

FIG. 1

DOCKYARD REORGANIZATION

SOME BASIC THOUGHTS

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Introduction

The way in which Chatham Dockyard has been reorganized was described in Vol. 15, No. 2 of this *Journal*; it is thought that some of the principles upon which this reorganization is based may be of general interest and may perhaps help ships officers to get better service during refit periods.

The problem of getting a group of men to work together and complete a task on time is far older than recorded history and, at some very early date, men ceased to work like ants or bees and developed what is called the 'executive system' (FIG. 1). It is interesting to note that Moses insisted upon it; he established his 'chain of command' (Exodus XVIII, 25) and he 'delegated' authority to the appropriate levels (Exodus XVIII, 26). In passing, it is also interesting to note that he used the decimal system.

In the middle of the nineteenth century machines started to make life so complicated that those in command needed an 'assistant' (a 'specialist' in engineering); the executive system, which had stood the test of time for certainly more than 3,000 years, had to be modified (FIG. 2) and this raised the question of 'authority'. Could B order the 'specialist' A_s to do something or could A_s order B? There were no established rules which governed the relationship between B and A_s; the difficulties, consequent upon failure to recognize and solve this problem, stand out clearly in *Up Funnell, Down Screw*, a book by Commander Penn.

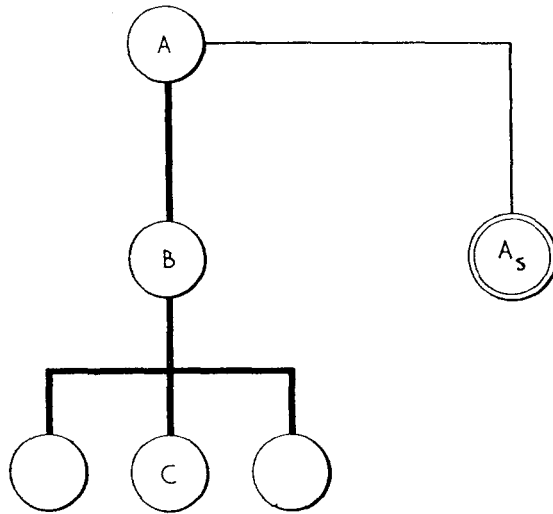


FIG. 2

to fire (limited) and to reward good work with promotion and/or salaries related to performance. In dockyards, management have less authority than the uniformed Service and less than industry; the 'speed of advance' must depend, to some extent, upon the degree of authority which management has over subordinates—negotiation takes time and persuasion requires patience.

It took the Navy the best part of a hundred years to establish a satisfactory 'role' for the specialist in H.M. ships and it is this problem, precisely, which confronts management when reorganizing a dockyard. It would be surprising if Chatham had in five years solved a problem which defied solution in the Navy for 100 years.

In the Navy, those in command have considerable authority over their subordinates by virtue of the Naval Discipline Act. In industry, management have ability to hire,

The Non-Reorganized Dockyards

Let the non-reorganized yard be represented by FIG. 1 where

A = Admiral Superintendent, who has authority over
 { B1 = M.C.D.
 B2 = M.E.D.
 B3 = E.E.M., each of whom has 'authority' over C1.1, etc., C2.1, etc., and C3.1, etc. Those in 'rank' C are 'accountable' for their work to those in 'rank' B, and those in 'rank' B to A. How do those in authority get work done?

'Authority' is no simple concept, nor is it absolute. An officer in battle may have unlimited 'authority' over his men but little 'power' to get them to do what he wants. An enemy soldier with a tommy gun pointed at you has extreme 'power' over you but no 'authority'. His 'power' may be limited by you because you may choose to die rather than be taken prisoner.

'Power' is no simple concept. The Executive Officer of a ship would be unlikely to say to the Engineer Officer: 'Your boat E.R.A. may not walk across my deck in dirty boots to mend the motor cutter' because to do so is not properly within the limits of his 'authority'. Such an order would need to come from the Captain. If, however, the Executive Officer regularly played golf with the Captain and the Engineer Officer was in the zone for promotion, it is unlikely that the Engineer Officer would disregard a request from the Executive Officer that the E.R.A. should avoid making the deck dirty, because the Executive Officer had, for want of a better word, 'power' over the Engineer Officer. If the Executive Officer ceases to play golf or the Engineer passes out of the zone for promotion, the 'power' available to the Executive Officer is diminished.

