DISPROVING WIDESPREAD MYTHS ABOUT WORKPLACE DESIGN

MICHAEL BRILL

Sue Weidemann

and the BOSTI ASSOCIATES

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AUTHORED BY: Mike Brill and Dr. Sue Weidemann with Dr. Lisa Allard, John Olson, and Ellen Bruce Keable, all of BOSTI Associates. **This has been a total team effort.**

BOOK DESIGN: Jane McWhorter of Blue Sky Productions, Great Barrington, MA
ILLUSTRATIONS: Su-Hyun Yi, Adam Brill, Katherine Meacham, Mike Tatum, Jeff Innes
PRODUCTION: Katherine Meacham and Donna Cameron
ECONOMIC ANALYSES: Judith Fabiniak

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INTRODUCTION

This publication is published and distributed by Kimball as a service to business executives, facilities managers, human resource staff, designers, suppliers and other stakeholders involved in the realization of high performance workplaces.

Kimball believes strongly in these research findings, even though they question the conventional wisdom and popular industry trends. It is empirical quantitative research on a significant base of users, using rigorous objective measurements. It has substance.

Kimball also feels it is important to share this new information and its design implications. These research findings have great capacity to have dramatic and positive effects on critical organizational outcomes of increased performance, more satisfied employees, more productive teams, and steeper learning curves by providing employees with high-performance workplaces.

We hope you benefit from and enjoy the reading.

Kimball® International

BOSTI'S HISTORY OF OFFICE PRODUCTIVITY RESEARCH

In 1985 BOSTI published a two volume work, "Using Office Design to Increase Productivity," the results of a seven year research program, involving some 10,000 people in about 80 business units. A major contribution of that work was to establish a clear relationship between workplace design and people's productivity and job satisfaction.

Much has changed since the first book, and BOSTI is engaged in a second wave of research to understand the impacts of those changes. **Over the past 15 years some long-term, stable business trends have emerged, strongly affecting how organizations operate, how people work, and how workplaces are being rethought. These trends, seen in most organizations, are particularly pronounced in progressive organizations, and are of four types:**

- ***Organizational structure and strategies***
- ***Workforce attitudes and expectations***
- ***Technology — its ever increasing power and widespread deployment***
- ***New recognitions about, and strategies for, the workplace***

The key areas of change within them are:

LONG-TERM, STABLE BUSINESS TRENDS

◆ Trends in organizational structure and strategies are:

- Business transformation, leading to organizational change and the conscious development of new employee attitudes and perspectives to support this transformation.
- Increased focus on customer needs and expanded definitions of who the customer is (internal as well as external to the organization).
- Deconstruction into smaller, more nimble, less hierarchical, more customer-responsive business units, often autonomous in their decision-making and in their profit and loss reporting.
- Partnering with customers and other vendors to craft integrated customer-specific solutions.
- Continually seeking improvements . . . everybody is responsible for innovating, at all levels and in all business units.
- More work done in cross-functional teams to reduce cycle time and time to market, substituting simultaneity for sequentiality in decision-making.

- More resource-lean organizations, with a strong focus on cost containment, and re-examination of the costs and benefits of all resources used.
- More geographically-dispersed locations (closer to customers) with this dispersed workforce connected through technology . . . or, consolidation of offices, using home-based work to serve field locations.
- More solution seeking and less "pushing existing product," leading to more consulting and service offerings.

◆ Trends in workforce attitudes and expectations are:

- Increased recognition of the asset value of employees as "intellectual capital."
- Team contributions more noticed and rewarded.
- High learning needs driven by more cross-functional teaming (and the need to know the basics of other people's disciplines) and more demand to innovate by customers . . . lifelong learning has become a core value for many companies.
- More individual and group autonomy in decision making, supported by just-in-time data delivery and communications.
- Many employees out of the office more, crafting customer solutions onsite and partnering with them, with a portion of the workforce becoming "periodic office residents."
- Much change (too much for some), causing high stress and anxiety.
- Globalization of work affecting people's perceptions of, and use of, time and distance.

◆ Trends in technology and its ever increasing power and global deployment are:

- Global deployment of technology, its networks and the Web, enabling more remote work, telework, and mobile work.
- Now the primary analytic and communications tools for most employees.
- Continuous increases in capacity of techno-tools, decreasing in size, and increasingly wireless.
- Integration of voice, data, and images.
- An enabler of best work done anywhere, anytime (work-life and life-life blur) . . . supports high mobility or "never leave the cottage."
- Very rapid pace of work expected, more people feeling loss of control of the pace of work, needing more "breaks."

