

Meeting Analysis: Findings from Research and Practice

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Abstract

"Almost every time there is a genuinely important decision to be made in an organization, a group is assigned to make it -- or at least to counsel and advise the individual who must make it." Hackman [23]

Meeting analysis, that is the study of meeting expenses, productivity, processes, and outcomes, is relevant to GSS practice And research for several reasons. Many reviews and surveys [1, 2, 3, 15, 21, 52, 53, 57, 75, 82] reveal that meetings dominate workers' and managers' time and yet are considered to be costly, unproductive and dissatisfying. Studies [13, 52, 53, 56, 57] show that meetings are essential and that the number of meetings and their duration has been steadily increasing. Studies of Managers and knowledge workers [1, 13, 21, 51, 52, 53, 68, 75, 79, 89, 90, 92] reveal that they spend between 25%-80% of their time in meetings, suggesting that meetings are an important part of one's working life. Estimates of meeting expenses [1, 13, 39, 53] range from costs of \$30 million to over 100 million per year to losses between \$54 million and 3.7 billion annually! Self estimates of meeting productivity [15, 21, 53, 75] by managers in many different functional areas range from 33% - 47%.

Introduction

Studies reveal that meetings are indeed costly and unproductive, yet essential and increasing in number and duration underscore the need for meeting productivity research. Studying the purpose of group meetings and common meeting problems provides insights into which types of group support may improve meeting productivity. Finally, the increasing trend toward telework [6, 17, 41, 58] justifies the need for research into virtual meeting support. It is important to understand how we meet and collaborate today before we can begin to design effective new methods for the future. This article reviews and summarizes in detail decades of "meeting analysis" research which reveal that meetings are costly and unproductive on the one hand, yet essential and increasing in number and duration on the other. Then it defines meetings and reviews literature on typical meetings, why groups meet, purposes for holding meetings, monetary and temporal meeting expenses, size and location of meetings, meeting problems, addition of technology to meetings, and finally the rise of telework and virtual meetings.

Meeting: A Definition

"A meeting is a gathering where people speak up, say nothing, and then all disagree." Kayser [38]

To explore complex human interactions such as meetings one needs to understand them and their components in

detail. There is value in defining meetings as the definition reveals the variety of purposes they serve and the specific techniques required for each to bring about the greatest return on investment [2]. Webster [96] defines a meeting as "an act or process of coming together" that may be "a chance or a

planned encounter." This definition incorporates the concepts formality level and joint process or action; however it is somewhat imprecise and inexplicit. Goffman [19] is more explicit in defining a meeting as that which "occurs when people effectively agree to sustain for a time a single focus of cognitive and visual attention." Hildreth [30] adds the concept of a shared goal to define a meeting as a "communication encounter between ... persons for a common purpose." Nunamaker et. al. [61] incorporate the concepts of physical and temporal dispersion and define a meeting as "any activity where people come together, whether at the same place at the same time, or in different places at different times."

The definition of meeting in this research combines elements of all those found in the literature: "a focused interaction of cognitive attention, planned or chance, where people agree to come together for a common purpose, whether at the same time and the same place, or at different times in different places." This definition includes several important dimensions of meetings: focused interactions; groups of people; a common purpose; level of formality; and temporal and physical dispersion. Each of these dimensions may affect the meeting itself and the support required to improve group productivity. Our definition includes formal board meetings, casual hallway conversations, telephone calls and internet-enabled interactions through tools such as Net-meeting and discussion groups. Our concept of a meeting involves people sharing data, information, knowledge and wisdom to garner their collective intelligence and bring it to bear to solve a problem or achieve a goal together.

Typical Meetings

"A meeting is an interaction where the unwilling, selected from the uninformed, led by the unsuitable, to discuss the unnecessary, are required to write a report about the unimportant." Kayser [38]

While each meeting is a unique event, some studies attempt to define a typical or average meeting. The 3M Meeting Effectiveness Study (3M Study) developed a profile for the typical meeting in Corporate America based on a survey of over 900 meetings (See Figure 1.)

Figure 1.

Profile of the Typical Meeting in Corporate America [52]

The typical meeting in this study has the following characteristics:

(Percentages based on 903 meetings surveyed, MF = Most frequently reported value)

- Staff Meeting (45%)
- Held in Company Conference Room (74%)
- Starting at 11:00 AM (MF)
- Lasts 1 hour and 30 minutes (MF)
- Involves 9 people (2 managers, 4 coworkers, 2 subordinates, & 1 outsider) (MF)
- Two hours prior warning (MF)
- No advance written agenda (63%)

- Somewhat or very informal (76%)
- Most or all present actively participate (72%)
- Uses handouts (47%)
- Completely covers agenda only one-half of the time (53%)
- Eleven percent of the time is spent discussing irrelevant issues. (MF)

Kayser [38, 39] developed two typical meeting profiles based on related 1989 and 1995 studies of Xerox's 24,000 person Manufacturing and Development group. These two profiles differed only in terms of average cost (See Figure 2.)

Figure 2. Average Meeting for Xerox Manufacturing and Development Group [38, 39]

Average Meeting Composition:
 Seven People
 Organizationally equivalent to
 Four Senior Engineers
 Two Project Managers
 One Second-Level Manager

Average Length:
 60 Minutes

Average Cost: (Accounting for fully loaded Salaries)
 1989: \$337.00
 1995: \$427.00

While defining the "average" or "typical" meeting provides some insight, additional analysis may provide deeper understanding. The following sections will explore meetings in more depth and review studies from the literature.

Why Do Groups Work Together in Meetings?

"We meet because people holding different jobs have to cooperate to get a specific task done. We meet because the knowledge and experience needed in a specific situation are not available in one head, but have to be pieced together out of the knowledge and experience of several people."
Peter Drucker [14]

"A Meeting is indispensable when you don't want to get anything done." **Thomas Kayser [38]**

Belief in the adage "two heads are better than one" may be found in the widespread employ of meetings in many societies; for example committees, boards, councils, and the use of juries within many legal systems [31, 77]. Research shows that group performance may often exceed individual performance. Perhaps the best known evidence comes from Hall's [24] research with the "Lost on the Moon" problem. Hall found that "When a group's final decision is compared to the independent points of view that the members held before entering the group, the group's effort is almost always an improvement over its average individual resource, and often it is better than even the best individual contribution."

Hill [31] analyzed experimental comparisons of groups and individuals on four dimensions: task, process, individual differences, and methodology. The overall results of the review and analysis showed that "group performance was generally qualitatively and quantitatively superior to the performance of the average individual." [31] Workers express the desire to work together in groups. Hall [25] found in a three-year survey of 10,277 U.S. workers from all levels of employment that 97% reported they need conditions that encourage collaboration to do their best work.

