

work lies—with the designers of the work standards, notably the organization's analysts. But the issue is less clear in the case of training. Control ostensibly rests with the professional. But although they have a good deal of discretion and appear to be autonomous, professionals are in fact products of their development, much like the actor who has learned his lines well. So some control lies too with those outside agencies that do the training and set the professional standards—universities and professional associations. Thus, **the professional organization surrenders a good deal of control over its choice of workers as well as their methods of work to the outside institutions that train and certify them and thereafter set standards that guide them in the conduct of their work.** With control passes allegiance; professionals tend to identify more with their profession than with the organization wherein they happen to practice it.

It may be recalled that Weber included training in his definition of bureaucracy: "Office management . . . usually presupposes thorough and expert training," and "only persons who have the generally regulated qualifications to serve are employed." But we have just seen that training and formalization—the latter central to the Weber definition—are to some extent mutually exclusive. Might this explain the finding that bureaucracy may be centralized or decentralized? Perhaps in one kind of organization, because the operating work is unskilled, day-to-day control of it passes to the technostructure and the structure becomes centralized; in the other, because the work is professional, control of it remains with the operators themselves, and beyond them, with their associations.

This is not the place to answer that question. Suffice it at this point to note that by our definitions, **professionalism and bureaucracy can coexist in the same structure.** Remember that we defined bureaucracy as the extent to which organizational "behavior is predetermined or predictable, in effect standardized." We did not specify *how* it is standardized.

DESIGNING THE SUPERSTRUCTURE

Given a set of positions, designed in terms of specialization, formalization, and training and indoctrination, two obvious questions face the designer of organizational structure: How should these positions be grouped into units? And how large should each unit be? Both questions—which pertain to the design of the *superstructure* of the organization—have received extensive consideration in the literature. In this chapter we take them up.

It is through the process of grouping into units that the system of formal authority is established and the hierarchy of the organization is built. The organigram is the pictorial representation of this hierarchy—that is, of the results of the grouping process. Grouping can be viewed as a process of successive clustering. Individual positions are grouped into first-order clusters, or units; these are, in turn, grouped into larger clusters or units; and so on, until the entire organization is contained in the final cluster. For example, soldiers are grouped into squads, squads into platoons, platoons into companies, companies into battalions, and so on through regiments, brigades, and divisions, until the final grouping into armies.

Combining this process with those described in the preceding chapter, organizational design can proceed as follows, at least in principle. Given overall organizational needs—goals to be achieved, missions to be accomplished, as well as a technical system to accomplish them—the designer delineates all the tasks that must be done. This is essentially a "top-down" procedure, from general needs to specific tasks. He or she then combines these tasks into positions according to the degree of specialization desired, and determines how formalized each should be as well as what kind of training and indoctrination it should require. The next step is to build the superstructure, first by determining what types and how many positions should be grouped into the first-order units, and then what types and how many units should be grouped into ever-more-comprehensive units, until the hierarchy is complete. This last step is, of course, a "bot-

tom-up" procedure, from specific tasks to the overall hierarchy. Finally, the superstructure is fleshed out and decision-making powers allocated, as we shall see in the next two chapters.

As noted, this is the procedure *in principle*. In practice, the organizational designer takes many shortcuts, reversing the top-down or bottom-up procedure. For example, he typically starts with a knowledge of specific structures and so can often move from missions to units directly. The designer of army structure need not work down to the level of soldier and then back up to the level of army. Instead, he shuffles divisions or armies around directly, as fixed blocks on the organigram. Likewise, he sometimes forms units from the top down, as when soldiers who were grouped into platoons for general training are later divided into squads for battlefield training. In other words, organization design is seldom carried out in a vacuum; in general, it proceeds with knowledge of past structures. In fact, organizational design is much less common than organizational redesign—incremental shifts from existing structures. In practice, as **goals and missions change, structural redesign is initiated from the top down; as the technical system of the operating core changes, it proceeds from the bottom up.**

Unit Grouping

The grouping of positions and units is not simply a convenience for the sake of creating an organigram, a handy way of keeping track of who works in the organization. Rather, **grouping is a fundamental means to coordinate work in the organization.** Grouping can have at least four important effects:

- 1 Perhaps most important, **grouping establishes a system of common supervision among positions and units.** A manager is named for each unit, a single individual responsible for all its actions. And it is the linking of all these managers into a superstructure that creates the system of formal authority. Thus, **unit grouping is the design parameter by which the coordinating mechanism of direct supervision is built into the structure.**
- 2 **Grouping typically requires positions and units to share common resources.** The members or subunits of a unit share, at the very least, a common budget, and often are expected to share common facilities and equipment as well.
- 3 **Grouping typically creates common measures of performance.** To the extent that the members or subunits of a unit share common resources, the costs of their activities can be measured jointly. Moreover, to the extent that they contribute to the production of the same products or services,

→ *confunde medidas de performance de output, como no de inputs?*

their outputs can also be measured jointly. Joint performance measures further encourage them to coordinate their activities.

4 Finally, **grouping encourages mutual adjustment.** In order to share resources and to facilitate their direct supervision, the members of a unit are often forced to share common facilities, thereby being brought into close physical proximity. This, in turn, encourages frequent informal contacts among them, which in turn encourages coordination by mutual adjustment.

Thus, **grouping can stimulate to an important degree two important coordinating mechanisms—direct supervision and mutual adjustment—and can form the basis for a third—standardization of outputs—by providing common measures of performance.** Unit grouping is, as a result, one of the most powerful of the design parameters. (A prime characteristic of the two other coordinating mechanisms—standardization of work processes and of skills—is that they provide for the automatic coordination of the work of individuals; as a result, they can be used independently of the ways in which positions are grouped.)

But for the same reason that grouping encourages strong coordination *within* a unit, it creates problems of coordination *between* units. As we have seen, the communication is focused within the unit, thereby isolating the members of different units from each other. In the terms of Lawrence and Lorsch (1967), units become *differentiated* in their various orientations—in their goals, time perspectives, interpersonal styles of interaction, and degrees of formalization of their structures. For example, a production department might be oriented toward the goal of efficiency as opposed to that of creativity, have a short time perspective, exhibit an orientation to getting the job done rather than to the feelings of those who do it, and have a highly bureaucratic structure. In contrast, a research department may exhibit exactly the opposite characteristics on all four dimensions. Sometimes this differentiation is reinforced by special languages used in the different departments; there are times when personnel in production and in research simply cannot understand each other.

The result of all this is that each unit develops a *propensity* to focus ever more narrowly on its own problems while separating itself ever more sharply from the problems of the rest of the organization. **Unit grouping encourages intragroup coordination at the expense of intergroup coordination.** The management school that adopts a departmental structure soon finds that its finance professors are interacting more closely with each other but are seeing less of the policy and marketing professors, and all become more parochial in their outlook. Of course, this can also work to the advantage of the organization, allowing each unit to give particular attention to its own special problems. Earlier, we saw the example of the

new venture team isolated from the rest of a bureaucratic structure so that it can function organically and therefore be more creative.

