
DIVISION OF LABOR OR INTEGRATED TEAMS: A CRUX IN THE MANAGEMENT OF TECHNICAL COMMUNICATION?

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Two models of collaboration predominate in the process by which technical documents are produced. We call these the *division of labor model* and the *integrated team model*. Division of labor has tended to prevail since the 1950s, when “technical writer” first made its appearance as a job title. Writing, editing, and illustrating—not to mention communication management—had formerly been integrated into other activities of document production. Engineers and scientists wrote and edited their own reports, for example. The addition of technical communication support personnel no doubt has improved document readability and aesthetics. But the writing process has become steadily more fragmented and linear. Certain people are in charge of planning, others do the research and writing, and still others are responsible for editing, illustrating, and typing. The proliferation of specialists among communications professionals also creates a need for managers who find their place in the division of labor as reviewers of the documents and perhaps as planners.

This fragmentation is further abetted by the development of specialized “discourse communities”—groups such as nuclear physicists, electrical engineers, systems programmers, and, now, technical communicators, who are, in turn, specializing as manual writers, newsletter and brochure managers, medical editors, and so on. These groups distinguish themselves from others by specific language practices. Technical terminology, jargon, and shoptalk reinforce distinctions based on job titles or job descriptions.

Yet an alternative to this divided practice has begun to emerge in industry, an approach that could involve full integration of all contributors to a given document in every stage of the process—planning, research, writing drafts, revising, and even (given full access to automated systems for word processing and desktop publishing) typing and illustrating. This alternative to the division of labor—the integrated team model—demands a new socializing of individuals from disparate discourse communities and thus represents a challenge for managers. Their main task in this approach is to oil the machinery of collaboration

DIVISION OF LABOR VS. INTEGRATED TEAMS: BACKGROUND

The purpose of this section is to ground our research in the general history and theory of organizational management and to report briefly on recent literature in technical communication that is relevant to our topic.

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Historical and Theoretical Perspective

The two organizational models have a long history in managerial theory, the essentials of which are effectively summarized in *Managing Communication in Organizations: An Introduction* by Cummings, Long, and Lewis [1]. The division of labor approach, with its origins in the classic economics of Adam Smith, was first described as an aspect of modern bureaucratic rationality by Max Weber in 1909. The Weberian analysis of bureaucratic organization recognized the following principles:

- Hierarchical distribution of power and control
- Standardized rules and procedures
- Specialization and division of labor according to tasks and subtasks
- Employment based on technical competence
- Detailed job descriptions
- Prescriptive and rigid information flow
- Subordination of individual needs to organizational goals.

Although Weber was ambiguous, even cynical, about the overall effects of this type of organization upon human society [2], he was quite clear about the advantages he observed in bureaucratic rationality:

The decisive reason for the advance of bureaucratic organization has always been its purely technical superiority over any other form of organization. The fully developed bureaucratic apparatus compares with other organizations exactly as does the machine with the non-mechanical modes of production. Precision, speed, unambiguity, knowledge of the files, continuity, discretion, unity, strict subordination, reduction of friction and of material and personal costs—these are raised to the optimum point in the strictly bureaucratic administration [3, 973].

The Weberian description of efficient division of labor was supplemented by Frederick Taylor, the founder of “scientific management,” also known as Taylorism. The first “efficiency expert,” Taylor contributed four new principles to the model of bureaucratic rationality:

- Work should be selected scientifically through rigorous testing.
- Effectiveness should be objectively measured.
- Managers are planners.
- Workers are doers [1, 36].

In 1916, Henri Fayol added to this theory of managerial control the five now classic principles of management: *planning, organizing, commanding, coordinating, and controlling* (review and evaluation) [1, 36].

As early as 1927, the beginnings of the integrated team concept began to emerge as a dialectical challenge to what was by then the well-established division of labor model. The founder of industrial psychology, Elton Mayo, developed the so-called “human relations approach,” which offered alternatives to the system of bureaucratic management, including the following:

- People-oriented rather than production-oriented management
- Use of informal work groups

- Emphasis on cooperation rather than competition, building of community among workers and managers
- Inclusion of workers in planning and decision-making
- Increased concern over worker satisfaction [1, 38–39; 4].

