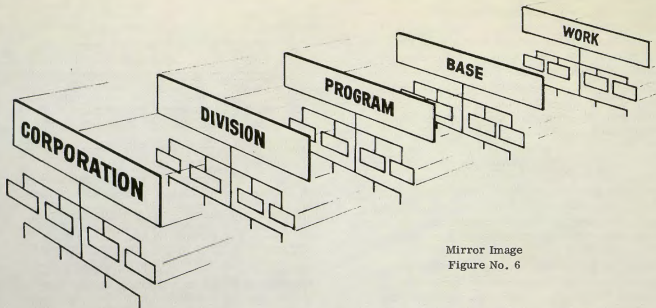
Solid Foundation
Figure No. 5

Have you ever looked for guidance from a higher echelon of your organization only to find that there really was no counterpart? It probably took two or three contacts before you were properly guided in your action. The mirror image type of organization promotes communication and understanding among people, and most importantly, it promotes an air of respect worthy of the parent organization.

Although certain middle management personnel won't admit it, they eagerly seek functional guidance from those who are in a position to provide it. Mirror image organizations, through a complete understanding and use of similar terms, encourages functional guidance to flow freely through the various organization levels.

Common Denominator

The least common denominator of a corporation is the work team at a job site. If you analyze this team you find that its efforts reflect the same four basic functions, i.e., TECHNOLOGY, LOGISTICS, PRODUCTION and BUSINESS Management. Technology at the job site would have a few design engineers and test engineers, quality control inspectors and a scheduler. Logistics might have only two dispatchers and a stock clerk. Production would consist of a foreman, several mechanics and technicians. Business Management might consist of but one timekeeper.



Mirror Image
Figure No. 6

It can be seen that if the highest, the intermediate and the lowest organization levels of a company limit their basic functions to these four, a major step in encouraging effective communication takes place.

The Technology Function

In reviewing the Technology function, the tasks that can be considered technical in nature are: Marketing, Engineering, Testing, Program Control, Customer Service, Configuration Management and Quality Control. These tasks can be headed by one member of top management carrying the full authority and responsibility for Technology.

It is important, of course, that each of these tasks remain segregated as specific disciplines. Even though their interests and activities are closely related, there will be differences in opinions. These differences can best be resolved by the leader of Technology rather than the top executive of the corporation, division, project, base, or work level management.

The managements of many aerospace companies are coming more and more to realize that Technology is the life blood or backbone of the firm. Technology is the one building block that management looks to for creativeness, insight, foresight, vision, courage, vigor, and new innovations.

Engineering and Marketing

Representatives of a Marketing Department and an Engineering Department often accomplish nothing when they independently try to decide on the best product to promote for their company. Being completely unbiased you would have to agree that it is best to have these men realize that they both work for one leader. The head of Tech-

nology can best judge problem situations before they need the attention of the enterprise executive.

It is very difficult at times to determine who the salesmen are, the men in the Marketing Department or the men in the Engineering Department. Actually both are required. Market researchers and dedicated product sales personnel are a real necessity, and together with advanced design engineers they can become one strong team under Technology.

Engineering and Testing

Flight Testing, static testing, subsystem and component testing are definitely technical in nature. In some organizations testing is an integral part of Engineering. Certainly testing and engineering are closely related, but experience has shown that they definitely are two separate disciplines. If a fair and unbiased evaluation of the product to be delivered to the customer is to be made, engineering and testing should be separated to provide a proper check and balance. Both, however, rightfully belong under Technology.

Engineering and Quality Control

Some people believe that Reliability and Quality Control should not come under Engineering as this would not provide a proper check and balance. There is sound and logical reasoning behind this belief, but this does not mean that they cannot be under the same technology roof as separate disciplines.

When a production article is built to drawings and it conforms to specifications, it is normally classified as reliable and of good quality. Engineers develop these drawings and specifications and they revise them as technology advances. Quality Control personnel assure the engineers that the articles have been made to the drawings. Test engineers assure that the articles perform to their specifications.

Engineering and Customer Service

The Customer Service Department with its technical representatives in the field, its service engineers at home, training aid developers, personnel subsystem engineers and technical manual writers, easily falls into the Technology category. When a product is in the hands of the user, the Customer Service Department takes the forefront.

Customer Service is the principal contact for the customer on the delivered product, thus freeing the Engineering Department of this burden and allowing it to concentrate on new products. Modification Engineering, Engineering Change Proposals and Emergency Technical Orders are best handled by the Customer Service Department. The importance of formulating accurate and well understood technical orders that instruct the customer on how to best use the product has become increasingly important as our technology advances.