Bases for grouping

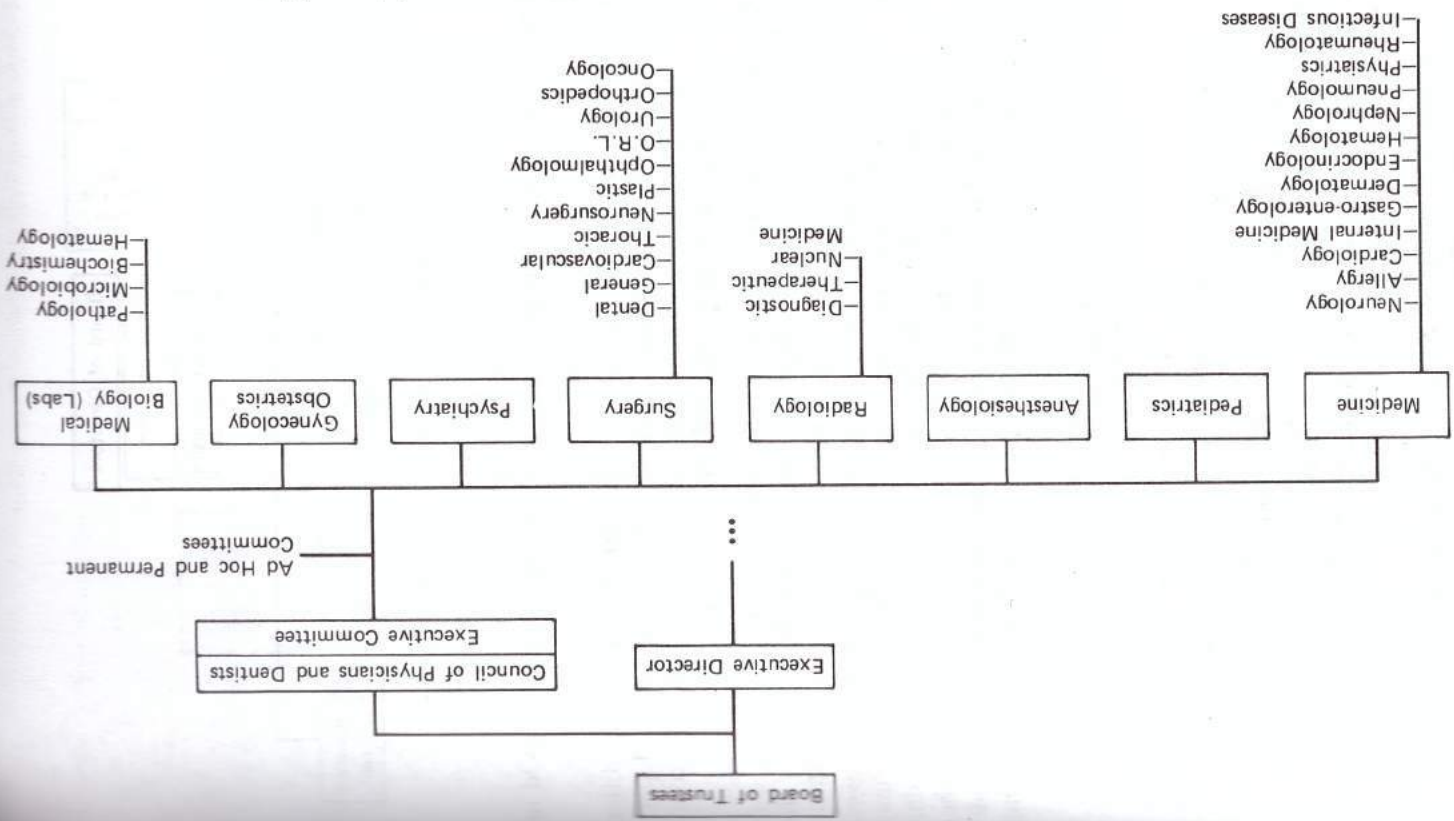
On what basis does the organization group positions into units and units into large ones? Six bases are perhaps most commonly considered:

- 1 **Grouping by Knowledge and Skill.** Positions may be grouped according to the specialized knowledge and skills that members bring to the job. Hospitals, for example, group surgeons in one department, anesthesiologists in another, psychiatrists in a third. Figure 3-1 shows the organigram for the medical component of a Quebec teaching hospital, with the physicians grouped by knowledge and skill in two tiers. Grouping may also be based on *level* of knowledge or skill; for example, different units may be created to house craftsmen, journeymen, and apprentices, or simply skilled and unskilled workers.
- 2 **Grouping by Work Process and Function.** Units may be based on the process or activity used by the worker. For example, a manufacturing firm may distinguish casting, welding, and machining shops, and a football team may divide into a line unit and a backfield unit for practice. Often, the technical system is the basis for process grouping, as in a printing shop that sets up separate letterpress and offset departments, two different processes to produce the same outputs. Work may also be grouped according to its basic function in the organization—to purchase supplies, raise capital, generate research, produce food in the cafeteria, or whatever. Perhaps the most common example of this is grouping by “business function”—manufacturing, marketing, engineering, finance, and so on, some of these groups being line and others staff. (Indeed, the grouping of line units into one cluster and staff units into another—a common practice—is another example of grouping by work function.) Figure 3-2 shows the organigram for a cultural center, where the grouping is based on work process and function.

3 **Grouping by Time.** Groups may also be formed according to *when* the work is done. Different units do the same work in the same way but at different times, as in the case of different shifts in a factory.

4 **Grouping by Output.** Here, the units are formed on the basis of the products they make or the services they render. A large manufacturing company may have separate divisions for each of its product lines—one for chinaware, another for bulldozers, and so on. A restaurant may separate organizationally as well as spatially its bar from its dining facilities. Figure 3-3 shows the product grouping by divisions in Imasco, a Canadian con-

Figure 3-1. Grouping by knowledge and skill: medical departments of the teaching hospital



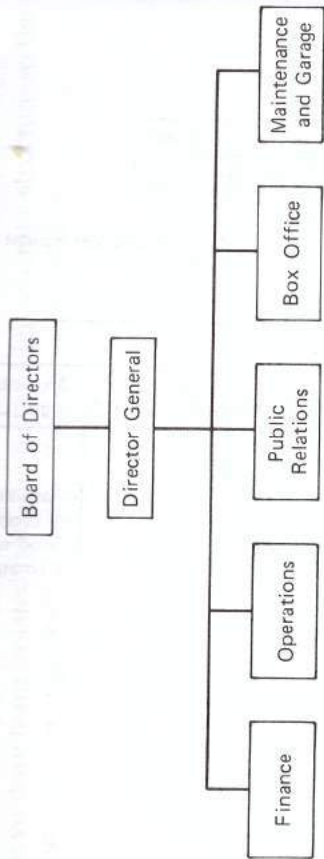
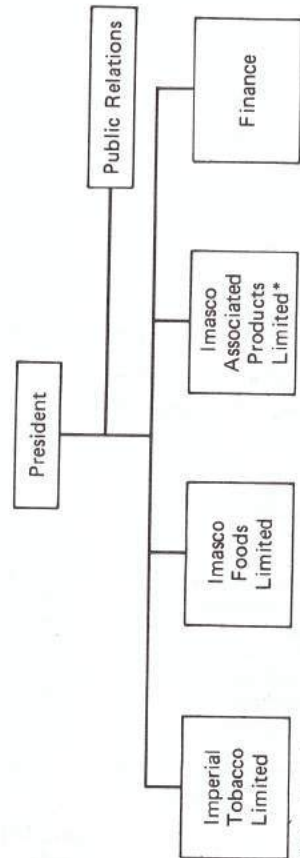


Figure 3-2. Grouping by work process and function: a cultural center

glomerate firm (with two units—public relations and finance—based on function).

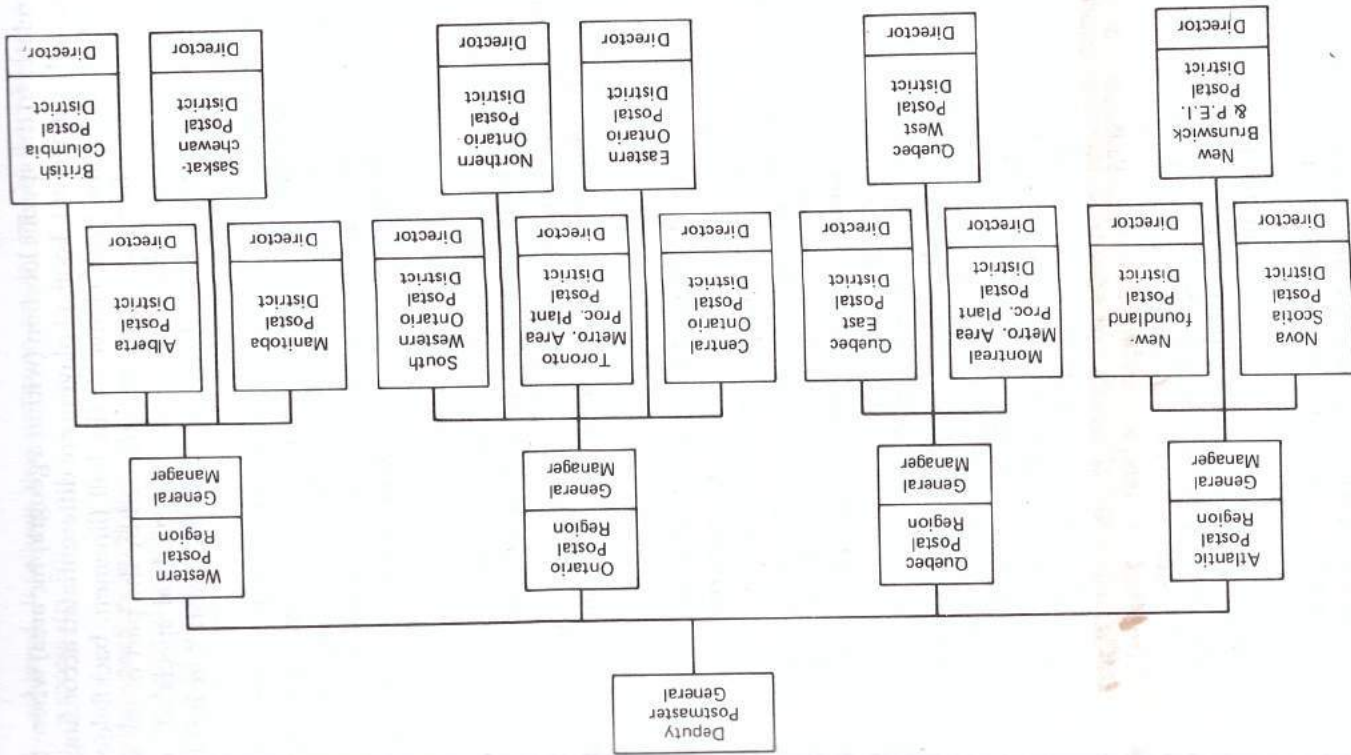
5 Grouping by Client. Groups may also be formed to deal with different types of clients. An insurance firm may have separate sales departments for individual and group policies; similarly, hospitals in some countries have different wards for public and private patients.