Meeting Purposes

"A meeting is a place where you keep the minutes and throw away the hours." **Thomas Kayser [38]**

Meetings bring together a number of people that share a definite purpose and value stems from that definite purpose [2].

The literature shows that groups meet for many different reasons. Figure 3 provides some examples.

Figure 3 Examples from the Literature of Why Groups Meet [53, 56, 61]

Make Decisions	Avoid Decisions
Socialize	Build Trust
Review	Share Visions
Synergy	Build Consensus
Solve Problems	Surface Perspectives
Share work	Build Teams
Long Range Planning	Handling Emergencies
Education	Training
Information Exchange	Information Exchange
Sales	Reorganization

Table 1 shows meeting purposes by percentage from the 3M Study [52]. Almost two thirds (66%) of the meetings involved complex group processes: reconcile conflict (29%); reach a group judgment or decision (26%); solve a problem (11%).

Table 1. Meeting Purposes by Percentage [52]

%	Meeting Purpose
29	Reconcile conflict
26	Reach a group judgment or decision
11	Solve a problem
11	Ensure that everyone understands
5	Facilitate staff communication
4	Gain support for a program
4	Explore new ideas and concepts
2	Accept reports
2	Demonstrate a project or system

(Percentages based on 903 Meetings)

Much literature (i.e. [5, 26, 43, 71, 97]) identifies numerous meeting types. Figure 4 and Table 2 show some examples based on surveys [2, 52], to determine the goals and procedures of the meeting.

Figure 4 Six Different Meeting Types: [2]

- Staff Meetings
- Information Meetings
- Fact Finding Meetings
- Problem-Solving and Decision Making Meetings
- Committee Meetings
- Major Sales Meetings

Table 2 Types of Meetings in Corporate America by Percentage [52]

%	Meeting Type
45%	Staff
22%	Task Force
21%	Information Sharing
5%	Brainstorming
2%	Ceremonial
5%	Other

(Percentages based on 903 Meetings)

Meeting Expenses: Time and Money

"Time and Money, money and time, with respect to meetings they intertwine. And, when all the costs are added up, it blows your mind." **Thomas Kayser [39]**

There is no such thing as a free meeting [38]. According to Kayser, when one attends a meeting their actions send a clear message: "This meeting is so important that I am willing to set aside everything else that I could be doing to join with the other attendees" [38]. This section is not intended to mislead

the reader nor to overwhelm them with statistics, but rather to emphasize the exceedingly high costs associated with meetings.

Time Spent Meeting

“Ask any group of managers in any country in the world to list their three most time-consuming activities. Invariably, ‘meetings’ will appear among the three. I have asked this question of more than 200 groups, and in every case but three, more than three quarters of each group indicated that half their time spent in meetings is wasted” McKenzie [48]

Meeting time studies have gone on since the 1960s, when Tillman’s [87] early benchmark study found on average executives spent three and one-half (3 ½) hours weekly in planned meetings and more time in informal meetings. 1970’s surveys show increases in numbers of meetings [53]. Rice [75] found that of 600, the average participated in six to seven meetings weekly, or almost twice as many as Tillman [87] found, and that one-half reported they attended more meetings than in the past. Mintzberg’s [51] study of six CEOs over a five week period suggests managers spend up to 70% of their time in meetings (60% scheduled 10% unscheduled (see Table 3.) and on average attend eight meetings per day. Van de Ven [92] found that program managers spent as much as 80% of their time in meetings. Tubbs [90] reports that in a 1978 survey the average executive at a large Insurance company spent approximately 700 hours annually or almost two out of five days in meetings. Many middle managers reported spending as many as three or four full days a week in meetings and some reported spending eight straight hours in one meeting [53]. These 1970’s studies reveal a general trend toward business professionals at all levels in small and large companies spending increasing amounts of time in meetings [53].

Table 3 Percentage Distribution of Hours by Managerial Activity [51]

Managerial Activity	% Hours
Scheduled Meetings	59%
Desk Work	22%
Unscheduled Meetings	10%
Telephone Calls	6%
Tours	3%

Studies in the 1980’s also show increases in numbers of meetings. Mosvick [54, 55] conducted two related studies of 950 managers and technical professionals in large-scale technology-intensive industries ranging from junior to senior management in both the U.S. and abroad over a five year period. Major findings were *“a notable shift toward an increase in the number and length of meetings with an increasingly high level of dissatisfaction with meetings”* (See Table 4) [53].

Professionals in the first survey [54] report attending seven weekly meetings with three or more participants, six at work and one after-hours, accounting for nearly six hours [54] (See table 4 Survey I). Respondents in the second survey report an increase of 2.5 meetings to a weekly average of 9.5, 8.5 at work and one after-hours, which consumed nearly 25% (or 10 hours) of their work week [55] (See table 2.4 Survey II). This translates into a 55% increase in total meeting hours. Results also indicate a slight increase in meeting length [55] (See table 4 Survey II.) In a more detailed value analysis of all managers and technical professionals at one location within one major company, Mosvick and Nelson [53, 55] found that 7000 managers at all levels spend on average 8.4 hours per week in meetings (See Table 5.)

Table 4 Average Number and Length of Reported Meetings Each Week [53, 54, 55]

Types of Meetings	Survey I (1981-1982) (N=230)		Survey II (1983-1986) (N=720)		Increase
	#	Length (min.)	#	Length (min.)	
Staff	1.5	57	2.0	62	9%
Policy	0.7	48	1.0	56	17%
Problem Solving	2.3	50	3.5	54	8%
Interdepartmental	1.5	60	2.1	61	2%
Total on the job	6.0	5.4 Hr.	8.6	8.3 Hr	54%
After hours or Business lunch	0.8	59	1.2	67	14%
Total Meetings	6.8	6.2 Hr.	9.8	9.6 Hr	55%

Table 5. Time Spent in Meetings per Week in a High-Technology Corporation by Management Level [53, 55]

Level	# Employees	Hours
Senior	1000	9.7
Middle	2000	9.0
Junior	4000	7.8
Mean	7000	8.4

Table 6 presents meeting lengths reported in the 3M Study [52]. The range was from five minutes (1%) to 11 hours (1%) and the median one hour and 30 minutes. Over one-half (51%) of the more than 900 respondents reported that meetings were 30 minutes to one and one-half hours in length. [52].