Design engineers require reliability and maintainability feedback. A good Service Engineering group can best accumulate such customer experience and transmit this information to the design engineer on the drawing board where real value, reliability and maintainability must have its origin. Now, in a MIND organization, Customer Service can be a strong separate discipline under the Technology function.

Engineering and Program Control

The long range plans of the company and the schedules that support plans are usually vested in a group called Program Control. The inputs of Engineering and Marketing are the first dictates of a company's plans and schedules. Therefore, since there is a close relationship, Program Control can rightfully come under the Technology function.

Although this arrangement might appear on the surface to be in opposition to a good check and balance, Program Control groups historically seem to flounder and become weak puppets unless they are supported by a strong technological force.

The Logistics Function

Logistics is one of the more important operating functions of an industry involved in manufacturing and delivering a product. The logistics function is sometimes referred to as the Distribution function. But regardless of what it is called people always seem to forget that this function must be a complete entity to function effectively.

Has your job ever been delayed due to the late delivery of parts, or have schedules slipped because of continually postponed delivery dates? If you are experiencing delays, you can usually pin them down to a Logistics function that does not have all of its proper elements.

It is rather frustrating when someone says, "Oh! That's not my job, the other department handles that." It is even more frustrating and very nerve-wracking when the next department gives you the same story. By putting all elements of Logistics under one function these frustrations can be eliminated.

No Excuses Necessary

The question then arises, what elements do Logistics Managers need to do their job right? Observations and analysis of past experiences have shown that there have been good Logistics functions, but they were the ones that contained within themselves the complete capabilities of:

Purchasing - to buy the materials and vendor's parts;
Traffic - to control the statewide delivery routes and methods; Transportation - to control the movement of vehicles including all mobile equipment needed for the handling and placement of materials; Material Control - for record keeping; Production Control - for dispatching; Warehousing - for storage; Spares - for ready support; Shipping and Receiving, and Industrial Engineering.

When the Logistics Manager is provided with these capabilities, he automatically has all of the tools he needs to do his job. No excuses are necessary.

The Production Function

The Production Function, sometimes referred to as the Operations Function, has the mechanics, technicians and the maintenance men, all specialists in their particular trades. These are the people that do most of the physical work. The Production Function consists of Manufacturing Research, Production Planning, Tooling, Fabrication Bench Work, Final Assembly, Production Check-out and Plant Maintenance.

A separate plant that limits its operations to production or a separate depot operation in support of the customer, but utilizing the same personnel skills, can also be under the Production Function. All of these, including Plant Engineering that oversees subcontract construction, are intimately interrelated, and each can be a separate discipline under Production.

The Business Management Function

Business Management, sometimes referred to as the Administration Function, is not a catchall for everything remaining in an organization. Instead, it is an orderly grouping of service departments that are required to support a going organization.

Finance, Contracts, Data Management, Legal Counsel, Community Relations, Value Control and Industrial Relations (with its Medical, Security, Fire Protection, Labor Relations, Employment, and Wage & Salary tasks) can all be separate disciplines under the Business Management Function.

The top man of the corporation, division, project, base or work level should not have to worry about the needs in each of these areas, when a good business management administrator can do the job for him.

Span of Control

A manager may have the tendency to absorb many direct, indirect and staff subordinates thereby creating a large span of control. Some managers go completely overboard and have as many as 15 to 25 men reporting directly to them.

Although some men have greater capabilities than others, one theory of subordinate-superior relationships indicates that catastrophic complexity is created by a manager having more than eight subordinates.

For example, each subordinate added over a quantity of four doubles the number of relationships. Having twelve subordinates results in twenty-four times as many relationships as having eight. MIND organization encourages a reasonable number of subordinates, thereby maintaining an effective and efficient span of control and encouraging delegation of authority.

Having too few subordinates is just as serious as having too many. It is a big waste of management talent to have just two or three subordinates.

Common Guidelines

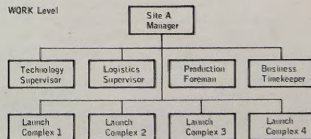
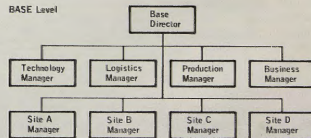
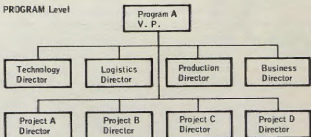
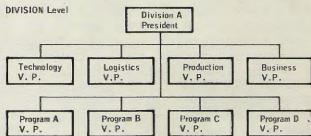
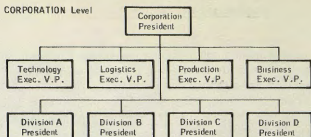
The MIND organization, expressed as a mirror image, establishes common guidelines for corporate, division, project, off-site base and work level management to follow. It permits the flexibility needed to assure the right blend of project and matrix organizations, decentralized or centralized organizations, company or customer emphasis, and the various geographic locations of divisions, plants, and off site bases.