◆ New recognitions about, and strategies for the workplace are:

- Current workplaces are often a poor fit for the new work.
- Workplace design really affects individual and team productivity, job satisfaction, quality of worklife, and learning.
- Workplace is a tool, not a status-driven entitlement.
- Office work can be and should be deployed over larger business geographies, continuing the erosion of many downtowns.
- People can use an array of work locations (like satellite offices) and others which are not "owned" or leased, like employees' homes, airline clubs, and hotels.
- A workplace designed as a good fit for the work needs a different approach to workplace design, and new ways to manage and use space.

"New Officing" as a creative response to these trends

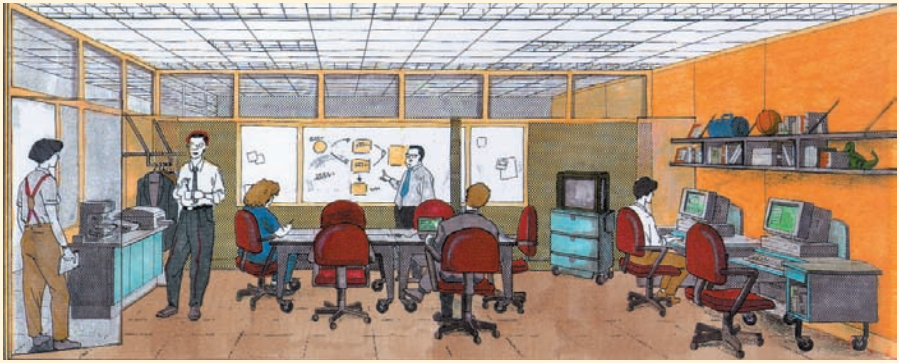
In many companies, a creative response to this set of long-term and continuing trends has been the development of a set of strategies called Alternative Officing, or (we prefer) New Officing. New Officing's goal is to use workplaces, technologies, and work processes as an integrated system of enablers . . . to work smarter . . . and wherever work happens.

NEW OFFICING HAS ONLY THREE BASIC STRATEGIES: Radical Re-Design; Work-From-Anywhere; Hotelling. They can be used singly or intermixed.

1. **Radical Re-Design** . . . is both a process and a result and neither is business-as-usual. Its premise is that, given the trend-driven changes in work, traditional workplace design and use concepts have diminishing value, and, a more radical approach to workplace design and its management would yield real benefit.

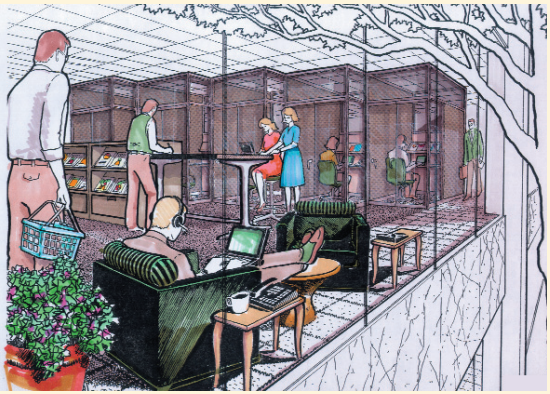
   Radical Re-design is the result of a research driven and highly purposive design process. Its goals are to support:
   - Organizational transformation
   - Changing work processes and practices
   - Increased emphases on effective groupwork
   - Continuous learning
   - Increasing the performance and satisfaction of individuals

Main Street



Workshop Meeting Room

Airline Club



It often involves a discarding of old workplace standards and development of new ones based on rigorous analysis of the business and the work. Through this, it develops new models for workplaces that purposively affect productivity and satisfaction, and optimize work's locations day-to-day. This new process results in *new physical solutions*, and often new standards.

2. Work-From-Anywhere . . . where the office is not the major site for work. This includes:

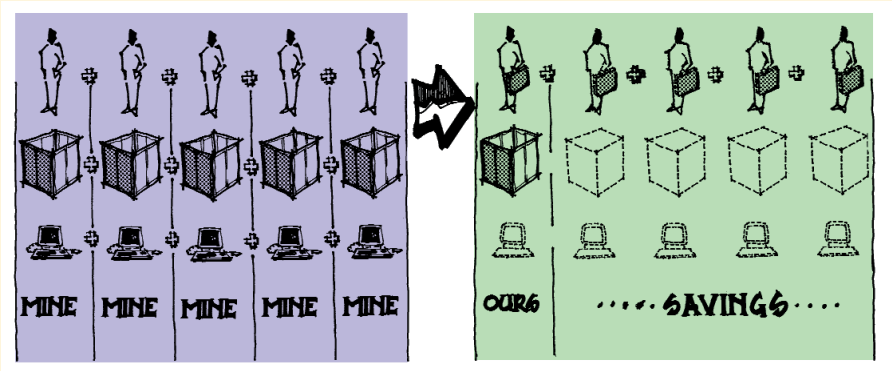
- Work-from or at-home
- Work at clients' sites
- Satellite work sites
- Virtual work in hotels, airports, on vacation, even in hospital beds

The Work-From-Anywhere strategy can reduce space substantially (if efforts are made to capture it).