Table 6. Reported Length of Actual Meetings in Corporate America [52]

Length	%
0-30 min.	0.9%
31-61 min.	26.0%
1-1.5 hrs.	25.0%
1.5-2 hrs.	16.0%
2-4 hrs.	13.0%
> 4 hrs.	10.0%

(Percentages based on 903 Meetings)

Panko [67] found in a survey of 22 executive MBA students with full time managerial or professional positions that most meetings are brief. Table 7 shows that by percent of time almost three-quarters (73%) of the 436 reported oral communication events were 30 minutes or less in length, while only three percent (3%) lasted longer than 2 hours. The table also shows that by percent of events brief meetings of 15 minutes or less account for only 12% of face-to-face meeting time, while the longest meetings of two or more hours account for one-half of the time.

The 3M Study [52] found that almost one-third of the respondents (31%) spend one or more hours attending meetings with three or more people daily, while another third spends fifteen minutes or less attending meetings (See Table 2.8) [52].

Table 7. Reported Length of Oral Communication [69]

Length	% Events	% Time
5 min.	28%	3%
10 min.	12%	3%
15 min.	14%	6%
30 min.	19%	15%
45 min.	6%	8%
1 hr.	9%	18%
2 hrs.	9%	29%
> 2 hrs.	3%	21%

(Percentages based on 436 Oral Communication Events)

Table 8. Amount of Time Spent in Meetings Daily [52]

Length	%
0-15 min.	35%
15-30 min.	14%
30-60 min.	21%
1-2 hrs.	13%
2-4 hrs.	11%
> 4 hrs.	7%

(Percentages based on 903 Meetings)

Several Survey's by Tropman [89] showed that more than 50% of an active managers official work-time is spent in meetings. A survey of 2000 business leaders by Harrison-Hofstra showed that they spend 25-70% of their day in meetings [10, 56, 79]. A survey of 1000 [21] executives found that seven out of ten (71.9%) spend more time in meetings than they did five years prior and that 87% spend at least the same amount of time in meetings as they did five years earlier (see Table 9.) The same survey found that almost one-half (49.3%) expect to spend even more time in meetings and that almost 85% expect to spend at least as much time in meetings five years in the future [21] See Table (10.)

Table 9. Time Spent in Meetings Compared to Five Years Earlier [21]

Time Spent	% of Respondents
More	71.9%
Same	14.8%
Less	10.9%
No Opinion	3.2%

(Percentages based on 1000 executives)

Table 10. Expected Time Spent in Meetings Five Years in the Future [21]

Expected Time	% of Respondents
More	49.3%
Same	35.1%
Less	12.5%
No Opinion	3.1%

(Percentages based on 1000 executives)

The 3M Study [52] found that 25-80% of a typical managers time is spent in meetings. Doyle [13] found that typical middle managers spend around 35% of their work week in meetings and top mangers may spend as much as 50% of their time in meetings. Mosvick and Nelson [53] found that the average technical professional or manager spends almost one-fourth (1/4) of their work week in meetings, top and middle managers may spend as much as two full days a week in meetings, and executive managers may spend four days a week in meetings.

Panko [67] found that as much as 20% of a manager's workday is spent in conference room meetings. In another study Panko [68] found that managers spend approximately 20% of their work day in five-person or larger formal meetings and as much as 85% of their time communicating. The 1999 Pitney Bowes Survey of 800 Knowledge Workers Found that the number and format of communication messages that knowledge workers receive is increasing (See Table 11.)

Table 11. Pitney Bowes Survey of Knowledge workers

Message Format	1999	1998	1984*
Telephone Calls	52		20
E-mails	36		4
Voicemails	23		0
S-Mails	18		10
Interoffice Memos	18		11
Faxes	14		0
Post-its	13		5
Message Slips	9		4
Pager Messages	8		0
Cell Calls	4		0
Express Mail	7		0
Total	202	190	54

Estimate

If one takes a very conservative estimate of four hours of meetings per week the average person would spend over 9,000 hours or 365 days in meeting during their lifetime. [13] Mosvick and Nelson [53] estimate that many companies are losing the "equivalent of 30 man-days and 240 man-hours a year for every person who participates in business conferences," due to poor meeting preparation, ad hoc scheduling, and lack of training in meeting management. The 3M Meeting Management Team [1] conservatively estimates that middle managers spend 4.4 million hours in meetings annually.

2.4.2 Number of Meetings

"There are meetings, and meetings about meetings, and meetings to plan reports, and meetings to review the status of reports. And what these meetings are about is people just trying to figure out what they are doing." Paul Strassmann

Several studies [13, 52, 53, 57] show that meeting frequency is growing. In 1988, United States *Fortune 500* companies are estimated to have held between "eleven and fifteen million" formal meetings daily and between "three and four billion" meetings yearly [13, 52]. Results of the 1998 Meeting Professionals International/American Society of Association Executives (MPI/ASAE) Seventh Annual Meetings Outlook Survey [57] indicate that the need for meetings will increase in the future. Twenty-four percent (24%) of respondents expect to hold more meetings in 1998. Eighteen percent (18%) expect to hold more regional meetings, while eighty-two percent plan to hold at least the same number. Twenty-one (21%) percent expect to hold more national meetings. Fourteen percent (14%) expect to hold more international meetings. Only fifteen percent (15%) predict they will hold shorter meetings [57].

2.4.3 Economic Costs of Meetings

"Unproductive meeting time translates into a \$37 billion annual waste."
Harrison-Hofstra Survey [79]

Research shows that although figures vary, most organizations spend between seven and fifteen percent (7-15%) of their personnel budget on meetings [13, 52.] One California company with a 350 million dollar personnel budget estimates that they spend **\$30 million annually** on meetings [13]. Mosvick and Nelson performed a detailed value analysis of 7000 managers and technical professionals at one location within a major company that revealed an over **\$54 million annual loss** due to ineffectively planned and conducted meetings [53, 55] (see Table 2.12)