6 Grouping by Place. Groups may be formed according to the geographical regions in which the organization operates. In May 1942, the U.S. War Department was organized in terms of seven "theaters"—North American, African Middle Eastern, European, Asiatic, Pacific, Southwest Pacific, and Latin American. On a less global scale, a bread company may have the same baking facility duplicated in twenty different population areas to ensure fresh daily delivery in each. Figure 3-4 shows another example of geographical grouping—in this case two-tier—in the superstructure of the Canadian Post Office. A very different basis for grouping



* Retail chain stores, etc.

Figure 3-3. Grouping by output: Imasco Limited (circa 1975). Used by permission.



Note: Headquarter staff groups deleted.

Figure 3-4. Grouping by place: the Canadian Post Office (circa 1978). Used with permission.

by place relates to the specific location (within a geographic area) where the work is actually carried out. Football players are differentiated according to where they stand on the field relative to the ball (linemen, backfielders, ends); aircraft construction crews are distinguished by the part of the airplane on which they work (wing, tail); and some medical specialists are grouped according to the part of the body on which they work (the head in psychiatry, the heart in cardiology).

Of course, like all nice, neat categorization schemes, this one has its own gray areas. Psychiatry was purposely included in two examples—one in grouping by place, the other in grouping by knowledge and skill—to illustrate this point. Consider, for example, the medical specialties of surgery and obstetrics. These are defined in the *Random House Dictionary* as follows:

- *Surgery*: the act, practice, or work of treating diseases, injuries, or deformities by manual operation or instrumental appliances.
- *Obstetrics*: the branch of medical science concerned with childbirth and caring for and treating women in or in connection with childbirth.

These definitions are not consistent in our terms. Obstetrics is defined according to client; surgery is defined according to work processes. A closer look indicates that even within a medical specialty, the basis for specialization can be ambiguous. Obstetricians may deal with particular clients, but they also use particular work processes, and their outputs are also unique to their grouping (namely, delivered babies); surgeons treat special kinds of patients and they also have their own distinct outputs (removed or replaced organs). In the same vein, so to speak, Herbert Simon points out that “an education department may be viewed as a purpose (to educate) organization, or a clientele (children) organization; the Forest Service as a purpose (forest conservation), process (forest management), clientele (lumbermen and cattlemen utilizing public forests), or area (publicly owned forest lands) organization” (1957:30, 31).

The notion of grouping by process, people, place, or purpose (output) is, in fact, one of the pillars of the classical literature on organization design, and Simon devotes some of his sharpest criticism of the classical principles to it (pp. 28–35). He is especially severe on the “ambiguities” of the terms, arguing, as in the quotation above, that the same group can often be perceived in different ways.

A typist moves her fingers in order to type; types in order to reproduce a letter; reproduces a letter in order that an inquiry may be answered. Writing a letter is then the purpose for which the typing is performed; while writing a letter is also the process whereby the purpose of replying to an inquiry is

achieved. It follows that the same activity may be described as purpose or process. (p. 30)

Simon's basic point is that process and purpose are linked in a hierarchy of organizational means and ends, each activity being a process for a higher-order goal (typing a letter to answer an inquiry, manufacturing products to satisfy customers), and a purpose for a lower-order one (moving fingers to type a letter, buying machines to manufacture a product). In the same sense, the *whole* organization can be viewed as a process in society—police departments for protection so that the citizens can live in peace, food companies to supply nourishment so that people can sustain themselves.

It is interesting to note that Simon's illustrations of ambiguities between process and purpose in specific departments all come from organizations in which the operators are professionals. So, too, does our example of surgery and obstetrics. In fact, it so happens that their training differentiates the professionals by their knowledge and skills as well as by the work processes they use, which leads them to be grouped on these two bases concurrently. In professional organizations, clients select the professionals on these bases as well. One does not visit a cardiologist for an ingrown toenail; students interested in becoming chemists do not register in the business school. In other words, in professional organizations such as hospitals, accounting firms, and school systems, where professionals serve their own clients directly, grouping the operators by knowledge, skill, work process, and client all amount to the same thing.

But is that true in other organizations? The purchasing department in a manufacturing firm is far removed from the clients; it merely performs one of the functions that eventually leads to the products' sale to the clients. Thus, it cannot be considered to be a client-based or output-based group. Of course, in Simon's sense, it does have its own outputs and its own clients—purchased items supplied to the manufacturing department. But this example shows how we can clarify the ambiguity Simon raises: simply by making the context clear. Specifically, we can define output, client, and place only in terms of the *entire* organization. In other words, in our context, purpose is defined in terms of the purpose of the organization vis-à-vis its clients or markets, not in terms of intermediate steps to get it to the point of servicing clients and markets, nor in terms of the needs of the larger society in which the organization is embedded.

In fact, we shall compress all the bases for grouping discussed above to two essential ones: *market* grouping, comprising the bases of output, client, and place,¹ and *functional* grouping, comprising the bases of knowl-

¹The term *market* is used expressly to refer to business as well as nonbusiness organizations. Every organization exists to serve some market, whether that consist of the citizens for a police force, the students for a school system, or the customers for a manufacturing firm.

edge, skill, work process, and function. (Grouping by time can be considered to fall into either category.) In effect, we have the fundamental distinction between grouping activities by ends, by the characteristics of the ultimate markets served by the organization—the products and services it markets, the customers it supplies, the places where it supplies them—or by the means, the functions (including work processes, skills, and knowledge) it uses to produce its products and services.

Each of these two bases for grouping merits detailed attention. But to better understand them, we must first consider some of the criteria organizations can use to group positions and units.

Criteria for grouping

We can isolate four basic criteria that organizations are able to use to select the bases for grouping positions and units: interdependencies related to the work flow, the work process, the scale of the work, and the social relationships around the work.

1 Work-Flow Interdependencies. A number of studies that have focused on the relationships among specific operating tasks stress one conclusion: grouping of operating tasks should reflect natural work-flow interdependencies. In Figure 3–5, for example, we have one writer’s view of “natural” and “unnatural” grouping in a sequential manufacturing process in an Indian weaving mill. Grouping on the basis of work-flow interdependencies creates what some researchers call a “psychologically complete task.” **In the market-based grouping, the members of a single unit have a sense of territorial integrity; they control a well-defined organizational process; most of the problems that arise in the course of their work can be solved simply, through their mutual adjustment; and many of the rest, which must be referred up the hierarchy, can still be handled within the unit, by that single manager in charge of the work flow.** In contrast, when well-defined work flows, such as mining a coal face or producing a purchase order, are divided among different units, coordination becomes much more difficult. Workers and managers with different allegiances are called upon to cooperate. Since they often cannot, problems must be handled higher up in the hierarchy, by managers removed from the work flow.