3. Hotelling . . . where the office is still the base for work, but much of it happens elsewhere. Essentially, this strategy runs the office like a "hotel," where people who are now out of the workplace a lot (generally, 60% or more) share a set of reservable but non-dedicated spaces.

Hotelling reduces space needs, depending on the ratios calculated for the number of workspaces needed for the number of people in the office on any given day . . . it is a form of "just-in-time" workspace delivery.

Workspaces for hotellers are the same size and quality as those for permanent residents . . . they're not "second class" workspaces, or merely touch-down spaces for short periods of time. Since no hoteller "owns" a workspace, their materials are stored elsewhere and brought in as needed.



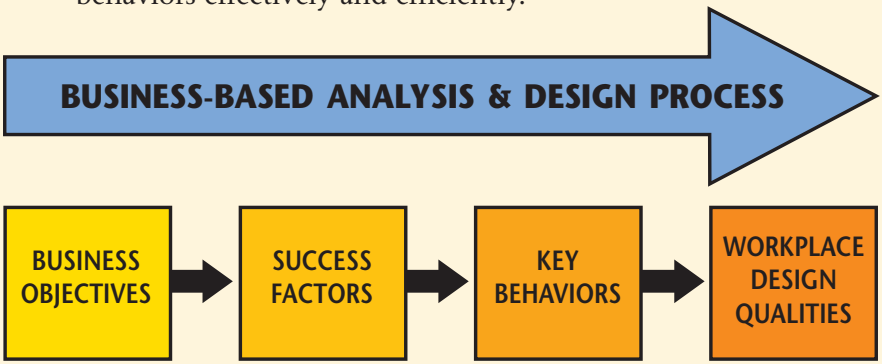
ALL ASSIGNED WORKSPACES HOTELLING

BOSTI'S RESEARCH PROGRAM

BOSTI has implemented these New Officing strategies in many companies in several major industries, and **more importantly, has studied their effects.** Now, 15 years after documenting its first comprehensive set of findings, BOSTI is poised to publish another book based on a six year study (1994-2000) of some 13,000 people in some 40 business units. This booklet you're reading, whose publication is supported by Kimball International, is an early release of an important portion of the findings. There is much more to come.

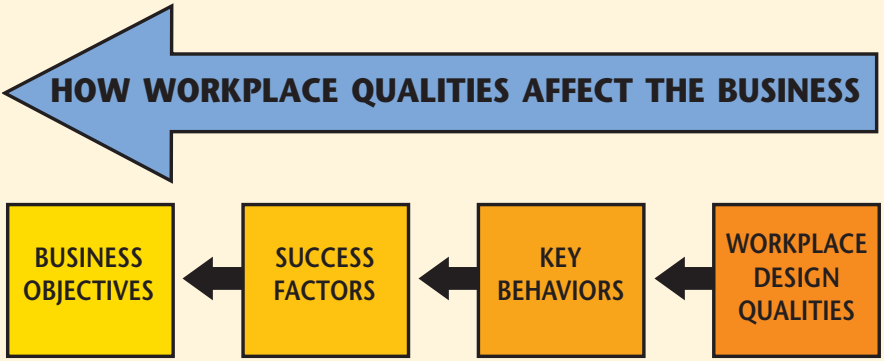
BOSTI's approach in all its consulting assignments is a rigorous research process that begins with analysis of the business, and not the facility. This enables us to focus on the very wide range of business issues the workplace could affect. Basically, our analysis involves a four-step process that:

1. Articulates **business *objectives*** . . .
2. From which **business *success factors*** are derived.
3. Describes the **key employee *behaviors*** needed to achieve the business success factors.
4. Describes the **workplace *qualities*** required to support those behaviors effectively and efficiently.



This process diagrammed above is one which selects workplace qualities **that will positively affect business objectives. Diagrammed below is how workplaces actually get used. It is, essentially, the reverse of its design process, where specific workplace qualities affect key employee behaviors, which affect achievement of success factors, which in turn affect attainment of business objectives.**

If the workplace is designed using this business-based analysis and design process, it becomes a *tool* in service of achieving business objectives.



This research was done as part of BOSTI Associates' many business-based New Officing consulting projects between 1994 and 2000. **[See BOSTI's web site at www.bosti.com for a listing of our clients.]** These companies, with a wide variety of cultures, sought new workplace concepts and designs that would be a strategic response to the set of business trends previously described. In 1999, we began analysis across all our client-specific research-based consulting projects to see if there were many common patterns and findings, and indeed there are. The results are startlingly common across companies and industries, and are very robust. Some call into question a few of our most cherished assumptions about how people work and how design of the workplace affects those people and their work.