If two dockyard foremen give each others' children a lift to school on alternate days, each can exert 'power' (used in the sense described above) over the other to obtain a 'service'. This 'power' differs only in degree from that exerted by a soldier with a gun. Nevertheless it is significant; to maintain this domestic 'service' it is likely that each foreman will go to great lengths to see that he provides the other with 'services' in the dockyard.

Because B1 (FIG. 1) has no authority over B2 or B3 the only way in which he, B1, can co-ordinate their efforts is by 'consent', to obtain which he must use 'power' (in the sense of the word described above).¹ Did the various M.C.D.s and their staff down to and including Foremen of the Yard have enough 'power' to enable them to obtain 'co-ordination by consent'?² For various reasons they had not.

'Power' depends largely upon 'status' which comes from many different factors—salary, officer-like qualities, and so on. The title 'Foreman of the Yard' confers the 'status' which helps a man to co-ordinate the work of the other foremen in a non-reorganized yard. A secretary who earns enough to afford a holiday in Spain has 'status'. The right club confers 'status'.

Services

In a non-reorganized dockyard M.C.D. would provide staging, M.E.D. the crane and E.E.M. the electricity, as a 'service' to the other Departments. S.N.S.O.'s storekeepers would provide a 'service' for all departments.

In M.E.D.'s factory the tool room would provide a 'service' for all sections of the shop. So would the lathes if grouped in one section. Or is it better to let each section have its own lathes? Maintain its own lathes? Have its own ready-use stores? The decision is one for managerial judgement which must take into account local conditions. At one end of the spectrum is complete specialization and excessive dependence on the 'service' of others; at the other end of the spectrum is the Jack-of-all-trades with consequential inefficiency and duplication.

One thing is certain: however hard we try to avoid 'services' in favour of executive authority down a clearly defined 'chain of command', 'services' cannot be eliminated in any large organization.

Referring to FIG. 1, C1.1 and C1.2 can only obtain a service from C1.3 in one of two ways:

- either (a) because B1 uses his 'authority' and issues an order,
- or (b) C1.1 and C1.2 use the 'power' available to them.

Having decided to discard 'co-ordination by consent' and to establish 'authority' instead of 'power', it is only logical to suppress alternative (b) and develop alternative (a). C1.1 may be held responsible by B1 for obtaining the 'service' he requires but he can only be held 'accountable' if B1 'delegates' authority to him. B1, to avoid being inundated with detail, needs an assistant, a specialist, a planner, call him what you will, (to be discussed later), *to whom he must delegate authority*.

The Cross-Over Point

If C1.1 or C1.2 cannot get a 'service' from C1.3 the problem is simple. It is referred to B1, at the 'cross-over point', who makes a decision.

¹This article concerns a fully-loaded or overloaded dockyard. 'Power' is not needed when those who provide a service are underloaded—in extreme cases an 'unwanted' service may be thrust upon one to keep men in employment. Between the two extremes of underloading and overloading lies the condition when 'services' are available and readily provided without the use of 'power' or the exercise of 'authority'.

²It is interesting to note that A, at the top, can rely upon 'authority' to get work done and needs no 'power'. A workman, at the bottom, relies on 'power' and has no 'authority'. The ratio of 'authority' to 'power' changes progressively from top to bottom of the 'chain of command' and explains the frustration, so often experienced by 'middle management' (but not by 'top management'), and the formation of 'pressure groups' to exert 'power' at the bottom.

If however C1.1 cannot get a 'service' from C2.3 it is not so simple. It requires discussion between B1 and B2 and, if they cannot agree, it requires a decision from A, at the higher 'cross-over point'.