Like the bureaucratic model, the human relations approach claimed to have found the key to the manager's foremost concern—productivity. The difference is that the emphasis in Taylorism and its descendants has fallen upon time and cost efficiency, whereas the emphasis in human relations management falls on worker motivation, which, it is claimed, assures the highest quality products and which is neglected and even suppressed in bureaucratic management despite any advantage that is realized in terms of time and cost.

Three recent developments within the human relations tradition support the emergence of integrated teams: the concepts of *meaningfulness of work*, *self-directed teams*, and *informating versus automating*.

Meaningfulness of work. Hackman and Oldham claim that this essential ingredient in a worker's motivation—and thereby the key to increased productivity—depends upon three factors:

- Skill variety: the chance to use and develop a number of skills in a task
- Task identity: the degree to which the worker identifies with the task, usually an effect of being involved from beginning to end
- Task significance: the worker's recognition of the task's importance in the lives of other people within the organization and in the world of human relations in general [1, 261; 5].

Self-Directed Groups. Businesses have begun to experiment with project groups that work on a task from beginning to end and have a high degree of decision-making power in their project [6, 7]. This practice appears to have been influenced by the trend among Japanese managers to favor employee participation and the use of small, informally structured groups [8]. But the American system has a motive different from the tradition-sensitive managers of Japanese industry: "Given rising educational levels, demands for greater individualism, and alienation from traditional authority, it is becoming increasingly important to consider human needs" [9, 1188]. In one company designed to accommodate these worker needs, "members of autonomous work groups rotate jobs, select their own members, decide on assignments, monitor their own performance, provide training for each other, and are paid for the number of tasks they know how to perform" [9, 1189].

Rossabeth Kanter, an advocate of this approach, observes, "The organizational chart with its hierarchy of reporting relationships and accountabilities reflects one reality; the 'other structure,' not generally shown on the charts, is an overlay of flexible, ad hoc problem-solving teams . . ." [10, 488]. Kanter stresses that the purpose of such groups is to increase the fertility of the setting in which ideas are generated and implemented by drawing team members from a diversity of sources and backgrounds: "It is not the 'caution of committees' that is sought—reducing risk by spreading responsibility—but the better idea that comes from a clash and an integration of perspectives" [10, 489].

Table 1. Summary of Two Organizational Models

Division of Labor	Integrated Teams
1. Managers hire and assign highly specialized employees to discrete roles in a closely analyzed production process.	1. Project teams composed of individuals from various specialties share in a holistically determined effort to complete a task.
2. Tasks are accomplished (i.e., documents are produced) in a step-wise, linear flow.	2. Tasks are accomplished in an informal, often recursive manner that varies according to team decisions and capabilities.
3. Process of document production is managed and reviewed "from outside" by professional managers.	3. Process is managed "democratically" by members of the team or "representatively" by a leader within the group who serves as a liaison with management.

Automating versus Informating. In an important new book, *In the Age of the Smart Machine*, Shoshana Zuboff argues that the computerization of the industrial environment creates two possible managerial options which stand in direct opposition to one another and which run parallel to the two models we have been outlining [11]. According to Zuboff, managers can use a computer networking either to *automate* their organization, increasing the mechanical control and impersonality of Taylorism, or to *informate* their organizations, using computer networking as a means of providing widespread access to information and of opening lines of communication formerly closed in the rigid bureaucratic hierarchy [see also 12]. The tendency to automate falls within the division of labor tradition of bureaucratic management, while the tendency to informate creates a way of empowering self-directed, integrated teams.

We are now in a position to summarize the two models against the background of these dialectically opposed traditions. Table 1 provides a brief comparison of the two models.

Review of Relevant Literature in Technical Communication

The literature on the management of technical communication often takes division of labor for granted. The implicit adoption of the values of bureaucratic and "scientific" management is suggested by the predominant concern with such issues as increased specialization, automating, and efficiency in matters of time and cost. Thus, the editors of the special issue of *Technical Communication* dealing with the topic echo the classic managerial values of Fayol in their claim that "information . . . is a productive resource that can be evaluated and managed for the purposes of planning, controlling, and decision-making," though they stop short of giving a mechanistic or Tayloristic definition for input (number of hours spent on a project) and output (number of pages produced) [13, 216].

Likewise, while reporting on managerial innovations in technical manual production, Killingsworth and Eiland nevertheless rely on the Fayolian description of

the manager's tasks—*planning, organizing, commanding, coordinating, and controlling*—without recognizing the possibility that management can be participatory [14].