What this Research Is and Isn't

This work is very different and far more rigorous and systematic than that done by the design and vendor communities. It is not the result of an opinion poll of managers, designers, or experts. The results are:

Not from interviews with **designers** about *what they think* matters in the workplace.

Not from interviews with **managers** about *what they think* matters in the workplace.

Not from interviews with **vendors** about *what's popular* in the marketplace.

Not from a review of the **literature**, piecing together an argument from multiple sources.

. . . and NOT from **BOSTI's opinions** either.

The results are the product of direct research on 13,000 workplace users, using rigorous objective measurements. They are the findings from structured questionnaires, responded to by these office workers in multiple industries and 40 business units. It is *empirical quantitative*

research using data gathered directly from employees and managers about their tasks and work experiences. We report research findings across many consulting projects, using consistent data gathering methods which allow results to be combined and compared.

About BOSTI's Questionnaire

In these questionnaires, we don't ask people what they *think* affects their productivity or job satisfaction. Rather, we measure the effects of the workplace on their work and other important outcomes. Statistical analyses of their responses to questions about their work environment and activities are analyzed against responses to self-measures of individual and team performance, job satisfaction, learning, communication, etc.

[For a discussion of the benefits and limitations of this method, see Appendix A.]

BOSTI's questionnaire asks people for ***descriptive*** information about their individual and group work tasks and work settings, where they occur, the time spent by task and their importance. It also asks people about their own workspace size, its degree of enclosure, the amount of storage and equipment they have and how they use it, and the frequency, size, and duration of their meetings and interactions (both scheduled and impromptu). The questionnaire asks for ***evaluative*** information of how effectively the various work settings (and particular qualities of them) support their work, as well as ratings of ***job performance, team performance, and job satisfaction***, and information about how they learn.

While the questionnaire demands careful thought and takes over 30 minutes to complete, there are high response rates in all projects . . . on average, about 40% of those surveyed responded. People were informed that their responses to the questionnaire will remain confidential and anonymous, so they had no compunction about sharing their candid evaluations with us. As well, respondents took it seriously, given that new and/or improved workplaces were to be the result of the research.

These research findings offer a basis for fundamentally rethinking the workplace so that it is designed more as a tool for work, and not as just a place to house the tools of work, or as primarily a "design statement."

Reporting Findings: This **booklet reports findings by job category and by workspace type**, but not by company (for anonymity) nor by industry, since the findings are very similar across industries. **In *all* cases, data presented here are for the entire database, across all the companies.**

In reporting by **JOB TYPE**, we have collapsed the hundreds of job titles we found into four basic categories, based on the tasks people engage in and for how much of their workday. Job titles comprising these four "functional job types" are ones in which the work behaviors are so similar the titles can be considered as a set for analysis. They are:

- ***Managers***
- ***Professionals***
- ***Engineers & Technical***
- ***Administrative***

[For a discussion of the development of the four functional job types, some of the typical job categories in each, and their relative proportions in the database, see *Appendix B: About Job Types In The Database*.]

In reporting by **WORKSPACE TYPE**, we use those most frequently identified:

- ***Private workspaces occupied alone***
- ***Private workspaces with two occupants***
- ***Open workspaces***

In reporting on **SURVEY RESULTS**, we report only the percent of people who are positive or negative in their responses, and don't report the percent who are "neutral" about the issue (if you're interested, the percent neutral is *100% minus the % positive and % negative*.) There were no findings in which most people were neutral.

ECONOMIC ANALYSES OF THE COSTS OF DOING WORK

We are presenting research establishing that the physical workplace has substantial effects on job performance and job satisfaction. Since any actions that might be taken as a result of this research should be subjected to a cost-benefit analysis, it is important to understand the cost of the operating workplace and technology relative to the cost of employees. These are the primary *costs* of doing office-based white collar work. The *benefits* (or detriments) come from design interventions that increase (or decrease) performance and satisfaction.