James Thompson puts some nice flesh on the bones of these concepts, describing how organizations account for various kinds of interdependencies between tasks. Thompson discusses three basic kinds of interdependence: pooled, involving only the sharing of resources; sequential, where the work is fed from one task to the next; and reciprocal, where the work is passed back and forth between tasks. Thompson claims that organizations try to group tasks so as to minimize coordination and commu-

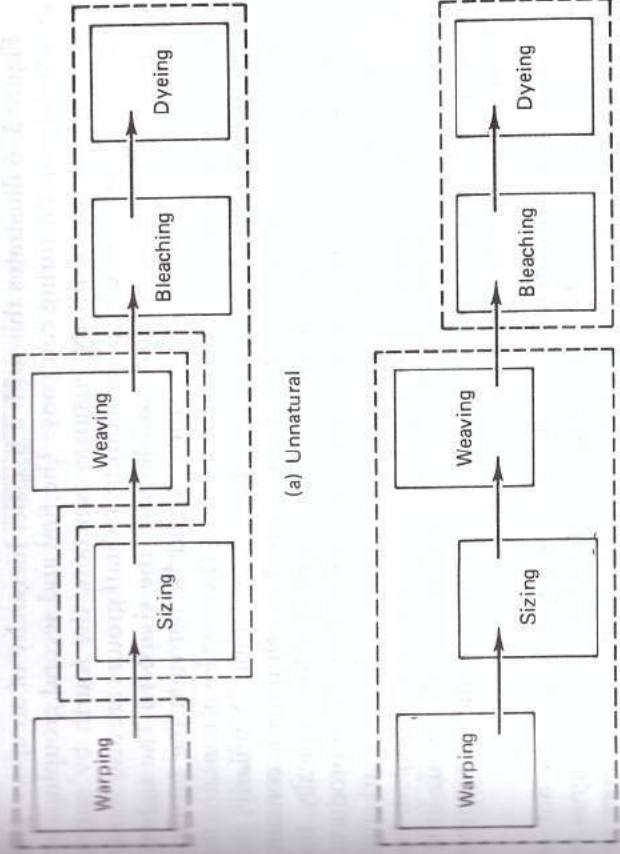


Figure 3-5. “Natural” and “unnatural” grouping in a weaving mill according to work flow (from Miller, 1959:257)

nication costs. Since reciprocal interdependence is the most complex and hence the most costly, followed by sequential, Thompson concludes:

The basic units are formed to handle reciprocal interdependence, if any. If there is none, then the basic units are shaped according to sequential interdependence, if any. If neither of the more complicated types of interdependence exists, the basic units are shaped according to common processes [to facilitate the handling of pooled interdependence]. (1967: 59)

The question of grouping does not, however, end there, because “residual” interdependencies typically remain: one grouping cannot contain all the interdependency. This must be picked up in higher-order groupings, thus necessitating the construction of a hierarchy. And so, “The question is not which criteria to use for grouping, but rather in which *priority* are the several criteria to be exercised” (p. 51). Thompson’s answer is, of course, that the organization designs the lowest-level groups to contain the major reciprocal interdependencies; higher-order groups are then formed to handle the remaining sequential interdependencies, and the final groups, if necessary, are formed to handle any remaining pooled interdependencies.

Figure 3-6 illustrates this with a five-tier hierarchy of an apocryphal international manufacturing company. The first and second groupings are by work process, the third by business function, the fourth by output (product), and the top one by place (country). (Staff groups are also shown at each level; these will be discussed later in the chapter.) The tightest interdependencies, reciprocal in nature, would be between the turning, milling, and drilling departments in the factory. The next level contains the sequential interdependencies from fabricating to assembly. Similarly, the level above that, largely concerned with product development, contains important sequential interdependencies. In mass production, typically, the products are first designed in the engineering department, then produced in the manufacturing department, and finally marketed by the marketing department. Above this, the interdependencies are basically pooled: For the most part, the product divisions and the national subsidiaries are independent of each other except that they share common financial resources and certain staff support services.

2 Process Interdependencies. Work-flow interdependencies are not, of course, the only ones to be taken into consideration by the designer of organization structure. A second important class of interdependence relates to the *processes* used in the work flow. For example, one lathe operator may have to consult another, working on a different product line (that is, in a different work flow), about what cutting tool to use on a certain job. In effect, **we have interdependencies related to specialization, which favor functional grouping.** Positions may have to be grouped to encourage process interactions, even at the expense of work-flow coordination. When like specialists are grouped together, they learn from each other and become more adept at their specialized work. They also feel more comfortable "among their own," with their work judged by peers and by managers expert in the same field.

3 Scale Interdependencies. The third criterion for grouping relates to economies of scale. **Groups may have to be formed to reach sizes large enough to function efficiently.** For example, every department in the factory requires maintenance. But that does not necessarily justify attaching one maintenance man to each department—in effect, grouping him by work flow. There may not be enough work for each maintenance man. So a central maintenance department may be set up for the whole factory. This, of course, encourages process specialization: whereas the maintenance man in each department would have to be a jack of all trades, the one among many in a maintenance department can specialize, for example, in preventive maintenance. Similarly, it may make economic sense to have only one data-processing department for the entire company, so that it can use a large, efficient computer; data-processing departments in each division might have to use smaller, less efficient ones.

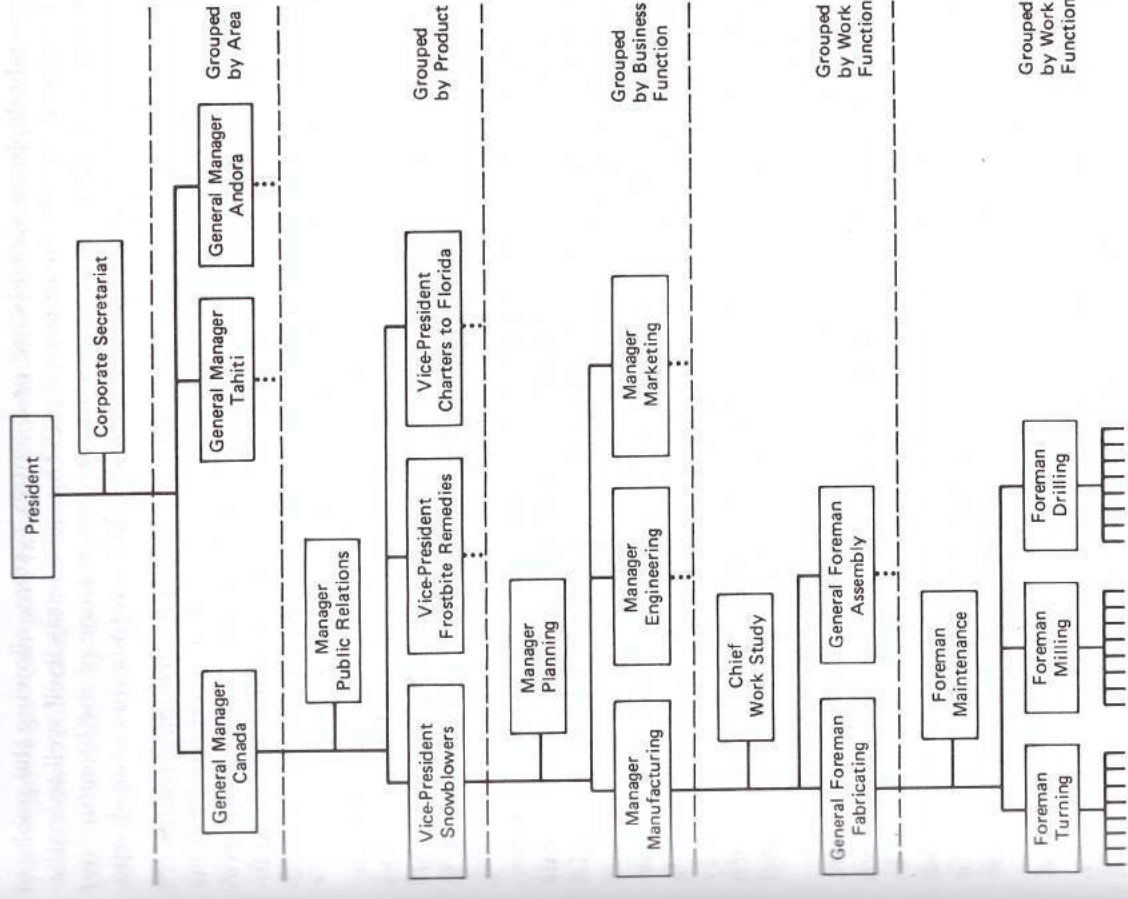


Figure 3-6. Multiple levels of grouping in a multinational firm

This issue—essentially of the concentration or dispersal of services—arises in a great many contexts in the organization. Should secretaries be grouped into typing pools or assigned to individual users; should the university have a central library or a series of satellite ones attached to each faculty; should the corporation have a single strategic planning group at headquarters or one attached to each division (or both); should there be a

central telephone switchboard or a centrex system, allowing the public to dial directly inside the organization? The issue lends itself well to mathematical formulation and has been so treated in some of the literature (for example, Kochen and Deutsch, 1973). We shall return to this issue shortly.