Table 2.11. Summary of Time Spent in Meetings Literature

Yr.	Study Population	#/Units/Time	Reference
1960	Executives	Ave 3 1/2 hrs/week in planned meetings	[87]
1973	600 Executives	6-7 meetings/week	[75]
1973	1/2 of 600 Executives	Report more meetings than ever	[75]
1973	6 CEOs	Up to 70% of time in meetings 60% scheduled, 10% unscheduled	[51]
1973	6 CEOs	On average attend 8 meetings per day	[51]
1973	Program managers	Up to 80% of time in meetings	[92]
1978	Ave. Executive	700 hrs/yr or 2 days/week in meetings	[90]
1982	Managers	9000 hrs or 365days/Lifetime in meetings	[13]
1982	Middle managers	35%/work week in meetings	[13]
1982	Middle managers	50%/work week in meetings	[13]
1982	Ave. mgr. or tech prof.	6 hrs/week in meetings	[54]
1985	Managers	>50% worktime in meetings	[89]
1986	Ave. mgr. or tech prof.	~10 hrs/week in meetings	[55]
1987	Ave. mgr. or tech prof.	up to 50%/time in meetings	[53]
1987	7000 managers	Ave. 8.4 hrs/week in meetings	[53]
1987	Ave. mgr. or tech prof.	~ 1/4/work week in meetings	[53]
1987	Middle managers	Up to 4 full days/week in meetings	[53]
1987	Middle managers	8 straight hrs in one meeting	[53]
1989	2000 business leaders	25-70%/day in meetings	[79]
1989	1000 Executives	71.9% spend more time meeting than 5 yrs ago	[21]
1989	1000 Executives	49.3% expect to spend more time in meetings five years from now	[21]
1989	Typical Managers	25-80%/time in meetings	[52]
1989	1/3 of 903 managers	1 or more hrs/day in 3 or larger meetings	[52]
1989	1/3 of 903 managers	15 min./day or less in meetings	[52]
1994	Middle Managers	4.4 Million hours/year	[1]
1994	Managers	85%/time Communicating	[68]
1994	Managers	25%/workday in conference room meetings	[68]

Table 2.12. Annual Cost of Meetings and Estimated Loss in a High-Technology Corporation by Management Level [53, 55]

Level	#Emps	Hours	Estimated Burden Rate	Cost of time in Meetings
Senior	1000	9.7	\$50	\$485,000
Middle	2000	9.0	\$40	\$720,000
Junior	4000	7.8	\$30	\$936,000
Weekly Cost of Meetings				\$2,141,000
Annual Cost of Meetings (\$2,141,000 x 48 Weeks)				\$102,768,000
Estimated Meeting Efficiency (47% of Annual Cost)				\$48,300,000
Loss Due to Ineffective Meetings				\$54,468,000

(Meeting hours and burden rate drawn from one company in the 1986 Mosvick Study)

Mosvick and Nelson conducted a similar cost analysis of a larger population of managers and technical professionals working for a larger multinational firm. This second analysis, using actual company reports of time spent in meetings, estimates of meetings, and the company's burden rates, yielded a conservative estimate of losses in group productivity of **\$71 million** per year [53, 64].

The 3M Meeting Management Team [1] conservatively estimates that meetings involving middle managers within 3M corporation cost the company **\$78.8 million annually**. Kayser [38, 39] found that the average cost of a one hour meeting, accounting for fully loaded salaries, within Xerox's 24,000 person Manufacturing and Development group rose from \$337.00 in 1989 to \$427.00 in 1995. When multiplied by a conservative estimate of 4,500 meetings per week and 52 weeks per year the annualized cost increase was \$22.3 million (28.5%) from \$78.9 million in 1989 to \$100.4 million in 1995.

Table 2.13. Summary of Economic Costs/Losses of Meeting Studies

Yr.	Study Population	\$	Cite
1982	CA corp. \$350 m/yr. personnel budget	30 Million (cost)	[13]
1986	7000+ mgrs. in hi tech firm	54 Million (loss)	[53]
1986	7000+ managers in high tech firm	71 Million (loss)	[53]
1989	24,000 Man. & Dev. Group in Xerox	78.9 Million (cost)	[38]
1994	3M middle managers	78.8 Million (cost)	[1]
1995	24,000 Man. & Dev. Group in Xerox	100.4 Million (cost)	[39]
1989	3000 Business Leaders	\$37 Billion/Year (waste)	[39]

2.4.3.1 Determining the Direct Cost of Meetings

The 3M Meeting management institute suggests that the following factors should come into play when calculating the cost of a meeting:

- Hourly wages and/or salaries (including benefits) for all attendees
- Wages and salaries for those who prepare the meeting (including attendees, secretaries, set up crew, etc.)
- Cost of materials used for the meeting (handouts, visuals, etc.)
- Overhead costs for the facilities for length of meeting
- Cost of speaker or facilitator, if applicable
- Cost of travel, lodging, meals, etc. if meeting is held out of office
- Cost of any additional miscellaneous expenses incurred due to holding the meeting

They suggest that these factors are often difficult to measure, and therefore developed a formula that estimates meeting costs at twice the salary costs for all attendees. Table 2.14 shows an example of how costly meetings may be with only a few participants in attendance.

Table 2.14 Estimated Hourly Meeting Costs [1]

Ave. Annual Salary	Hourly Cost of Meeting in \$					
	150	300	450	600	750	1500
\$75,000	150	300	450	600	750	1500
\$62,500	125	250	375	500	625	1250
\$50,000	100	200	300	400	500	1000
\$37,500	75	150	225	300	375	750
\$25,000	50	100	150	200	250	500
\$12,500	25	50	75	100	125	250
	2	4	6	8	10	20
	Number of Attendees					

2.4.3.2 Indirect Meeting Costs

“Many meetings create a ripple effect. A meeting of fifteen people can affect how three hundred people work -- or don't work -- for the rest of the day or week or even permanently.”
Michael Doyle and Peter Strauss [13]

Unproductive meetings may cost organizations more than wasted dollars; time may be lost, morale may decline, and productivity may be reduced [1]. There are a number of hidden costs associated with unsuccessful meetings, for example time wasted cooling off due to frustration and anger and griping to others. Doyle and Strauss [13] estimate that the time lost after ineffective meetings may cost \$800,000 per 1000 employees. Doyle and Strauss [13] call this the *“Meeting Recovery Syndrome.”* While direct meeting costs, such as time and money, are obvious, there is also the cost of *‘lost opportunities’* to work on other more productive tasks [38].

2.5 Meeting Size and Composition

“The best meeting is a group of three with one person sick and another out of town.” Kayser [39]

2.5.1 Having the Right People Attend Meetings

When meetings are required one must decide who it is appropriate to invite [13, 39]. Oppenheim [66] found that not having the *“right”* people is one of the leading causes of unproductive meetings. More than a third (34%) of 3M Study [52] participants report only a few (4%) or some (30%) relevant people attended meetings (See Table 2.15.) Several researchers offer guidelines for who to invite to meetings (See Table 2.16 for a summary.)