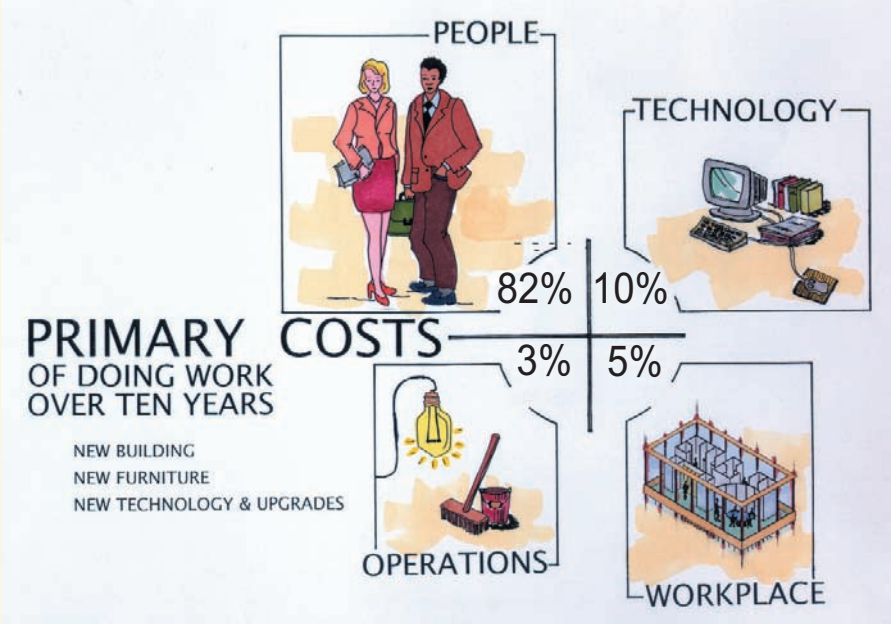
What does the workplace cost? *The primary purpose of a workplace is to support an organization's mission* and it incurs costs in achieving this. In the past much attention was paid to the costs of the office environment and not much to the benefits of its use. In 1968, BOSTI Associates projected out over 10 years many of the then current costs, comparing the cost of people to the cost of the operating workplace. This 1968 to 1978 analysis revealed that for an office built new, furnished new, and operated for 10 years, over that ten year period, 92% of all money spent to achieve the organization's office-based mission went for people's salaries, 2% to maintain and operate the building, and only 6% were the costs of building it new, and buying furnishings and business equipment.

Similar ratios resulted from calculations done again in our 1981 to 1991 10-year calculations. At this point, the relative costs of *technology* began to increase, and in our year current 1998-2008 calculation, *technology costs now surpass facility costs*.

In all these calculations, the total cost of the ***workplace*** includes *building* it new and buying its furniture. The ***technology*** costs include supplying electronic equipment, software, infrastructure, and training. The ***operations*** cost relates to providing energy and maintenance for day-to-operations.

The relative costs of the primary elements of doing work, over 10 years, are graphically displayed on the facing page.

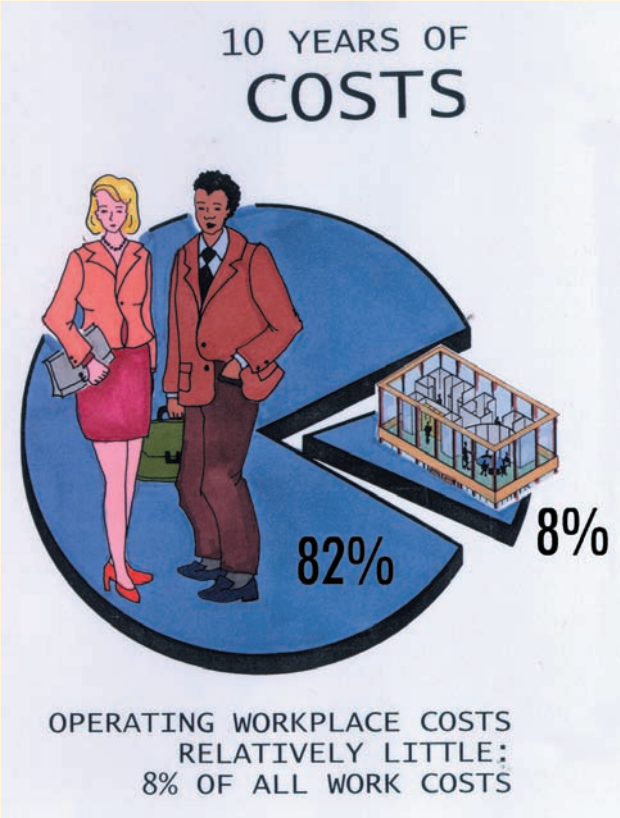
[See *Appendix C* for the details of this analysis.]


PEOPLE
TECHNOLOGY
82%
10%
PRIMARY COSTS
OF DOING WORK
OVER TEN YEARS
3%
5%
NEW BUILDING
NEW FURNITURE
NEW TECHNOLOGY & UPGRADES
OPERATIONS
WORKPLACE

Implications of these Economics of the Workplace

In the late 1960's, upon discovering how little the workplace costs when compared to the costs of the people who work in it, the next important research question was to find out whether the planning and design of the workplace affected the productivity and job satisfaction of the people working in it.