In a case study of automated management, Shirley Anderson describes a “Job Tracking System” that exemplifies quite well the use of computers for the kind of authoritarian automating described by Zuboff and that thereby finds its implicit justification in the orientation and values of the division of labor model. With the system, the communication managers are able to monitor—

- Daily status of individual inputs and projects
- Unit productivity, product cost, and vendor performance
- Employee time entered by task [15, 119].

If the classical managerial rationales do prevail in the field, how are the tasks of communicative labor divided? At least two articles have drawn on the division of the writing process into prewriting (planning and researching a topic), drafting, revising, and editing—much as it is treated in composition textbooks. Krull and Hurford consider the effect on productivity enabled by computer assistance in each stage of the process [16]. Manyak encourages managerial intervention at the stages of pre-writing, revision, and editing—leaving drafting (or “scribing,” to use the term of Krull and Hurford) to the individual communicator [17].

No articles have as yet explicitly considered the *concept* of integrated teams, but a number of authors provide case studies and anecdotal evidence that such practices are emerging in technical communication. Dressel, Euler, Bagby, and Dell present a system of managing proposal production that involves all members of an integrated team—proposal manager, text coordinator, writers, contract officer, text-processing leader, and graphics leader—in every stage of the writing process: outlining, drafting, editing, reviewing, and producing the document in its final form; moreover, this system employs informing technologies closely resembling the ideal of Zuboff [18].

Proietti and Thomas report on an integrated and democratically managed group in a project to develop an interactive video course; the group includes the project manager, course developer, programmer, editor, instructional designer, consultant, funder, and subject matter experts [19].

Dilbeck and Golowich describe a company reorganization that effected a fuller integration of software developers, trainers, and technical writers, with the result that all the participating employees achieved a higher level of job satisfaction: the writers attained a better sense of “the big picture,” the trainers were grateful for a reduced writing load, and the developers gained a new respect for the writers and trainers through a better understanding of their functions; they also attained a higher level of job performance: training manuals were better written, and user manuals were more technically astute [20].

The need to develop effective user manuals has given rise to a number of innovative efforts at collaboration and integration in the computer industry. Wendy Milner, in asserting that technical communicators can make a contribution to online documentation, seeks an expansion of the writer's role into the area of product design [21]. Barstow and Jaynes make essentially the same point in insisting on effective integration of on-line and hard-copy instructions for users [22]. Mark Smallwood agrees that documentation can be improved if writers are included in the initial development of

software products, though he admits that communicators crossing boundaries in this way may be greeted with hostility by designers; writers can win credibility, he suggests, only by achieving a degree of technical proficiency and role flexibility [23]. In the same vein, Fowler and Roeger advise close collaboration between writers and programmers [24]. Chew, Jandel, and Martinich also insist on the “enhanced role of writers in the product development cycle,” especially in human factors engineering of user interfaces in computer products [25; see also 26, 27].

Just as the need for good user manuals has spurred new collaborations among technical experts (programmers and designers), communicators (writers, editors, and artists), and managers in the computer industry, the need to produce a quality product in a hurry has prompted proposal teams to seek innovative techniques of integration. The literature on proposal writing for some years now has reported on the success of storyboarding and other graphical techniques of document planning as a way of achieving maximum input from team members at various stages of the project [28, 29, 30]. No longer considered merely a way of illustrating written points, visuals are used early in the writing process as a means of encouraging collaboration of various team members. This practice breaks the traditional linear path of document development (from planning to drafting to revising to editing to printing) and allows for overlap and recursion in the stages of the writing process.

Table 2. Summary of Two Organizational Models Applied to Technical Communication

Division of Labor	Integrated Teams
1. Only managers observe and participate in the whole process by which documents are planned and produced.	1. All members of a document team participate in all stages of production.
2. Individuals are responsible for a clearly defined task which they are trained as specialists to perform.	2. Team members are assigned roles based on their training as specialists but share and exchange roles within the team if this will improve the final product.
3. The process of writing is accomplished in a step-wise, linear fashion, with managers and technical staff planning the document, technical staff and technical writers drafting it, writers and editors revising and editing it, artists illustrating it, and word processors and printers producing final copy.	3. The stages of the writing process are overlapping and recursive, with all team members offering advice and content at every phase: writers, editors and artists, for example, may offer outlines and graphics for story-boarding during planning; and technical experts may participate in producing final copy through the use of desktop publishing software.
4. Computer technology is used to automate (monitor and manage time and costs).	4. Computer technology is used to informate (allow team members full and fast access to company files).