Table 2.15. Relevance of People Attending Meetings [52]

Statement	%
No Relevant People	0%
A Few Relevant People	4%
Some Relevant People	30%
All Relevant People	66%

(Based on 903 Meetings)

Table 2.16. Summary of Guidelines for Who to Invite to Meetings

Guideline	References
Those with the relevant expertise	[2, 13, 39]
Those who must be in on this decision	[2, 13, 39]
Those that are crucial to the implementation	[13]
Those most affected by the problem being addressed or their representative	[1, 13, 39]
Those with direct responsibility and authority over the topic of discussion	[1, 2, 39, 53]
Those responsible to resolve or implement decisions	[1, 2, 39, 53]
Those with enough knowledge to contribute meaningfully	[1]
Those with require information unavailable elsewhere	[2, 53]

2.5.2 Number of People Attending Meetings

“Just why an executive already having four subordinates should hesitate before adding a fifth member to the group which he controls directly, becomes clear if it is realized that the addition not only brings twenty new relationships with him, but adds nine more relationships to each of his colleagues.”

The total is raised from 44 to 100 possible relationships for the unit, an increase in complexity of 127 percent in return for a 20 percent increase in working capacity.”

V. A. Graicunas [2]

2.5.2.1 Early Studies of Group Size and Performance

Questions about the effects of group size on performance have been of interest to researchers since the first experimental studies of groups in the late 1890s and early 1900s [28, 80, 86, 88]. Taylor [86] observed that steel workers would slow their individual pace to match that of a group norm when working with others. James [36] found that larger groups are less stable than smaller groups. Several studies [4, 8, 9, 18] found that larger groups inhibit individual participation and have more difficulties in communication than smaller groups. Both Gibb [18] and Rice [74] found that larger groups create more stress than smaller ones. Two studies [83, 95] found larger groups were more successful than smaller groups with certain tasks due to the greater number of skills present; however four studies [27, 45, 83, 85] found that large groups are less efficient or productive at many other tasks. Slater [81] found that members of groups of six or smaller never felt their group was too large and that members of groups of four or larger never felt their group was too small. Both Bales [5] and Slater [81] found that five appears to be the optimum group size.

Table 2.17. Summary of Early Meeting Size Studies

Yr.	Finding	Cite
1903	Slowed pace when other present to match group norm	[86]
1927-28	Larger groups more successful with certain tasks due to additional resources	[83, 95]
1934-51	Larger groups inhibit individual participation and have more communication difficulties than smaller ones	[4, 8, 9, 18]
1951	Larger groups less stable than smaller ones	[36]
1951	Larger groups create more stress than smaller ones	[18, 74]
1927-52	Large groups are less efficient and productive than small groups at many tasks	[27, 45, 83, 85]
1954-58	Five appears to be the optimum group size	[81]
1958	Members of groups of 6 or less never felt group was too large	[81]
1958	Members of groups of 4+ never felt group was too small	[81]

2.5.2.2 Meeting Size Guidelines

Meeting literature suggests both that meetings should be as small as possible [2, 39, 53] and that they should have as many points of view as possible to avoid groupthink [2, 13, 33]. Mosvick and Nelson [53] suggest that studies have shown the ideal size to be an uneven number, to prevent deadlocks, of five to seven members. They suggest that groups smaller than five lack the broad mix of expertise required to efficiently handle tasks. They also suggest that groups of more than seven have complicated group dynamics: a few members dominate and participation becomes unequal; factions may form; and people may have less commitment to tasks. Doyle and Strauss [13] suggest that the larger the group the more structure meetings require.

Doyle and Strauss [13] suggest guidelines for appropriate meeting sizes for different meeting purposes based on four

arbitrary divisions (2-7, 7-15, 15-30, and above 30) around the boundaries of which they believe meeting dynamics seem to change. Each of these is discussed in the following sections.

2.5.2.2.1 Meetings of Two to Seven Participants

Many meetings have two to seven (2-7) participants, specifically staff meetings of managers and subordinates [13]. The question of how many to invite to a staff meeting is rarely raised, because the number is often assumed to be determined by the number of people at the next hierarchical level [13]. Doyle and Strauss [13] suggest that this size assumption may not always be valid and that for certain issues one may want and need to include other organizational members. They present several potential advantages of such meetings: groups assemble quickly; sessions are informal and flexible; any meeting type may be used; detailed technical and logistical problems may be efficiently addressed; and finally it is relatively easy to manage the group dynamics. They suggest two main disadvantages: first, only a few viewpoints are represented, which may lead to decisions of lower quality and impact than might be achieved with larger groups; and second, the small group may not have the critical mass needed to achieve the best creative problem-solving [13].

2.5.2.2.2 Meetings of Seven to Fifteen Participants

Doyle and Strauss [13] suggest that this size is ideal for decision-making and problem-solving meetings. They suggest several advantages: all participants may easily be involved; everyone's thoughts may be communicated; it is small enough to be informal and spontaneous and also large enough to allow for a facilitator and a scribe; and it seems to be the size which best creates synergy. They point out two disadvantages: first, complexity is such that clear structure is required; and second that a recorder and facilitator are both required, but there are high costs in terms of time to record everything.

2.5.2.2.3 Meetings of Fifteen to Thirty Participants

Doyle and Strauss [13] suggest that "most meetings should not have more than fifteen participants," because the group dynamics become very complex and often professional facilitation is required. They suggest that the disadvantages include the need to impose rules of order, increased formality over smaller meetings, decreased spontaneity, and the need for facilitation to achieve constructive participation.

2.5.2.2.4 Meetings of Thirty or More Participants

Doyle and Strauss [13] suggest that groups of thirty or more work well for lectures, panel discussions, formal debates, and voting, but much beyond thirty participation requires a clear set of rules such as parliamentary procedure. They also suggest that large numbers can be involved in the planning process.

The 3M Meeting Management Team [1] also suggest that the number of participants should vary according to meeting type (See Table 2.18.)

Table 2.18. Optimal Meeting Sizes [1]

Meeting Type	Max. Parts.	Comments
Problem Solving	5	Recommend 5 or fewer
Decision Making	5	Recommend 5 or fewer
Problem Identification	10	More may bog down the process
Training Seminar	15	Especially for hands-on
Informational	30	To promote interaction
Review or Presentation	30	To promote interaction
Motivational	No Limit	The more the better

2.5.2.3 Meeting Size and Composition Surveys

Several studies analyzed meeting size and three of those also looked at meeting composition: Mintzberg's [51] executive observations; the Harrison-Hofstra Study [21]; the 3M Study [52] Kayser's two Xerox Surveys [38, 39]; and Panko's [69] Executive MBA Survey.

2.5.2.3.1 Average Meeting Size and Composition

Five studies [21, 38, 39, 52, 69] report an "average" meeting size, however the one common finding is that there is no "typical" meeting size. 70% of the respondents in the Harrison-Hofstra Study [21] reported that the typical meeting size was fifteen participants or less. The 3M Study [52] found that the median number of meeting attendees is nine and consists of two managers, four coworkers, two subordinates, and one outsider. The Two Xerox Surveys [38, 39] found the average meeting involves seven participants and is composed of four senior engineers, two project managers, and one second-level manager. Panko [69] argues that dyads are the dominant meeting size, however this survey defined meetings as any oral communication.