BOSTI Associates' 30 subsequent years of research and consulting (and research done by others) demonstrate that the workplace measurably affects job performance, job satisfaction and ease and quality of interaction, which are important bottom-line measures for all organizations. The research suggests that the dollar value of the benefits of appropriately designed offices are substantial, as are the costs of poorly designed ones. And, there is symmetry . . . non-supportive design has negative effects (costs) on work and workers, and design appropriate to the work has positive effects (benefits).



DEFINITIONS USEFUL IN READING THIS WORK

For clarity, these are the important definitions we've used:

WORKPLACE: A general term for the *entire physical environment for work* . . . the whole floor, whole building, whole campus. The work*place* always contains large numbers of work*spaces*.

WORKSPACE: **The space where an employee sits (mostly) when in the office.** Generally there's one person to a workspace, and sometimes, two. Many workspaces are assigned to an individual, but in an increasingly used workplace strategy (hotelling), we see pools of shared workspaces that a group of individuals use on an as-needed basis, but *not dedicated* to any individual. While individual-use workspaces vary widely in size, **there are two primary conditions of acoustic privacy . . . private (enclosed) offices and open offices.**

PRIVATE OFFICE: A workspace that has four walls to the ceiling and a door.

OPEN OFFICE: A workspace whose perimeter boundaries do *not* go to the ceiling. Most often constructed of relocatable panels and panel-hung worksurfaces and storage, or of relocatable panels with free-standing furniture *or* of non-relocatable, drywall boundaries (*not* to the ceiling) and free-standing furniture.

SYSTEMS FURNITURE: **Open-office and system furniture are not interchangeable terms**. Systems furniture is furniture and panel units whose dimensions, geometries, and connections are pre-engineered for compatibility. This enables it to be relocated and reconfigured in many ways, easily, and without the necessity of using expensive tradespeople. Worksurfaces and storage units are often hung from modular panels, creating both enclosure and furnishings in one unit. Systems' worksurfaces and storage units can also be hung on some types of walls-to-the-ceiling.

THE RESEARCH FINDINGS

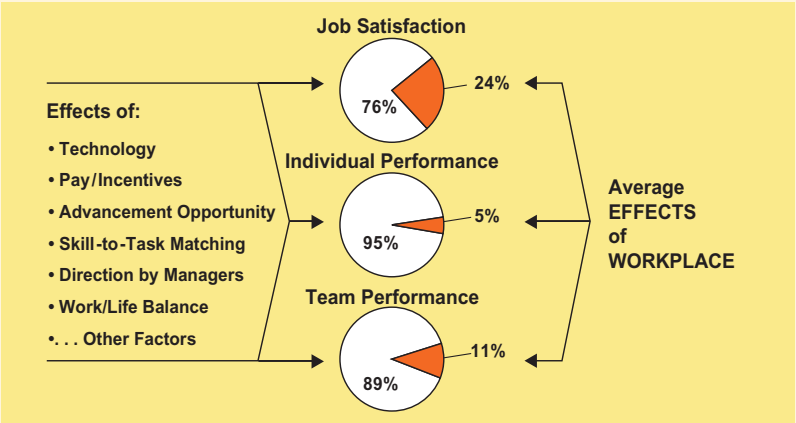
CONTRIBUTION OF THE WORKPLACE TO THE BUSINESS

Since previous research and this most current research shows that workplace design and its use affect important work outcomes, an important question is "how much?" This question arises because of the limits that companies have on resources available to invest in all their desired initiatives for improvement. Such limits make these investments directly competitive with each other, requiring decisions that prioritize them. To help do this, companies need to be able to measure the effect that each initiative has (or might have) on success in comparison with the effects of the others. **From our facilities perspective, we must measure the total effect the *workplace* has in order to appropriately place it in competition for resources.**

The difference in investment between "doing it right" and "doing it wrong" in workplace design does not necessarily involve spending more on first costs (although it might). **But, doing it *right* affects the continuing performance and retention of employees, the largest cost factor for any company in achieving their office-based mission.**

There are numerous factors that contribute to job performance and job satisfaction (e.g.: technology; skill-to-task matching; pay incentives; direction by managers; advancement opportunities; challenging work; good colleagues; work/life balance; and others). In our projects we quantify only those effects that are directly attributable to design of the workplace. **This is a useful strategy since the critical issue, for us, is how much the design of the workplace alone affects important business outcomes.**

Looking across all the sites in our database, the **average effects of the workplace** are:



An observation: Consistently, the workplaces' strongest effects are on job satisfaction (and through this, the ability to recruit and retain high performers), the next strongest effects are on team performance, and least (but still quite significant) on individual performance. In a business climate where it is increasingly important to get and keep the best talent and have them engage in more productive teamwork and solo work, the design of the workplace plays a much stronger role than we believed.