It is interesting to consider an extreme example. A draughtsman, X, designs a sophisticated item of equipment and estimates the maintenance load before it can be decided, by N at some 'cross-over point', that the complement of the ship matches the total maintenance load. Suppose N decides that the total maintenance load is excessive he must either:

- (a) Abandon the equipment, or
- (b) Have it redesigned, or
- (c) Increase the complement (and size) of the ship, or
- (d) Put the maintenance load on the dockyard.

But such decisions can only be reached at a 'cross-over point' which is too high up. If N decides it best to increase the load on the dockyards he may find that they are losing the very men most suited to the repair of sophisticated equipment because such men expect latrines which compare favourably with those in industry. Someone, at some level, must strike a balance. It is obviously, a waste of money to put equipment into ships which cannot be maintained; it is possible that ten per cent less money spent on sophisticated equipment and the money thus saved devoted to dockyard latrines would provide better fighting ships.

In the days of D.G.N.W., the 'cross-over point' would have been the First Lord and the Board of Admiralty who would have exercised their 'authority'. It now depends on the relative 'power' of the Minister of Public Building and Works and that of the Minister of Defence; 'authority' for a decision rests with the Prime Minister himself, none other.

In practice, of course, authority is 'delegated' and at some cross-over point, say G, a decision can be made to choose between, say, an extra married quarter or a dockyard latrine, keeping within approved financial limits. This need to delegate, at all levels of management, is fundamental and requires managers³ to define their 'policy' (discussed later).

The Assistant (or Specialist)

If B1 (FIG. 1) is to have time to devote to man-management and to the exercise of his professional skill he needs an assistant who will decide, *within the limits of his, B1's, policy*, the priority of rival claims between C1.1 and C1.2 for the services of C1.3. Let us call this assistant a 'planner', and use the suffix 'PLM' instead of 'S' for specialist (FIG. 2) and develop a system (FIG. 3).

The heavy line in FIG. 3 indicates firm 'executive' control with 'authority' delegated down the 'chain of command'. The light lines illustrate the way in which the planner works for his 'manager' and the hatched lines illustrate:

- (a) Vertically, the specialist allegiance which C_{PLM} has to B_{PLM} and A_{PLM} (to be discussed later), and
- (b) Horizontally, the 'authority' (not 'power') which C_{PLM} has over D1, D2 and D3, and B_{PLM} over C1, C2 and C3.

Provided A, B and C define their policy and provided A_{PLM} , B_{PLM} and C_{PLM} behave as assistants who act within the framework of that policy, the instructions which they give to C1, etc. and D1, etc. along the horizontal hatched lines have the 'authority' of the appropriate manager and the need for 'power' is eliminated. D1 can, of course, challenge an instruction from C_{PLM} in which

³'Managers', used in its general sense here and elsewhere, is used to include all ranks down to and including Inspectors.