Common Guidelines are readily visible when viewed on one chart as shown in Figure 7.

Standard Practice

The MINimum Department MIND organization concept with mirror image relationships can be adopted as a company standard practice. MIND organization as a company policy provides the guidance and direction required to prevent people from repeatedly creating complicated topsy-turvy organizations, i.e., organizations which in effect have few paths of communication or understanding within themselves or with others.

A Program Manager or Project Engineer and his subordinates must never lose sight of the fact that there is a parent organization. They must never lose their respect for division management, no more so than a division president and his staff would forget that they obtain their guidance from the corporation president



Common Guidelines
Figure No. 7

and his staff. Base Directors located miles away from the parent organization cannot forget that they and their subordinates must accept functional guidance from the home office.

Conclusion

Our country's planned venture to the moon calls for quite a few maneuvers in space. Each maneuver is based on sound and logical technical reasoning, but someday someone will accomplish this great feat with a MINIMUM number of steps.

Thinking BIG is necessary in certain hardware applications, but the question is, can thinking MINIMUM be applied to management. We must accomplish tasks with the fewest number of people, we must strive for value by having the least number of production parts, and we must cut out the frills and reduce the burden.

Organization structure must match management objectives and managers must operate to well understood charters in the form of policy and standard practices.

To deliver quality performance systems on schedule within budget in the environment of cost incentive contracting and total package procurement, the manager must recognize the need for the early consideration of all systems criteria.

The functions and disciplines required to administer, conceive, build, and support a total system in our Space Age requires the ultimate in efficiency.

A key to this efficiency, the MINIMUM Department (MIND organization) concept, centers on the requirement of thinking MINIMUM. This concept can help a company reach its primary goal of attaining maximum long term profits. Try it! Keep MIND organization on your mind.

Suggested Reading

Principles of Management by Harold Koontz, Ph.D., and Cyril O'Donnell, Ph.D., University of California, McGraw-Hill Book Company - 1964, Third Edition

Project Management by John Stanley Baumgartner, Management Consultant, Richard D. Irwin, Inc. - 1963

Planning and Developing the Company Organization Structure by Ernest Dale, American Management Association - 1962

Management by Objectives by George S. Odiorne, Ph.D., University of Michigan, Pitman Publishing Corp. - 1965

Management Systems by Peter P. Schoderbek, University of Iowa, John Wiley & Sons, Inc. - 1967

Economic Analysis of the Firm by Ivory L. Lyons, N.E. University and Manuel Zymelman, Harvard University, Pitman Publishing Corporation - 1966

Organizing the Research & Development Function by Alexander O. Stanely and K. K. White, American Management Association - 1965

Self Renewal by John W. Gardner, Ph.D, Harper and Row, Publishers - 1964

Introduction to Modern Business by Vernon A. Muselman, Professor of Business Education, University of Kentucky and Eugene H. Hughes, Professor and Dean, College of Business Administration, University of Houston, Prentice-Hall, Inc. - 1964, Fourth Edition.

About the Author

Bill Chana manages the Proposal Development group at the Convair division of General Dynamics. Prior to this assignment, and for a three year period, he was the Base Manager at Convair's Sycamore Static Test Site in San Diego, California, where Atlas and Centaur missile research and development captive hot firings were conducted.

In 1959-61 he was Base Manager for General Dynamics at Fairchild AFB, Washington during the installation and checkout of the first operational "E" series Atlas Weapon System. The Air Force Ballistic Systems Division "Commanders Award" was presented to him and his Fairchild team by General Thomas P. Gerrity for contribution to the U.S. Intercontinental Ballistic Missile Program. Prior to the Fairchild AFB assignment Chana was a military requirements specialist in Marketing assigned to Navy anti-submarine warfare programs.

He attended Purdue University and joined Convair in 1941. During World War II and the postwar years he was involved in the flight testing of Convair airplanes, from the first XB-24 Liberator bomber to commercial Convair-Liner transports. For a two year period he was in customer service commercial transports. This was followed by three years as Chief of Convair's Interceptor Service Department, where he directed In-Plant Service Engineering and F-102 and F-106 Field Service Technical Representatives assigned throughout the United States.