WORKPLACE QUALITIES WITH THE STRONGEST EFFECTS

Across all the business units and all job types, the workplace qualities we have examined that have the strongest effects on individual and team performance and job satisfaction are shown below and in a general rank order, with the most powerful qualities first. Note that all qualities on this list should be considered priorities. There are other workplace qualities that are not on this list because their effects are less strong.

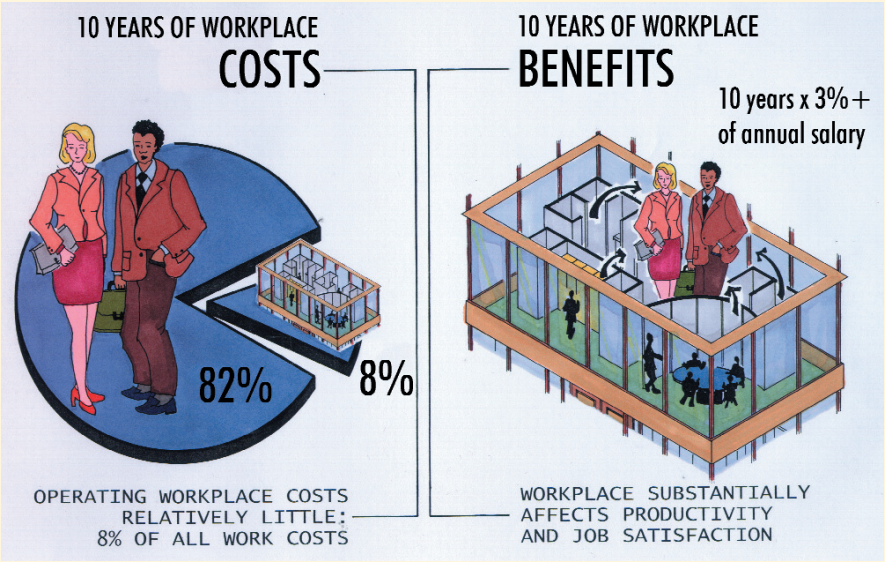
These workplace qualities rank much the same across individual and team performance and job satisfaction. The implication is that providing good levels of these qualities affects all of these important measures.

WORKPLACE QUALITIES WITH THE STRONGEST EFFECTS / RANKED
Ability to do distraction-free solo work
Support for impromptu interactions (both in one's workspace and elsewhere)
Support for meetings and undistracted groupwork
Workspace comfort, ergonomics and enough space for work tools
Workspace supports side-by-side work and "dropping in to chat"
Located near or can easily find coworkers
Workplace has good places for breaks
Access to needed technology
Quality lighting and access to daylight
Temperature control and air quality

The two workplace qualities with the strongest effects on performance and satisfaction are those supporting distraction-free work and supporting interactions with co-workers (especially impromptu ones). Both of these top workplace design priorities must exist without compromising the other.

The focus of this booklet is on demonstrating how these two top predictors of performance and satisfaction affect each other and what the critical design and facility management implications of these effects are.

Given the magnitude of the effects workplace design has, and that many of the top ten predictors of these effects can, in most workplaces, be substantially improved, **we estimate that these improvements would, very conservatively, yield at least 3% improvement in individual performance and team performance, taken together.** This does *not* include effects of workplace improvements on job satisfaction, whose effects would be felt in improved recruitment and retention.



To better understand how these two top predictors of benefits affect each other, we start with some basic facts: a description of what tasks people actually do when in the office, for how long, and where they perform these. It is interesting to note, that over the past six years (1994–2000), the percent of time people spend at their various work tasks has not changed much.

HOW people spend their time at work

In all these analyses, we used 8 task categories to understand where and how people spend their time:

- ***Computer and quiet work***
- ***Telephone work***
- ***Meetings, interactions in one's own workspace***