Against this background, we can now refine our description of the division of labor and integrated team models to show how they work in technical communication. Table 2 gives a summary.

A SURVEY OF TECHNICAL COMMUNICATORS

To get a better sense of how deeply entrenched the division of labor is in today's industry and to chart the inroads cut by the alternative of the integrated teams model, we conducted a survey of technical writers in various organizations.

Research Questions and Hypotheses

In general, our research questions were these:

- How does a document progress through the planning, drafting, and revision phases; is the process linear, overlapping, or recursive?
- What kinds of personnel participate at each stage of the document preparation process?
- How does the training of the personnel affect their participation in the process?
- Is the process different for different kinds of documents?
- To what extent is the process automated or informed?
- To what extent is the process assisted by graphical techniques?
- What are the employees' attitudes toward their place in the process of document production?

We begin with the hypothesis that the production process in industry is most frequently modelled according to the division of labor along a linear path from planning to drafting to revising and editing. We also expected that variations in the process would depend upon the types of individuals (managers, technical experts, marketing people, writers, editors, artists) involved at different stages in the process, the training of the writers and editors, the degree to which the process was automated, how the process was managed, and the rhetorical and graphical techniques employed. Finally, we expected, on the basis of our reading of the literature, that integrated teams would be used most frequently in organizations that produced contract proposals and computer manuals for users.

Methods: Data Collection and Analysis

We developed a questionnaire to elicit information about the document production process and the individuals involved (Figure 1). We asked the participants to answer questions about the participation of various individuals in different stages of document production, about the relation of the different stages of the process, about automation of the process, and about the structure and management of the process. We realized that, in labeling various stages of the process ("planning," "drafting," and "editing") or in providing descriptive terms for the flow of information development ("linear," "recursive," "overlapping"), we ran the risk of biasing our data. In all our questions, therefore, we left space for comments, hoping the rel-

Questionnaire on the Process of Developing Technical Documents

Return as soon as possible (no later than March 15) to:

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 Department of English
 Texas Tech University
 Box 4530
 Lubbock, TX 79409

_____ Check here if you would like a copy of the results of this questionnaire.

1. Please give your name, title, and the name and address of your company, division, and/or organization.

2. Which form(s) of technical communication does your office often produce?
 Proposals _____ *Comment:*
 Manuals (including computer documentation) _____
 Reports _____
 Other _____
3. What kind of personnel participates in each stage of document production (for example, technical writers, engineers/technical staff, editors, graphic artists, marketing staff, management)?

Planning?

Drafting (that is, early stages of writing)?

Revising/Editing?

Comment:

4. Which stages involve teams of authors/editors/artists, and which are normally done by individuals?

	individuals	teams
planning	_____	_____
drafting	_____	_____
revising	_____	_____

Comment:

5. How automated is the process; that is, which stages are handled "on line" or in some way make use of word processors and other computerized equipment?

planning _____	<i>Comment:</i>
drafting _____	
revising _____	

6. In which stages are graphics used as devices for organizing, illustrating, or replacing written text (in some organizations, for example, flow charts and other graphic devices play a significant role even in the early stages of planning)?

planning _____	<i>Comment:</i>
drafting _____	
revising _____	

7. Which of the following term(s) best describe the writing process at your company or division?
 _____ *linear* (The process flows directly from planning to drafting, then back again, for example.)
 _____ *recursive* (Drafting begins while planning is still in progress, then back again, for example.)
 _____ *incremental* (All operations are completed on one section of a document before the next section is written.)
 _____ *other* (Please give term and definition):
8. Who oversees and approves publication design?
9. Who oversees, manages and/or controls the overall process of planning, drafting, revising, and publishing documents?
10. How does the process vary as the type of length of document varies?
11. What kind of formal training in technical communication have you and your staff had? (Include degrees in technical writing, workshops, seminars, graduate courses, etc.)
12. Please use the rest of this page (and, if necessary, the back of the page) to comment on any features that you think are unique in the way your company handles the process of document production.