Table 2.19. Summary of Average Meeting Size

Yr.	Study Population	Finding	Cite
1989	1000 Executives	Typical size 15 or fewer	[21]
1989	903 Managers	Median size is 9	[52]
1990	Xerox 24,000 group	Average meeting involves 7	[38]
1995	Xerox 24,000 group	Average meeting involves 7	[39]
1995	22 Executive MBA – Managers	Groups of two dominate	[69]

2.5.2.3.2 Meeting Sizes Across Studies

Mintzberg [51] found that for twenty-two CEOs observed, 43% of scheduled meetings involved three or more participants, while 57% involved dyads. Panko's Executive MBA Survey [69] found that most oral communication events were dyadic, however it should be noted that the design of the survey excluded data on many larger meetings (see Table 2.20.) Sixty-five percent (65%) of meeting events were dyadic and thirty percent (30%) had from three to ten participants. Panko [69] also suggests that meetings with four to seven participants, which account for thirteen percent (13%), are fairly common. In total meetings of ten participants or less accounted for ninety percent (90%) of all oral communication events [69].

Table 2.20. Oral Communication Episode Size by Percent [69]

Size	%
2	65%
3	12%
4	4%
5	2%
6	4%
7	3%
8	1%
9	2%
10	1%
>10	5%

(Based on 436 Oral Communication Episodes)

Table 2.21 presents data from the 3M study on the number of participants in meetings. Twenty percent (20%) of the meetings had fewer than six (6) participants, almost one-fourth (1/4) had sixteen (16) or more participants, forty-one percent (41%) had between six and ten (6-10) participants, and The median number of participants was nine (9) [52].

Table 2.21. Meeting Size by Percentage [52]

Size	%	#
1-5	20%	180
6-10	41%	361
11-15	17%	152
16-25	9%	84
26-90	10%	87
> 90	3%	24

(Based on 903 Meetings)

Table 2.22. Summary of Meeting Size

Yr.	Study Population	Finding	Cite
1973	22 CEOs of Large Organizations	43% of meetings had 3 or more participants	[51]
1989	1000 Executives	70% said typical size was 15 or fewer	[21]
1989	903 Managers	41% of meetings had between 6 and 10	[52]
1989	903 Managers	78% of meetings had 15 or fewer participants	[52]
1995	22 Executive MBAs	65% oral communication events dyads	[69]

2.6 Meeting Location

“Where people meet is a crucial as why and when. The choice of a meeting room has a significant impact on the overall quality of the meeting. Among other things, a meeting room can enhance or inhibit productivity, encourage or discourage communication, promote or stifle creativity, and make participants feel relaxed or tense.”

3M Meeting Management Team [1]

The literature discusses a number of different locations where meetings take place within business organizations (see table 2.23.) The 3M Meeting Management Team [1] suggests that great care be taken in selection and setup of a meeting location, because it plays a very important role in meeting productivity.

Table 2.23 Meeting Locations [21, 52, 69]

Conference rooms (On-site/Off-site)
Hallways
Restaurants/Company Cafeterias
Offices (Own/coworkers)
Breakout rooms

Respondents in the Harrison-Hofstra Survey [21] ranked physical environment high in terms of importance; nearly eighty-five percent (85%) said that it is important that meetings are conducted in the proper physical environment. Respondents said that off-site meetings are more effective than on-site ones by a factor of ten to one [21]. The 3M Study [52] found that almost two-thirds (74%) of meetings took place in company conference rooms, while all other locations individually accounted from between two and ten percent (2-10%) (see Table 2.24.)

Table 2.24. Meeting Locations by Percentage [52]

Meeting Location	%
Firm’s conference room	74%

This person’s office	3%
Coworker’s office	10%
Client’s conference room	2%
Outside this firm	5%
Other	6%

(Based on 903 Meetings)

Panko [69] looked at meeting location from two perspectives, percentage of events and percentage of time. In terms of ‘events’, office meetings account for half (50%) of all meeting events and conference room meetings up one quarter (25%). In terms of “amount of time” the situation is reversed, such that conference room meetings account for over half (54%) of all face-to-face meeting time and office meetings. One interesting finding is that hallway meetings were much less prevalent than one might expect (see Table 2.25.) The difference in the results of these two studies [52, 69] might be due to the fact that the 3M study did not consider dyads, while Panko’s study did.

Table 2.25. Meeting Location by Percentage Event & Percentage Time [69]

Meeting Location	% Event	% Time
Conference room	26%	54%
Office	50%	28%
Restaurant	7%	8%
Hallway	4%	1%
Other	13%	9%

(Based on 446 oral communication episodes)

2.6 Group Work Problems

“Even in a highly controlled meeting, there is a lot ... going on – bonding, rituals, glances, innuendoes, and so forth.” Terrence E. Deal

2.6.1 Meeting Productivity: Efficiency and Effectiveness

“One either meets or one works, One cannot do both at the same time.” [14]

Rice [75] found that of 600 CEOs surveyed one-third (1/3) felt that meetings were not worth the time and of only marginal value and seventy-three percent (73%) questioned meeting effectiveness in terms of lack of planning, discussions on irrelevant topics, or excessive meeting length. 3M Study respondents reported that between eleven and twenty-five percent (11-25%) of meeting time is spent on irrelevant issues [52]. The Harrison-Hofstra Survey [21] found that overall respondents concluded that one-third (33.4%) of time they spend in meetings is unproductive and that twelve percent (12%) of respondents felt that over fifty percent (50%) of the time they spend in meetings is unproductive. A recent survey of executives found that respondents felt twenty to thirty percent (20-30%) of meetings were unnecessary [15].