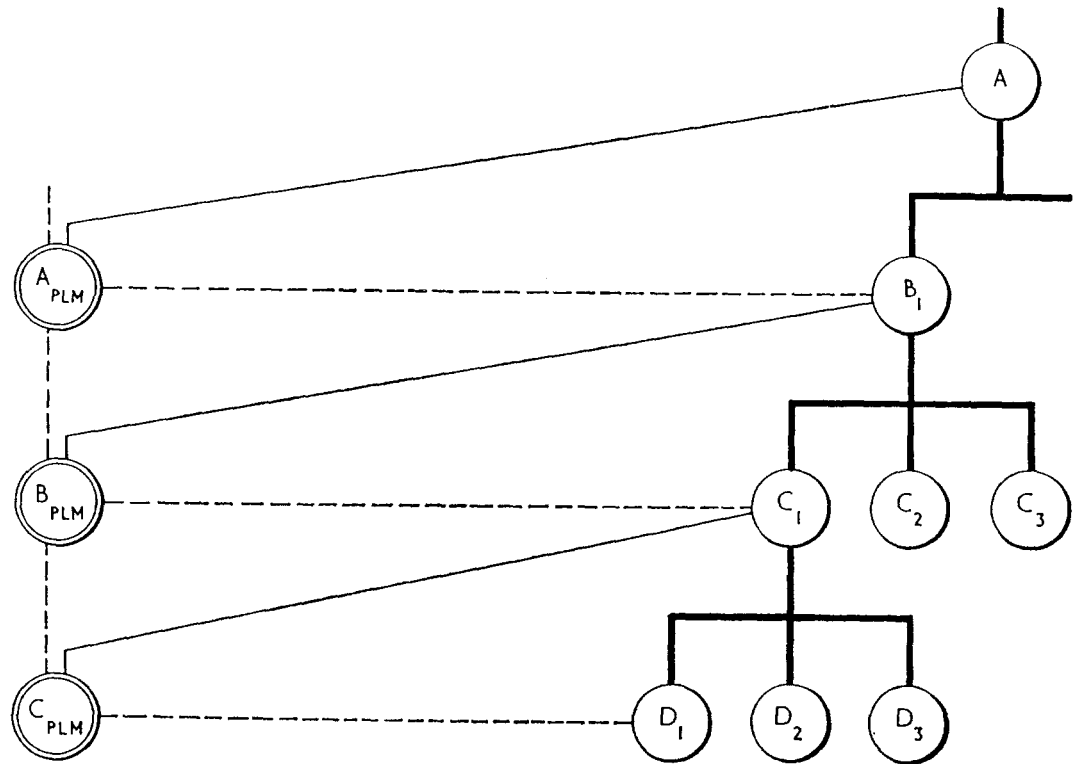


FIG. 3

case it is referred for decision to the 'cross-over point' C1. Similarly, C1 can challenge a decision by B_{PLM} and B1 one by A_{PLM}.

Such an organization enables A, B, and C to 'manage by exception' (see Exodus XV111, 26, again) and exercise the skill and experience appropriate to their rank.

It is axiomatic that A_{PLM} should be of the same rank as B1, B2, etc., that B_{PLM} should be of the same rank as C1, C2, etc., and C_{PLM} of the same rank as D1, D2, etc. If friction is to be avoided they must work as colleagues. Such a state of affairs cannot be achieved overnight in any reorganization; it can only grow with time.

In a reorganized dockyard we have:

- A = General Manager
- A_{PLM} = Planning Manager and staff
- B = Production Manager
- B_{PLM} = Head of Control and staff
- C1 = Chief Constructor and Trademaster⁴
- C2 = Chief Mechanical Engineer and Trademaster⁴
- C3 = Chief Electrical Engineer and Trademaster⁴
- C_{PLM}1, = Ship or Trade Office Foreman and staff of Planners,
2, 3, etc. Estimators and Progressmen
- D1, 2, 3, = Foremen
etc.

⁴Whereas groups of trades normally come under a Trademaster with a Foreman to plan Foreman D1 may have an Inspector D_{PLM} to plan the work of his staff E1, E2, etc., in his own Trade Centre and, in the smaller Trade Centres an Inspector i/c may have a Chargeman Planner to co-ordinate the work of his chargemen.

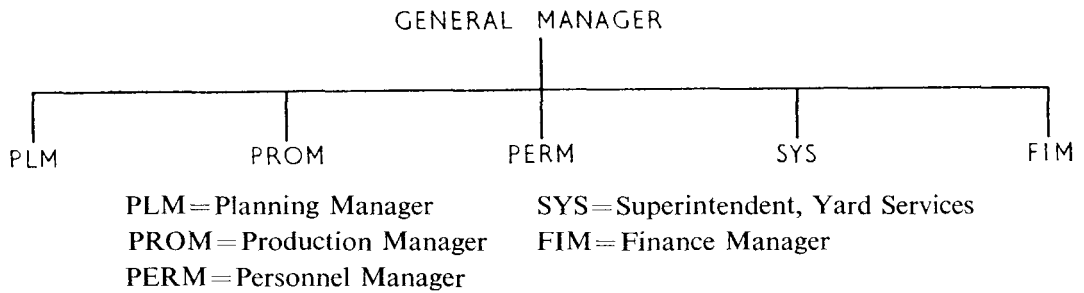


FIG. 4

The suffix PLM was used in FIG. 3 to indicate a 'planner' instead of the 'S' for 'specialist' in FIG. 2. It could have equally well have been replaced by an appropriate symbol for estimators, recorders, production facilities engineers, dimensional inspection, etc., etc.