Figure 1. Questionnaire used for data collection.

atively simple check-the-blank questions would ignite an attitudinal response in the comment section which would prove more valuable than a simple count of how many organizations used division of labor versus how many used integrated teams at the time of the survey.

We sent the questionnaire to 120 technical writers whose names were taken from the Society for Technical Communication's directory of members. Sixty-five, a little over 50 percent, responded, most with ample comments about their practice and their attitudes. The moderate return is most likely due to the demanding nature of the three-page questionnaire with its many requests for comments. One respondent complained vigorously about the design of the questionnaire (while nevertheless supplying us with extremely useful responses on her attitudes about her work).

To analyze the data we collected, we tallied the responses and attempted to discern patterns within and among them. Some of the data could be quantified (see the *Results* section below). But we were most lucky to receive many long responses in the comments sections. These gave us insights not only into the structure of document production, but also into the respondents' perceptions and feelings about that structure. Such responses yielded less to quantification than to careful scrutiny and dialectical interpretation in light of similar or vastly different responses. The "numbers" elicited by the questionnaire often do little more than reinforce our common sense about the profession. They are useful primarily in providing a context for the comments and a means of locating and identifying the authors of the comments. We ask, therefore, that our readers bear with us as we report this data, all the while realizing that our real interest is the reporting and analysis of the rich comments our subjects generously provided.

RESULTS

Of the 65 respondents, 16 (25%) were from companies involved in the computer or electronics industries, and 24 (37%) worked for other private sector companies involved in such fields as petroleum, agriculture, and consumer products. Eighteen (28%) represented military or government organizations, including defense contractors. Four responses (6%) came from university research or publications departments, and 3 (4%) were returned anonymously—with responses but without names, titles, or addresses.

Though the sample hardly represents all technical writing fields or indicates the breakdown of types of industries employing technical writers, our responses do provide a representative cross-section of organizations and companies. Strongly technical and scientific, those organizations further suggest active bureaucracies—multiple layers of departments and individuals that might participate in the document-production process.

Manuals and reports are the most commonly produced documents (45 and 39 of the 65, respectively), according to the respondents. A sizable number (23) reported that they prepare proposals as well. The "other" forms mentioned show a wide array of writing activity: brochures, marketing literature, journal articles, conference papers, newsletters, even speeches, maps, and videos.

Team Involvement at Different Stages of the Production Process

We found that collaboration (specifically, team involvement) is the normal procedure at many companies, especially at the planning stage. The following shows the answers to the question, *Which stages involve teams of authors/editors/artists, and which are normally done by individuals?*

	Plan	Draft	Revise
Individuals	30	47	40
Teams	30	13	

Clearly, individuals are entrusted with significant duties. That drafting, in particular, is an individual's task demonstrates to some extent the independent nature of this stage of the writing process, even in complex and bureaucratic companies. In contrast, planning relies on such social activities as brainstorming, setting multiple objectives, and problem solving, just as revising and editing require satisfying multiple agendas.

Participation of Different Discourse Communities at Different Stages

The personnel involved in production, also a function of organizational nomenclature, suggests significant participation from a variety of people and groups. We asked: *What kind of personnel participates in each stage of document production (for example, technical writers, engineers/technical staff, editors, graphic artists, marketing staff, management)?* The results:

	P	D	R
Writers	37	40	40
Tech. Staff	36	39	38
Editors	13	9	26
Artists	9	4	7
Mgmt	27	8	17
Other	17	8	13

P (Planning), D (Drafting), R (Revising)

These results suggest that it has become common for technical communicators to be involved throughout the production process and to interact with diverse groups and individuals. And the specific discourse communities begin to emerge as well: the engineering, scientific, and technical staff, artists, managers, and "others"—marketing staff, auditors, product specialists, reviewers, quality assurance personnel, and users. Technical staff, specialists in various scientific and technological fields, join technical writers in participating in the full process more frequently than such other groups as managers, editors, and artists, few of whom create drafts.

We found that of the three stages in the writing process, drafting and revising take most advantage of word processors and other computerized equipment. In fact, the involvement of personnel may be a function of the level of automation; for processes that individuals rather than teams dominate, computers are used.

Not surprisingly, the responses from computer companies show significant use of word processors and other computer equipment. One respondent commented, "This