Table 2.26. Summary of Meeting Productivity Studies

Yr	Study Population	Findings	Cite
1973	600 CEOs	73% questioned meeting effectiveness due to lack of planning, irrelevant topics, & excessive length	[75]
1989	900 Managers	11-25% of time spent on irrelevant issues	[52]
1991	1000 Executives	1/3 (33.4%) of meeting time is unproductive	[21]
1991	1000 Executives	12% felt over 50% of meeting time is unproductive	[21]
1998	Executives	Majority concluded 20-30% of meetings unneeded	[15]

2.6.2 Attitudes Toward Meetings

“Decision makers find themselves faced with more and more lengthy meetings required to discuss information-laden issues, but they are starting to resist attending these meetings” [35]

Executives surveyed by Tillman [87] in 1960 expressed positive attitudes about committee work with between fifty-five and eighty percent reporting they felt that committees promote coordination, creativity, and informed decision making. In contrast only eight percent wanted to eliminate committees if given the chance. However, by the mid seventies there was a growing dissatisfaction with meetings [53]. Both Rice [75] and Goldhaber [20] found an overall negative attitude regarding meetings. In the 3M Study [52] one third of meeting participants complain they have little or no influence on the outcome of meetings. A 1989 study of 200 corporate vice presidents found that forty percent (40%) admitted to falling asleep or dozing off during a meeting presentation and they reported that they found more than forty-three (43%) percent of business meetings “boring” [52]. A recent survey of executives found that forty-three percent (43%) of them admitted dozing off at least once during a meeting [15].

Table 2.27. Summary of Attitudes Towards Meetings

Yr.	Study Population	Findings	Cite
1960	Executives	55-85% felt committees promote coordination, creativity, & informed decision making	[87]
1960	Executives	8% would eliminate committees if they could	[87]
1973	600 CEOs	1/3 felt meetings not worth time and of only marginal value	[75]
1989	900 Managers	1/3 complain they have little or nor influence over meeting outcomes	[52]
1989	200 Corp. VPs	40% admit falling asleep or dozing off in meetings	[52]
1989	200 Corp. VPs	More than 43% of business meetings were boring	[52]
1998	Executives	43% admitted dozing off during a meeting	[15]

2.6.2 Specific Meeting Problems

“Phenomenon of Collective Incompetence”
“Very wise individuals can still compose very foolish groups”
 George Kieffer [40]
“Groups of individuals are far more likely to err than individuals” T. B. Macaulay
“Anyone taken as an individual is tolerably sensible and reasonable, but as a member of a crowd he at once becomes a blockhead” Friedrich Schiller
“The collective intelligence of the group turns out to be less than the sum of its members’ IQs.”
 3M Meeting Management Team [1]

Researchers [52, 53, 64, 78] have explored many potential problems that may impede progress when people work together. In two related studies managers and professionals were asked to list the two most personally bothersome problems that take place in meetings. The 1,305 responses were organized into specific categories; table 2.28 shows some of the reported problems. [53]

Table 2.28 Reported Meeting Problems[53]

(N= 1305)		
Rank	Type of Problem	#
1	Getting off the subject	204
2	No goals or agenda	190

3	Too lengthy	187
4	Poor or inadequate preparation	94
5	Inconclusive	88
6	Disorganized	86
7	Ineffective leadership/lack of control	38
8	Irrelevance of information discussed	37
9	Time wasted during meetings	37
10	Starting late	36
11	Not effective for making decisions	31
12	Interruptions from within and without	30
13	Individuals dominate/aggrandize discussion	29
14	Rambling, redundant, or digressive discussion	27
15	No published results or follow up actions	25
16	No pre-meeting orientation/cancelled or postponed meetings	20
17	Meetings too large/too many people	13
18	Ineffective speakers/communication problems	13
19	Too much information presented	12
20	Poor attitudes or effort by participants	10
21	Lack of participation	8
22	Participants have no decision authority	8

Source: Data combined from [54, 55]

Nunamaker et. al. [61] reviewed the literature on group processes and described process gains and losses. Table 2.29 lists some potential sources of process losses and processes gains, but is by no means exhaustive.

Table 2.29. Group Process Gains and Losses [61]

Sources of Process Gains	Sources of Process Losses
More information	Air Time Fragmentation
Synergy	Production Blocking
More Objective Evaluation	Attenuation Blocking
Stimulation	Concentration Blocking
Learning	Attention blocking
	Failure to Remember
	Conformance apprehension
	Evaluation apprehension
	Free Riding
	Cognitive Inertia
	Socializing
	Domination
	Information Overload
	Coordination Problems
	Incomplete Use of Information
	Incomplete Task Analysis

The 3M Study [52] suggests several common reasons for meeting failures and presents statistics from their study. These are described in the following sections.

2.6.2.1 Lack of Preparation

2.6.2.1.1 Lack of Notification

The 3M Study [52] found that seven percent of respondents reported they had no prior notification of a meeting and eighteen percent reported that they had less than one day’s notice (See table 2.30)

Table 2.30 Amount of Meeting Notification [52]

Notice	Percent
No notice	7%
0-1 hr.	4%
1 hr. - 1 day	14%
1 - 5 days	24%
5 - 7 days	18%
7 – 30 days	25%
> 30 days	5%

2.6.2.1.2 Preparation Time for Meetings

The 3M Study [52] found that one-third (33%) of respondents spent no time preparing for meetings, forty-four percent spent one hour or less, and only twenty-five percent spent more than one hour [52] (See Table 2.31).

Table 2.31. Amount of Time Spent Preparing for Meetings [52]

Prep Time	Percent
No notice	33%
1-60 min.	44%
1 hr. - 1 day	19%
1 - 5 days	4%
5 - 7 days	0%
7 - 30 days	2%
> 30 days	1%

2.6.2.1.3 Perceived Level of Self-Preparation for Meetings

Although more than seventy-five percent of the respondents in the 3M Study [52] report they spent one hour or less preparing for a meeting, when asked how prepared they thought they were personally, more than three-quarters (3/4) said they were prepared (54%) or very prepared (25%) (See Table 2.32). Five percent stated they were unprepared, while only one percent very unprepared. This presents somewhat of a paradox and may suggest that people either overestimate their level of preparedness or underestimate the time needed to prepare for meetings.

Table 2.32 Perceived Level of Self-Preparation for Meetings [52]

Preparation Level	%
Very Prepared	25%
Prepared	54%
Somewhat Unprepared	15%
Unprepared	5%
Very Unprepared	1%

2.6.2.2 Agenda Problems

Agendas are considered to be essential framing devices for meetings and the lack of one suggests inadequate planning [52, 53]. The best predictor of the success of a meeting may be a written agenda distributed in advance [1]. Although agendas are considered important or even essential to the success of meetings, meeting surveys presented in this section show that they are often not used or not communicated prior to meetings.

2.6.2.2.1 Lack of an Agenda

No goals or agenda was the second most commonly reported meeting problem in Mosvick and Nelson's [53] survey of 950 managers and professionals. In the Harrison-Hofstra [7, 79] survey nearly one-half of the meetings did not have a written agenda; however seventy-three percent of the respondents felt that an agenda is "essential" for a productive meeting. The 3M Study [52] found that almost one-third (32%) of respondents reported that their meetings had no stated agenda. Less than one-third (29%) have written agendas distributed prior to meetings and another 17% have verbal agendas stated in advance. 9% of the meetings have written agendas distributed at the start of the meeting (See Table 2.33).