4 Social Interdependencies. A fourth criterion for grouping relates not to the work done but to the social relationships that accompany it. One study in coal mines (Trist and Bamforth, 1951) showed clearly the importance of these social factors. Workers had to form groups to facilitate mutual support in a dangerous environment. To use a favorite term of the well-known British Tavistock Institute, the system was *sociotechnical*.

Other social factors can enter into the design of units. For example, the Hawthorne studies suggested that when the work is dull, the workers should be close together, to facilitate social interaction and so avoid boredom. Personalities enter the picture as well, often as a major factor in organizational design. People prefer to be grouped on the basis of "getting along." As a result, **the design of every superstructure ends up as a compromise between the "objective" factors of work flow, process, and scale interdependency, and the "subjective" factors of personality and social need.** Organigrams may be conceived on paper, but they must function with flesh-and-blood human beings. "Sure, the sales manager should report to the area superintendent. But the fact is that they're not on speaking terms, so we show him reporting to the head of purchasing instead. It may seem screwy, but we had no choice." How often have we heard such statements? Scratch any structure of real people and you will find it loaded with such compromises.

In many cases, "getting along" encourages process specialization. Specialists get along best with their own kind, in part because their work makes them think alike, but also, perhaps more importantly, because in many cases it was common personality factors that caused them to choose their specialties in the first place. The extroverts seek out marketing or public relations, the analytic types end up in the technostucture. Sometimes it is best to keep them apart, at least on the organigram.

These four criteria—work flow, process, scale, and social interdependencies—constitute the prime criteria organizations use to design units. Now let us see how these apply to the functional and market bases for grouping.

Grouping by function

Grouping by function—by knowledge, skill, work process, or work function—reflects an overriding concern for process and scale interdependencies (and perhaps secondarily for social interdependencies), generally at the expense of those of the work flow. By grouping on a functional basis,

the organization can pool human and material resources across different work flows. Functional structure also encourages specialization—for example, by establishing career paths for specialists within their own area of expertise, by enabling them to be supervised by one of their own, and by bringing them together to encourage social interaction. Thus, one researcher found in a detailed study of thirty-eight firms working on U.S. government R&D contracts that "while the existence of project [market-based] teams increased the likelihood of meeting cost and time targets, the presence of a strong functional base was associated with higher technical excellence as rated by both managers and clients" (Knight, 1976:115-16).

But these same characteristics indicate the chief weaknesses of the functional structure. The emphasis on narrow specialty detracts from attention to broader output. Individuals focus on their own means, not the organization's broader ends. Moreover, performance cannot easily be measured in the functional structure. When sales drop, who is at fault: marketing for not pushing hard enough, or manufacturing for shoddy workmanship? One will blame the other, with nobody taking responsibility for the overall result. Someone up above is supposed to take care of all that.

In effect, **the functional structure lacks a built-in mechanism for coordinating the work flow.** Unlike the market structures that contain the work-flow interdependencies within single units, functional structures impede both mutual adjustment among different specialists and direct supervision at the unit level by the management. The structure is incomplete; additional means of coordination must be found.

The natural tendency is to let coordination problems rise to higher-level units in the hierarchy, until they arrive at a level where the different functions in question meet. The trouble with this, however, is that the level may be too far removed from the problem. In our Figure 3-6, for example, a problem involving the functions of both drilling and selling (perhaps a request by a customer to have a special hole drilled on his snowblowers for rear-view mirrors) would have to rise three levels to the vice-president in charge of snowblowers, the first person whose responsibilities involve both functions.

Of course, functional structures need not rely on direct supervision for coordination. These are specialized structures; where their jobs are unskilled, they can rely on formalization to achieve coordination. Thus, we can conclude that **the functional structures—notably, where the operating work is unskilled—tend to be the more bureaucratic ones.** Their work tends to be more formalized, and that requires a more elaborate administrative structure—more analysts to formalize the work, and higher up the hierarchy, more managers to coordinate the work across the functional units. So some of the gains made by the better balancing of human and machine resources are lost in the need for more personnel to achieve coordination.

To put this issue the other way around, bureaucratic structures (with unskilled operators) rely more extensively on the functional bases for grouping. That is, they tend to be organized by the function performed rather than the market served. (And where there are many levels of grouping, they tend to be organized on functional bases at higher levels in the hierarchy.) In seeking, above all, to rationalize their structures, such bureaucracies prefer to group according to the work processes used and then to coordinate by the formalization of work, involving the proliferation of rules. This way, on paper at least, all relationships are rationalized and coherent.

Grouping by market

Lawrence and Lorsch provide us with an interesting illustration of the advantages of market grouping. They reproduce a memo from an advertising agency executive to his staff describing the rationale for a conversion from a functional structure (based on copy, art, and TV departments) to one of the market groups:

Formation of the "total creative" department completely tears down the walls between art, copy, and television people. Behind this move is the realization that for best results all creative people, regardless of their particular specialty, must work together under the most intimate relationship as total advertising people, trying to solve creative problems together from start to finish.

The new department will be broken into five groups reporting to the senior vice president and creative director, each under the direction of an associate creative director. Each group will be responsible for art, television, and copy in their accounts. (1967:37)

In this case, market-based grouping is used to set up relatively self-contained units to deal with particular work flows. Ideally, these units contain all the important sequential and reciprocal interdependencies, so that only the pooled ones remain: each unit draws its resources and perhaps certain support services from the common structure and in turn contributes its surpluses or profits back to it. And because each unit performs all the functions for a given set of products, services, clients, or places, it tends to identify directly with them, and so its performance can easily be measured in these terms. Markets, not processes, get the employees' undivided attention. And, of course, with the necessary mutual adjustment and direct supervision contained right inside the unit, the organization need rely less on formalization for coordination, and so tends to emerge as less bureaucratic.

But with the focus on coordination across specialties, there is, of course, less process specialization. Compare, for example, these two bases for grouping in a retail company, say, in hardware. The company can build

one large downtown store that sells everything imaginable, organizing itself on the basis of specialist departments. In contrast, it can set itself up as a retail chain, a market-based structure with small stores throughout the city. In search of special items for his nail sculptures, the customer in the large, specialized store would simply find the nail department and seek out a salesperson there who could tell him if copper roofing nails with crosshatched heads were available in the five-centimeter size or only in the seven-centimeter size. Should the nail sculptor find himself in the smaller branch store, almost certainly more conveniently located, he would probably find no copper nails of any kind in stock—or any salesperson who could distinguish copper nails from brass-plated ones. But the salesperson in the chain store could better tell him where to find a hammer.

In general, the market structure is a less machine-like structure, less able to do a specialized or repetitive task well. But it can do more tasks and change tasks more easily, its essential flexibility deriving from the fact that its units are relatively independent of each other. New units can easily be added and old ones deleted. Any one store in a retail chain can easily be closed down, usually with little effect on the others. But closing down one specialized department in a large store may bankrupt it. There are chain stores that sell only bread or cheese, but there is no supermarket that can afford to dispense with either.

The market basis for grouping is, however, no panacea for the problems of organizational design. We can see this most clearly in a study by Kover (1963-64). He, too, looked at an advertising agency that reorganized, in virtually the same way as the one cited earlier. But Kover found effects not mentioned above: Specialists had much less communication with colleagues in their own functions and even with the clients (communication with them now being restricted largely to the managers of the market units); their sense of professional worth diminished, in part because their work was judged by general managers instead of their specialist peers. Those who saw themselves as craftsmen became increasingly dissatisfied with their work and alienated from the firm; many, in fact, left within a year of the reorganization. In effect, the market-based structure detracted from an emphasis on specialization, apparently with a resulting decrease in the quality of the specialized work.