Cs will seek the advice of Bs and Bs of As where necessary but only concerning *his own specialist responsibilities*. Cs will also be given specialist advice down the vertical hatched line.

A Functional Organization

If A_{PLM} (FIG. 3) were to exercise authority over B_{PLM} and B_{PLM} over C_{PLM} down an executive chain of command, in parallel with B, C and D to whom they would provide a 'service', the organization would be called 'functional' and the way in which a reorganized dockyard can be considered functional is illustrated in FIG. 4.

It has, however, already been shown (FIG. 3) that to call a reorganized yard 'functional' is no more than half a truth because the Production Manager has a considerable planning and estimating staff under his direct command.⁵ A_{PLM} takes on what is known as 1st Level Planning, B_{PLM} as 2nd Level Planning and C_{PLM} as 3rd Level Planning.

It needs to be understood quite clearly that the part of the yard which concerns ships officers during a refit, the Production Department in a reorganized yard, is not 'functional'—it has a clearly defined executive chain of command and management at all levels have been provided with planning staff (ship/trade offices) to assist them to deploy the available labour to the best advantage.

Ships officers may be confused by the expression: 'So and so is in a functional post'. This expression has a meaning peculiar to the Royal Dockyards. It will be seen for example that A, A_{PLM} , B, B_{PLM} and certain other 'roles' can be held satisfactorily by professional and/or technical officers regardless of their specialization. The fact that A_{PLM} and B_{PLM} are known as 'functional posts' for complementing purposes must not be construed to mean that B_{PLM} is in the executive chain of command of A_{PLM} . Any instructions received by B_{PLM} from A_{PLM} will be within the framework of A's policy which has been accepted by B.

The Reorganized Yard

When the Author joined H.M.S. *Erebus*, the training ship, in 1931, the engineer officers borne for instructional duties did not (would not?) wear the purple stripe. When the Author served in his last ship, H.M.S. *Newcastle*,

⁵In a non-reorganized yard, estimators, in a Central Estimating Office, are organized 'functionally'. TGIII estimators in a reorganized yard are 'specialists' in a Trade Office, responsible to the executive 'chain of command' who write their Estaports; they are not organized 'functionally'.

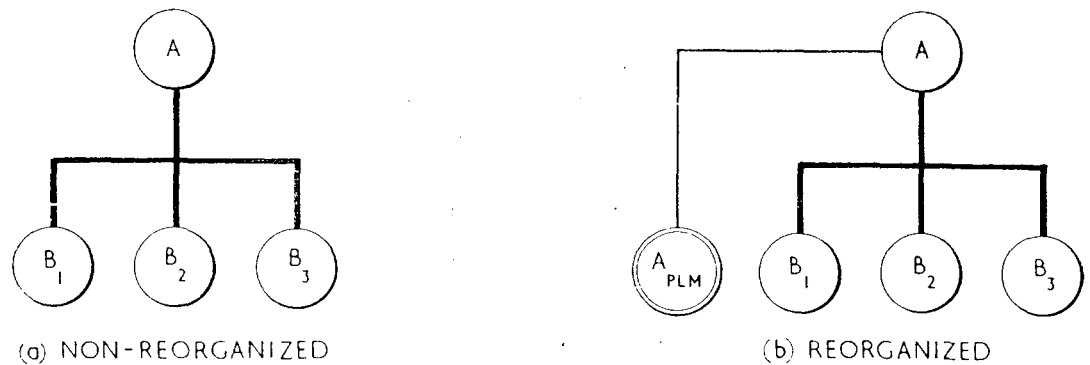


FIG. 5

in 1958, one of his officers was unwilling to remove his purple stripe. Such is the swing of the pendulum between two extremes of opinion in a comparatively short time. Similar extremes are part and parcel of every-day life.