Table 2.33 How a Meeting Agenda is communicated [52]

Agenda Communicated	Percent
No Stated Agenda	32%
Written Distributed Before	29%
Written Distributed at start	8%

Verbal to all before	17%
Verbal to some before	2%
Verbal to some before, not me	4%
Other	1%

2.6.2.2.2 Hidden Agendas

The 3M Study [52] found that even when a written agenda is distributed before a meeting there may still be underlying issues present which are not stated on the agenda. Nearly two-thirds (63%) of respondents indicated they felt underlying issues were present in meetings. Nearly one-third (30%) reported the presence of underlying issues to a small extent; twenty-one percent reported their presence to some extent; and twelve percent reported their presence to a great extent (See Table 2.34).

Table 2.34. Presence of Underlying Issues Outside the Official Agenda [52]

Underlying Issues	Percent
Not Present at All	38%
Present to a Small Extent	30%
Present to Some Extent	21%
Present to a Great Extent	12%

2.6.2.4 Lack of Control

The Harrison-Hofstra Study found that participants clearly understand what they are supposed to do in only one out of four meetings [79]. The 3M Study [52] and Mosvick and Nelson [53] report that almost fifty percent of the time spent in meetings is wasted due to information loss, information distortion, sub-optimal decision making, and meeting mismanagement. The Harrison-Hofstra Survey found that management experience does not appreciably improve the ability to hold productive meetings [79]. Chairmen, CEOs and Presidents with an average of twenty years of meeting experience report that twenty-eight percent of time they spend in meetings in nonproductive, while middle managers report that thirty-five percent of their meeting time is nonproductive [79]. Table 2.35 shows reported percentages of nonproductive meeting time by managerial function.

Table 2.35. Percentage of Nonproductive Meeting Time by Managerial Function [21, 79]

Management Function	% Unproductive Time
General Management	29.7
Human Resources	31.9
Sales/Marketing	33.6
Manufacturing	34.9
Finance	38.7
Overall Average	33.4

2.7 Why Add technology to meetings?

There are several reasons why adding technology to meetings may improve productivity. First, research shows that meetings dominate most workers time. Second, workers anticipate technological changes in meetings. Third, a variety of augmented meeting support (AMS) technologies [49, 50] exist that may improve productivity including 3-Dimensional multi-imaging [42], Video teleconferencing [76], television/film, both technology and actual content [73] and automated group support systems [59, 82]. Finally, technological innovations have been shown to improve productivity in both lab and field settings.

Previous sections of this article present data from meeting surveys and use of time studies that show that meetings increasingly dominate knowledge work. Panko and Kinney

[69] argue that given the amount of time knowledge workers spend in meetings attention is justified in the area of technology support for meetings. The 1998 MPI/ASAE Survey found that at fifty-two percent (52%) technology is the most significant anticipated area of change within meetings [44, 57].

Substantial improvements in meeting productivity through IT have been demonstrated through research at Claremont University, Georgia Institute of Technology, London School of Economics, Massachusetts Institute of Technology, University of Georgia, University of Indiana, University of Arizona, University of Michigan, University of Minnesota, New Jersey Institute of Technology, and many other institutions [12, 16, 32, 60, 65, 70, 91, 94]. Additionally several major corporations have invested significantly in GSS technology including American Airlines, American Express, Boeing, Dupont, EDS, The Internal Revenue Service, IBM, and Procter and Gamble [11, 22, 34, 37, 46, 47, 62, 65, 72, 93]. Smith [82] points out that use of GSS technology at IBM resulted in a fifty-six percent (56%) savings in the number of man-hours.

2.8 Telework, Telecommuting and Virtual Meetings

“Teleworking: ANY form of substitution of information technologies (such as telecommunications and computers) for work related travel.” Jack Nilles [58]

“Telecommuting: moving the work to the workers instead of moving workers to work; periodic work out of a central office, one or more days per week either at home or in a telework center.” Jack Nilles [58]

Remote or “telework” was most likely invented in 1857 by J. Edgar Thompson of Penn Railroad, when he used private telegraph lines to manage remote divisions [17, 41]. Jack Nilles [58] coined the term “telecommuting” in the early 1970s. Since the Mid 1950’s US manufacturing employment has steadily declined [58]. As of 1990 less than 1 in 3.7 workers held jobs in manufacturing or repair trades and less than 1 in 54 Americans worked on farms. At the same time sixty to eighty percent (60-80%) of the workforce was comprised of information or knowledge workers, whose work involves the creation, collation, manipulation, transformation, and/or dissemination of information or from their operation of IT [53, 58.]. Nilles [58] estimates that seventy percent (70% or ~50 million in 1994) of the U.S. information workforce could work remotely at least part of the time, however he points out that today only 3.5% of the total workforce works outside the traditional office.

Panko [67] suggests that stand-alone computer support dominated in the 1980’s due to technology limits and lack of critical mass of technology users, not due to a lack of need or interest in interacting. Studies [29, 84] have shown that computers have penetrated over eighty percent (80%) of desktops. In 1993 most telecommuters were home-based only part of the time and estimates of the number ranged from 3 million to 20 million, with about 600,000 in Southern California alone. [58] It has been estimated that over sixty (60) million Americans will work at home by the year 2000 [63]. (See Table 2.36.) Link Resources, a New York City-based research company, estimates that the sixty (60) million mark will be achieved by the end of 1998, which would be an increase of thirty-six percent (35%) over 1994 figures [6.]

Table 2.36 estimates of Telecommuters [63]

Year	Millions	Work Conditions
1997	4.2	Telework full time
1995	39.0	Work part-time at home

2000	60.0	Will work at home
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Unofficial telework, that is uncompensated overtime work done at home, may be widespread, as evidenced by a survey by *Modern Office Technology* magazine which found that ninety-five percent of readers that responded reported that they sometimes work overtime at home and thirty-nine percent do so every week [41]. Finally David Woolley’s web roster of synchronous and asynchronous communication and collaboration systems [98] available for use over the Internet lists 148 products as of Oct 20, 1999

Summary

This paper illustrates that several decades of studies reveal meetings are indeed very costly in both terms money and time. Studies also reveal that in general meetings are unproductive and wasteful. Studies find that meetings suffer from a myriad of problems, making managers and workers alike dissatisfied with the process and the outcomes in many cases. These same studies reveal that meetings are essential to accomplish tasks that individuals cannot complete by themselves. Finally the review suggests that both telework and distributed collaboration support are increasing in frequency and importance.

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