The market structure is also more wasteful of resources than the functional one—at the lowest unit level if not in the administrative hierarchy—since it must duplicate personnel and equipment or else lose the advantages of specialization.

... if the organization has two projects, each requiring one half-time electronics engineer and one half-time electromechanical engineer, the pure project [market] organization must either hire two electrical engineers—and reduce specialization—or hire four engineers (two electronics and two electromechanical)—and incur duplication costs. (Galbraith, 1971:30)

Moreover, the market structure, because of less functional specialization, cannot take advantage of economies of scale the way the functional structure can. The large hardware store can perhaps afford a lift truck at its unloading dock, whereas the small one cannot. Also, there may be wasteful competition within the market structure, as, for example, when stores in the same chain compete for the same customers.

What all this comes down to is that by choosing the market basis for grouping, the organization opts for work-flow coordination at the expense of process and scale specialization. Thus, if the work-flow interdependencies are the significant ones and if they cannot easily be contained by standardization, the organization should try to contain them in a market-based grouping to facilitate direct supervision and mutual adjustment. However, if the work flow is irregular (as in a job shop), if standardization can easily contain work-flow interdependencies, or if the process and scale interdependencies are the significant ones (as in the case of organizations with sophisticated machinery), then the organization should seek the advantages of specialization and choose the functional basis for grouping instead.

Grouping in different parts of the organization

At this point it is useful to distinguish the first-order grouping—that is, individual positions into units—from higher-order grouping—units into larger units. The former, of course, pertains to the grouping of operators, analysts, and support staffers as individuals into their basic working units, and the latter pertains to the grouping of managers in order to build the formal hierarchy.

A characteristic of the first-order groupings is that operators, analysts, and support staffers tend to be grouped into their own respective units in the first instance. That is, operators tend to form units with other operators, analysts with other analysts, and staff support personnel with other staff support personnel. (Obviously, this assumes that the organization is large enough to have a number of positions of each. An important exception to this—to be discussed later—is the case where a staff member is assigned as an individual to a line group, as for example when an accountant reports directly to a factory manager.) It is typically when the higher-order groups are formed that different operators, analysts, and support staffers come together under common supervision. We shall elaborate on this point in our discussion of each of these groups.

The examples cited in this chapter have shown that positions in the operating core can be grouped on a functional or a market basis, depending primarily on the importance of process and scale interdependencies as opposed to those of the work flow. Assembly lines are market-based groups, organized according to the work flow, whereas job shops, because

of irregular work flows or the need for expensive machinery, group their positions by work process and so represent functional groupings. And as we noted earlier, in operating cores manned by professionals, the functional and market bases for grouping are often achieved concurrently: The professionals are grouped according to their knowledge and skills and the work processes they use, but since their clients select them on these bases, the groups become, in effect, market-based as well.

Which basis for grouping is more common in the operating core? The research provides no definite answer on this question. But ours is a society of specialists, and that is most clearly manifested in our formal organizations, particularly in their operating cores and staff structures. Thus, we should expect to find the functional basis for grouping the most common in the operating core.

There is, by definition, only one level of grouping in the operating core—the operators grouped into units managed by the first-line supervisors. From there on, grouping brings line managers together and so builds the administrative superstructure of the middle line.

In designing this superstructure, we meet squarely the question that Thompson posed: not which basis of grouping, but rather in which order of priority? Much as fires are built by stacking logs first one way and then the other, so organizations are often built by varying the bases for grouping units. For example, in Figure 3-6, the first grouping within the middle line is based on work process (fabricating and assembling), the next above on business function (engineering, manufacturing, and marketing), the one above that on market (snowblowers, and so on), and the last one on place (Canada, and so on). The presence of market-based groups in the upper region of the administrative hierarchy is probably indicative: anecdotal evidence (published organigrams, and the like) suggests that the market basis for grouping is more common at the higher levels of the middle line than at the lower ones, particularly in large organizations.

As a final note on the administrative superstructure, it should be pointed out that, by definition, there is only one grouping at the strategic apex, and that encompasses the entire organization—all its functions and markets. From the organization's point of view, this can be thought of as a market group, although from society's point of view, the whole organization can also be considered as performing some particular function (delivering the mail in the case of the post office, or supplying fuel in the case of an oil company).

Staff personnel—both analysts and support staff—seem, like wolves, to move in packs, or homogeneous clusters, according to the function they perform in the organization. To put this another way, staff members are not often found in the structure as individuals reporting with operators or different staffers directly to line managers of market units they serve. Instead, they tend in the first instance to report to managers of their own

specialty—the accountant to a controller, the work-study analyst to the manager of industrial engineering, the scientist to the chief of the research laboratory, the chef to the manager of the plant cafeteria. This in large part reflects the need to encourage specialization in their knowledge and skills, as well as to balance their use efficiently across the whole organization. For example, the need for specialization as well as its high cost dictate that there be only one research laboratory in many organizations.

Sometimes, in fact, an individual analyst, such as an accountant, is placed within a market unit, ostensibly reporting to its line manager. But he is there to exercise control over the behavior of the line unit (and its manager), and whether de facto or de jure, his allegiance runs straight back to his specialized unit in the technostructure.

But at some point—for staff units if not for staff individuals—the question arises as to where they should be placed in the superstructure. Should they be dispersed in small units to the departments they are to serve—often market-based units—or should they be concentrated into larger ones at a central location to serve the entire organization? And how high up in the superstructure should they be placed; that is, to line managers at what level should they report?

As for level, the decision depends on the staffers' interactions. A unit of financial experts who work with the chief executive officer would naturally report to him, and one of work-study analysts might report to the manager at the plant level. As for concentration or dispersal, the decision reflects all the factors discussed above, especially the tradeoff between work-flow interdependencies (namely, the interactions with the users) and the need for specialization and economies of scale. For example, in the case of secretaries, the creation of a pool allows for specialization (one secretary can type manuscripts, another letters, and so on) and the better balancing of personnel, whereas individual assignment allows for a closer rapport with the user (I cannot imagine every member of a typing pool learning to read my handwriting!). Thus, in universities, where the professors' needs are varied and the secretarial costs low relative to those of the professors, secretarial services are generally widely dispersed. In contrast, university swimming pools, which are expensive, are concentrated, and libraries may go either way, depending on the location and specific needs of the various users.

Referring back to Figure 3-6, we find staff units at all levels of the hierarchy, some concentrated at the top, others dispersed to the market divisions and functional departments. The corporate secretariat serves the whole organization and links closely with the top management; thus, it reports directly to the strategic apex. The other units are dispersed to serve more or less local needs. One level down, public relations is attached to each of the national general managers so that, for example, each subsidiary can combat political resistance at the national level. Planning is dispersed to the next level, the product divisions, because of their conglomerate

nature; each must plan independently for its own distinct product lines. Other staff units, such as work study, are dispersed to the next, functional level, where they can serve their respective factories. (We also find our ubiquitous cafeteria here—one for each plant.) Finally, the maintenance department is dispersed down to the general-foreman level, to serve fabricating or assembly.

Unit Size

The second basic issue in the design of the superstructure concerns how large each unit or work group should be. How many positions should be contained in the first-level grouping, and how many units in each successively higher-order unit? This question of unit size can be rephrased in two important ways: How many people should report to each manager? That is, what should be the manager's *span of control*? And what *shape* should the superstructure be: *tall*, with small units and narrow spans of control, or *wide*, with large units and wide spans of control?

On this point, the traditional literature was firm: "No supervisor can supervise directly the work of more than five or, at the most, six subordinates whose work interlocks," said Colonel Lydal Urwick unequivocally (1956, p. 41). But subsequent investigation has made this statement seem rather quaint. One study (Holden et al., 1968:95) reported an average span of control of ten for corporate chief executive officers, with a range from one to fourteen. Woodward (1965) found an average of six for the chief executives of the industrial firms she studied, but that measure climbed above twelve in five of the "successful" firms. For the first-line supervisors in the firms in mass production, the average span of control was close to fifty, and it ranged into the nineties in some cases. Worthy reported that the merchandising vice-president of Sears, Roebuck and Co. had forty-four senior executives reporting to him; for the typical store manager, the figure was "forty-odd" department managers (1959:109). And Piffner and Sherwood (1960) noted the extreme example of "the Bank of America, which has over 600 branches throughout California, each of which reports directly to corporate headquarters at San Francisco. There is no intervening area structure with directive powers over the branch offices" (p. 161). In some of these cases, notably the Bank of America and perhaps also Sears, Roebuck, Urwick's qualification about interlocking work may apply. But certainly not in all.