At one extreme in the dockyards we have the desire for 'functionalization', (i.e., dependence upon 'services' and the choice between 'power' or 'planning'). At the other extreme we have the desire for executive 'authority' down a clearly defined 'chain of command' with subordinates 'accountable' to their superior.

The pendulum will continue to swing between these two extremes according to local conditions and current opinion. It should do so. Neither extreme provides an answer which is entirely satisfactory and compromise is inevitable. Rational agreement is required in each instance. As reorganization of the dockyards proceeds, a balance between the conflicting requirements is being established.

As engineers we are required to analyse any problem in an objective manner, reach a conclusion and recommend a solution, without prejudice or emotion. Organizational problems respond to this treatment. Reorganization of the Royal Dockyards is responding to this treatment, but it takes time.

Ships officers will hear a great deal about different methods of Planning and Control in different dockyards, all of which are incidental to the three following fundamentals:-

- (a) The change from the 'old' to the 'new' can only avoid the difficulties of 'co-ordination by consent' when A (the manager at whatever level) has defined his policy so that A_{PLM} can co-ordinate the efforts of B₁, B₂ and B₃, using A's 'authority', no longer having to rely on his, A_{PLM}'s, 'power'. This takes time to achieve because the 'roles' must be filled by men appropriate to the task; training is needed and is being given.
- (b) Changing priorities and conflicting requirements are part and parcel of ship repair work. They are the very nature of the work and become more critical as the work load increases. Planning may help to avoid but cannot eliminate conflict. Conflicting priorities must be accepted as normal and referred for decision to the new 'cross-over points' in a reorganized yard. To establish new 'cross-over points' takes time. Subordinates are reluctant to raise problems, when they fail to agree, with new superiors. New loyalties must be built up.
- (c) No plan can be better than the information on which it is based. A reorganized dockyard cannot make full use of its planning staff if a ship's Defect List lacks clarity, the equipment necessary for A.s and A.s is not available or the Supplementary Defect List inordinately large. The quality of information supplied by ships officers to a reorganized

yard must be raised to match its planning potential, just as the quality of petrol had to be raised to match the improvements in the design of a car engine, to get the best out of it. A reorganized yard is more sensitive than a non-reorganized yard to inadequate information or to late delivery of equipment, because it aims to have a better plan.

Conclusion

The Author hopes that the foregoing will help to put Reorganization in better perspective and lead to a clearer understanding by ships officers of some of the problems which confront a dockyard officer, if only to establish some clarity concerning the use of such words as 'functional'. Unless words have the same meaning to different people, those people are unlikely to reach agreement in discussion.

The thoughts expressed are not matters of opinion, they summarize those which have been subjected to close scrutiny by industrial consultants and accord in particular with the teaching of the Glacier Institute of Management. Grateful acknowledgement is made to Mr. A. D. Newman, B.Sc., A.M.I.Mech.E., the Principal of the G.I.M., and to his staff, for the benefit of their ideas.

Departmental Comment

Any complex organization employs 'specialists' and the basic theory described in this article is generally accepted. It is easier to expound the theory than to make it work. However, success is being achieved in those dockyards that have them. The Ship Superintendents are welcomed by ships officers.

Considerable progress has already been made in providing a plan (the value of which depends on the information supplied to the yards as Defect Lists, Planned Maintenance Items and A.s and A.s) to which Line Management can work. The ability to tell workmen what to do, when to do it and to provide them with the necessary information, material, tools and facilities is getting better all the time.

The aim to increase efficiency in the dockyards remains the same. To do this it is necessary to develop:

- (a) Modern management methods and organization
- (b) Adequate and well trained professional, technical supervisory, planning and estimating staffs
- (c) Sound incentive schemes
- (d) Co-operation of all concerned
- (e) Support from the Ministry of Defence and from the Fleet.

This presents a formidable task which, if tackled properly, must take time. The dockyards are being developed as fast as trained staff availability permits; new procedures and techniques are being introduced. As stated above, considerable progress has already been made, but nobody will deny that there is still much to be done. We can at least draw comfort from the fact that we know what we have done, what we are doing and what we have yet to do.