About the concept of span of control, Piffner and Sherwood have commented:

Much blood has been let to reduce the executive's span with inconsequential results to administrative performance. Yet span of control sails merrily on. There is much written about it. Most consultants tab this as an essential in

reform proposals. Students sweat over its definition, mainly because they assume the concept should be more complicated than it really is. Thus, regardless of what its merits may be, span of control is so entrenched in the administrative culture that it must be accorded a prominent place in any book on organization. (pp. 155–56)

There is no doubt that the concept merits a prominent place in this book. But there is reason to doubt Pfiffner and Sherwood's suggestion that it is a simple one. Who should be counted as a subordinate? For example, what about the assistant to, or those whose work is reviewed by the manager even though they do not formally report to him? What about the nonsupervisory aspects of the manager's job—collecting information, developing liaison contacts, and so on? Does a narrow span of control necessarily mean close "control," as the traditional literature suggested, or might it instead imply that the manager is busy doing these other things? What about the influence of the coordinating mechanisms other than direct supervision on the size of the work unit?

What all this suggests is that the issue is not a simple one and the focus on control is misplaced. Control—that is, direct supervision—is only one factor among many in deciding how many positions to group into one unit, or how many units to group in one larger unit, in both cases under a single manager. Hence, we prefer the term *unit size* to "span of control."

Unit size in relation to the coordinating mechanisms

Much of the confusion in this area seems to stem from considering unit size only with respect to the coordinating mechanism of direct supervision, not of standardization or mutual adjustment. The traditional management theorists set the tone by implying that control and coordination could be achieved only by direct supervision. What else would have prompted Urwick to insist on his "five, or at the most, six" formula?

As has been pointed out repeatedly since the start of our discussion, the five coordinating mechanisms are to some extent substitutable. For example, the manager's job can be "institutionalized" by standardization; and mutual adjustment within the work group can be used in place of direct supervision from above. We would, of course, expect such replacement of direct supervision by another coordinating mechanism to affect significantly the size of a unit. Thus, we should be able to explain variations in unit size largely in terms of the mechanisms used to coordinate work.

We can summarize our conclusions in terms of two basic propositions, one dealing with standardization, the other with mutual adjustment. First, **compared with direct supervision, the greater the use of standardization for coordination, the larger the size of the work unit.** It stands to

reason that the more coordination in a unit is achieved through the systems of standardization designed by the technostucture, the less time its manager need spend on the direct supervision of each employee, and so the greater the number of employees that can report to him. With this conclusion, we can rather easily explain Woodward's finding about the very high spans of control encountered in the mass-production firms. Bear in mind two points about her findings. First, the very wide spans of control were found at the first level of supervision—namely, in those units containing the operators themselves. Second, the largest operating units—with an average of almost fifty employees—were found in the mass-production firms. Those in unit (custom) and in process production had units averaging less than twenty-five and fifteen operators, respectively. Indeed, they had virtually no units even as large as the *average* for the mass producers. Now, when we combine this with Woodward's findings that the mass-production firms were the only bureaucratic ones, the other two being structured organically, we see an evident relationship. Unit size was largest where the work was the most standardized—in the operating cores of the most bureaucratic organizations.

So far, we have discussed only the standardization of work processes. However, our first proposition is not restricted to any special kind of standardization. In other words, standardization of skills and of outputs should also lead to larger unit size. In the case of skills, it stands to reason that the more highly trained the employees, the less closely they need be supervised, and so the larger their work units can be. We see this most clearly in general hospitals and universities. At the time of this writing, sixty of my colleagues and I work in a single unit, which runs smoothly under a single dean with no department heads.

Similarly, we would expect that the more standardized the outputs, the larger can be the size of the work unit. Thus, although the Bank of America justified its span of control of 600 on the basis of encouraging the initiative of its branch managers, we would be on safe ground in assuming that this enormous span of control would simply be impossible without a very tight system of performance (output) control, not to mention the use of all kinds of rules and regulations and of training and indoctrination programs for the branch managers. Similarly, those who shop at Sears well know how standardized that operation is. As Moore, referring implicitly to the role of indoctrination, commented, "Sears can decentralize [that is, release the store managers from close supervision]; everyone thinks alike anyway" (quoted in Wilensky, 1967:60). Chains of banks and retail stores frequently exhibit very wide spans of control precisely because each outlet is a carbon copy of all the others, thereby facilitating standardization.

Thus, we cannot conclude that being a member of a large unit automatically frees the individual from close control. Control from the boss, perhaps, but not necessarily from the systems of the technostucture—or

even from the person's earlier training and indoctrination. In fact, the most tightly controlled members of organizations are typically those in the largest units—the operators doing unskilled work in highly bureaucratic operating cores. Even their managers feel the same control. I once spoke to eighty branch managers of large Canadian banking firms on the nature of managerial work; the ensuing discussion period was dominated by one issue—their extreme frustration in being unable to act as full-fledged managers, because of the rules imposed on their branches by the corporate technostuctures.

Our second proposition is as follows: **Compared with standardization and often even direct supervision, the greater the reliance on mutual adjustment (owing to interdependencies among complex tasks), the smaller the size of the work unit.** A relationship between complex interdependent tasks and small unit size can be explained in two ways. The obvious one is that, all coordinating mechanisms (especially standardization) remaining equal, the more interdependent the tasks (complex or not) in a unit, the greater will be the need for contact between the manager and the employees to coordinate their work. Ostensibly, the manager will have to monitor and supervise the unit's activities more closely and to be more readily available for consultation and advice. Therefore, the manager requires a small span of control. This suggests yet another angle on the Sears and Bank of America stories—namely, the absence of interdependence. Geographically dispersed retail branches, each serving its own customers, are neither reciprocally nor sequentially interdependent; far more of them can, therefore, be supervised than, say, the sequentially interdependent departments of a factory. That is why Urwick qualified his principle of span of control with the word "interlocks."

But there is a second, more subtle explanation for the hypothesized relationship between complex interdependent tasks and small unit size. These kinds of tasks are difficult to supervise, so instead of an increase in direct supervision, they give rise to an increase in mutual adjustment. The employees themselves must communicate on a face-to-face basis to coordinate their work. But for such communication to function effectively, the work unit must be small, small enough to encourage convenient, frequent, and informal interaction among all its members. Thus, one study indicated that beyond ten members, groups tend to fragment into cliques—that is, smaller groups—and another found that five to seven members was optimal for consensus. Now, organizations, being what they are, designate a leader—a "manager"—for each of their units, no matter how small, even when that person acts as little more than the unit's official spokesperson. And so, when the span of control of units doing interdependent complex tasks is measured, lo and behold, it turns out to be small.

Let us reflect on this conclusion for a moment. On the surface, it is counterintuitive, since it could be restated as follows: the less the reliance

on direct supervision (in favor of mutual adjustment), the narrower the manager's span of control. The confusion, of course, lies with the term used, for here, span of control has nothing to do with "control"; it is merely an indication of the need to maintain a small face-to-face work group to encourage mutual adjustment when the work is complex and interdependent. In other words, although the restatement of the proposition may be technically correct, it is misleading to use terms like "direct supervision" and "span of control." We are better off to conclude that, because of the need for "mutual adjustment," "unit size" must be small.

This point suggests two lessons. First, in the area of structure (I am tempted to say management in general), things are not necessarily what they seem. We cannot rely on the pleasant conceptualizations of the armchair; we have to go out and research phenomena directly. Careful observation produces its own share of surprises. Second, we had better choose our terms (like "control") very carefully, and be quite sure of what we are measuring when we do empirical research.

One final point should be mentioned. Much of the evidence showing that complex interdependent tasks lead to small unit size comes from studies of professional groups. But how can we reconcile this finding with that of the first proposition—namely, that professionalism (that is, standardization of skills) leads to a large unit size? The answer lies in interdependence: Professional work is always complex (as we define it), but it is not always interdependent. **There are, in effect, two kinds of professional work—Independent and interdependent—requiring two very different structural forms.** In one case, the standardization of skills handles most of the interdependencies, so there is little need for mutual adjustment and the professionals can work independently, in large units. This is the situation we find in most accounting firms and educational systems, where individual professionals serve their own clients. In the other case, interdependencies remain that cannot be handled by the standardization of skills, so there must be considerable mutual adjustment. The professionals must work cooperatively in small, informal units. This happens, for example, in research laboratories and think-tank consulting firms.

Thus, looking at unit size in terms of all the coordinating mechanisms helps to sweep away some of the confusion. Before we conclude this discussion, however, we should mention some of the findings of other research—notably on tall versus flat structures, often carried out in the social psychological laboratory—because that has suggested some other factors that effect unit size. In particular, tall structures (with small units at each level, giving rise to many levels, or a "tall" hierarchy) have been shown to serve better the individual's need for security, since a manager is always readily available, although they can frustrate the needs for autonomy and self-actualization. Indeed, top managers seem to be more satisfied in tall structures—it is they, after all, who do the controlling—whereas lower-

Handwritten notes and scribbles at the bottom of the page, including phrases like "to see if it's a unit size" and "interlocks".

level managers have reported themselves in some studies as happier in flat ones (with large units and few levels in the hierarchy), where they have more freedom from their own managers. Thus, both Worthy and Pfiffer and Sherwood explain the large unit sizes in Sears and the Bank of America by this factor. As the latter note about the span of control of over 600:

When officers of the bank are questioned about this seemingly unorthodox setup, their response is that they do not want to risk setting up an echelon that would take authority away from the branch managers. They want them to be self-reliant local businessmen with a maximum opportunity for making decisions on their own. (p. 161)

Studies of tall versus flat structures have also found that tall structures interrupt the vertically upward flow of information more frequently, which can lead to greater distortion; and flat ones can require more discussion and consultation to get decisions made. Finally, studies have shown that the tall structure (or small-sized units), rather than encouraging closer supervision, may free the manager from the need to spend time on supervision, allowing him to get on with other duties (such as making decisions and interacting with outsiders).

To conclude our general discussion, we have seen that **unit size is driven up by (1) standardization of all three types, (2) similarity in the tasks performed in a given unit, (3) the employees' needs for autonomy and self-actualization, and (4) the need to reduce distortion in the flow of information up the hierarchy; and it is driven down by (1) the need for close direct supervision, (2) the need for mutual adjustment among complex interdependent tasks, (3) the extent to which the manager of a unit has nonsupervisory duties to perform, and (4) the need for members of the unit to have frequent access to the manager for consultation or advice, perhaps because of security needs.**

Unit size by part of the organization

How does unit size vary from one part of the organization to another? Generalizations are somewhat risky here, since, as we have seen, unit size is influenced by many factors. Nevertheless, some general comments are warranted.

It is in the operating core that we would expect to find the largest units, since this part of the organization tends to rely most extensively on standardization for coordination, especially standardization of work processes.

Managerial work is generally complex, so we might expect the size of units in the administrative structure to depend heavily on the interdependence encountered at a given level of the hierarchy. As we saw earlier in

this chapter, market grouping is often selected because it contains the work-flow interdependences within each unit (and because the process interdependences are secondary), whereas functional grouping often does not, requiring either that a higher-level manager coordinate the work flow across different units or that the managers or members of each of the units in question do so themselves through mutual adjustment. In either event, the result is the same: **only a few functional units can be grouped into a higher-order unit, whereas, typically, many more market-based units can be so grouped.** A great many autonomous divisions can report to one company president, as can a great many schools to one superintendent; in contrast, the president of an integrated manufacturing firm or the manager of a television station can supervise only a few interdependent functional departments. (It will be recalled that both Sears stores and Bank of America branches are market-based units.) And since organizations vary the bases for grouping used at different levels in the administrative hierarchy, we would not expect the middle line of the large organization to be uniformly tall or flat, but rather to exhibit a wavy shape, flat where grouping is based on markets, tall where it is based on function.

Earlier we noted that as we move up the hierarchy, managerial decision making becomes more complex, less amenable to regulation. Therefore, holding interdependence constant, we would expect a greater need for mutual adjustment at the higher levels, with a resulting decrease in unit size. So the overall managerial hierarchy should look like a cone—albeit a wavy one—with progressively steepening sides. Thus, holding all else constant, we should expect the chief executive officer to have the narrowest average span of control in the organization. What may not, however, remain constant is the basis for grouping. As noted earlier, the market basis is often used toward the top of the middle line. Where it is so used, and the people reporting to the chief executive themselves supervise functional units, we would expect his span of control to be wider than theirs.

Another factor that confounds the span of control for the managers of the middle line is their relationship with the staff units. Coordination of line and staff activities typically requires mutual adjustment—that is, flexible communication outside the chain of authority. This, of course, takes a good deal of the line manager's time, leaving less for direct supervision. So we would expect that where there is much line/staff interdependence, spans of control in the middle line should be narrower. **Organizations with great proliferations of technocratic and support staff units should have rather small units in the middle line.**

This leads us to an interesting conclusion about highly bureaucratic organizations, heavily dependent on technocratic staff groups to formalize the operating work: although the spans of control of the first-line supervisors should be high because of the extensive standardization in the operating core, that of the managers higher up should be small because of the

need for mutual adjustment with the staff members. In fact, this is exactly what comes out of the Woodward study. Mass-production firms, which she found to have bureaucratic structures, followed this pattern. In contrast, firms in process industries, with organic structures and more extensive staff units, exhibited very narrow spans of control for both first-line supervisors and managers in the center of the middle line.

Finally, what about the size of the staff units themselves? How many staff members can a staff manager supervise? In those support units that do relatively unskilled work—the cafeteria and mailroom, for example—the structure would tend to be bureaucratic and the units therefore large. But what of the other units in the technostructure and support staff? **The factors we discussed earlier indicate small size for most of the professional-type staff units.** The work within these units is complex and, being of a project nature, typically creates interdependences among the professionals. In other words, these staff members are professionals of the second type discussed earlier—namely, those who must function in small interdependent units rather than as independent individuals attached to larger units. Furthermore, the managers of technocratic units must spend a good deal of their time “selling” the proposals of their units in the middle line. Likewise, the support specialists do not work in a vacuum but serve the rest of the organization, and so their managers must spend a good deal of time in liaison with it. In both cases, this reduces the number of people the staff managers can supervise, and so shrinks the average size of staff units.

To conclude, in general we would expect the operating core of the organization to assume a flat shape, the middle line to appear as a cone with progressively steepening sides, and the technostructure and more professional support units to be tall in shape. That is, in fact, the design of our logo, as a quick glance back at Figure 1-2 will illustrate.

FLESHING OUT THE SUPERSTRUCTURE

Organizational design is not complete when the positions have been established and the superstructure built. At one time, the literature on organizational design stopped here. But contemporary research has made clear the need to flesh out the bones of the superstructure with linkages that are lateral, as opposed to strictly vertical. Two main groups of these linkages have received extensive treatment in the contemporary literature on organizational design—planning and control systems that standardize outputs, and liaison devices that grease the wheels of mutual adjustment. We discuss these in this chapter.

Planning and Control Systems

The purpose of a plan is to specify a desired output—a standard—at some future time. And the purpose of control is to assess whether or not that standard has been achieved. Thus, planning and control go together like the proverbial horse and carriage: There can be no control without prior planning, and plans lose their influence without follow-up controls. Together, plans and controls regulate outputs and, indirectly, behavior as well.

Plans may specify (standardize) the quantity, quality, cost, and timing of outputs, as well as their specific characteristics (such as size and color). *Budgets* are plans that specify the costs of outputs for given periods of time; *schedules* are plans that establish time frames for outputs; *operating plans* are those that detail output quantities for given periods of time; *operating plans* are those that establish a variety of standards, generally the quantities and costs of outputs. Typically, planning systems, as well as the reporting systems that feed back the control information, are designed in the technostructure, by analysts with titles such as Planner, Budget Analyst, Controller, MIS Analyst, Production Scheduler, and Quality Control Analyst.