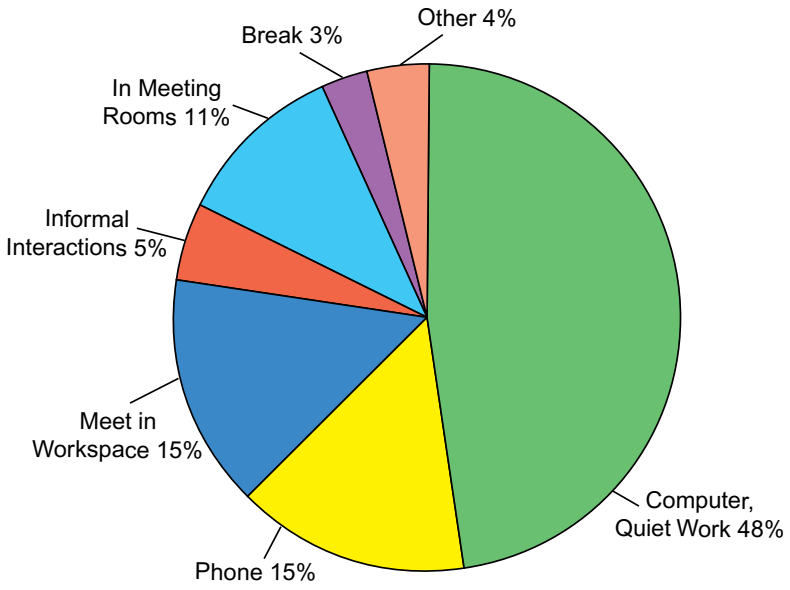
} ***In one's workspace***

- ***Scheduled meetings outside one's workspace***
- ***Informal interactions outside one's workspace***
- ***Taking breaks***
- ***Doing office chores/lab work***
- ***Other***

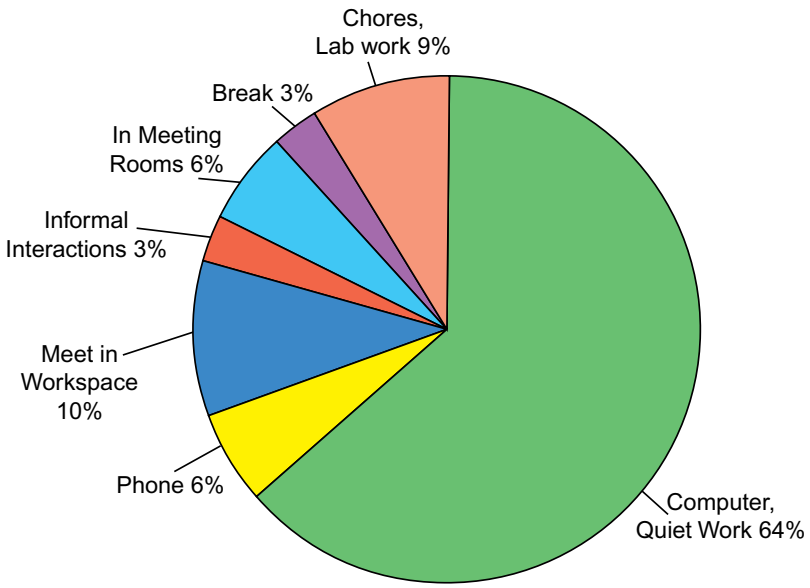
} ***Outside one's workspace***

The following "time pies" show time-at-task (as averages) for all the people in the 4 functional job types in our database: Managers, Professionals, Engineers, and Administrative. The amounts of time people spend at their various work tasks is remarkably consistent: across 3 of the 4 functional job types (only managers are really different); across industries; in both New Economy and "old" economy businesses; and across both public and private sectors.

MANAGERS



ENGINEERS & TECHNICAL



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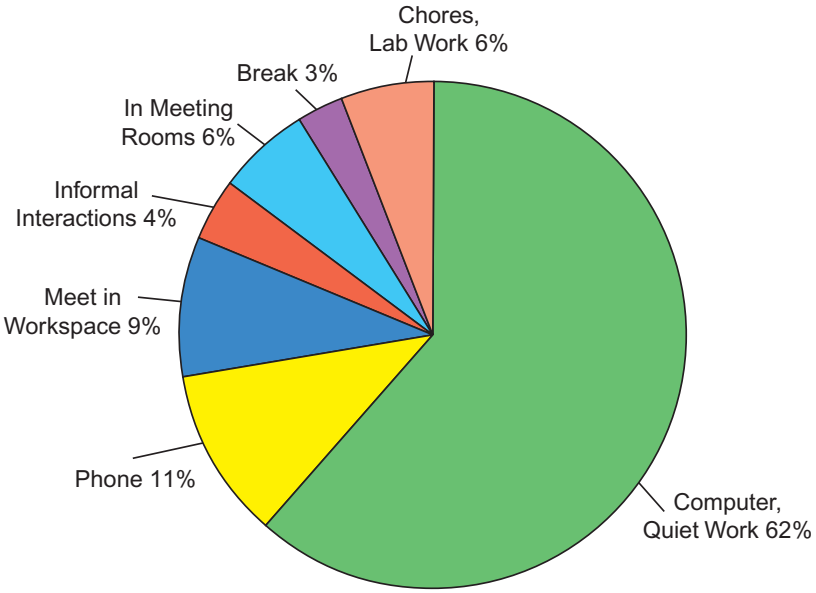
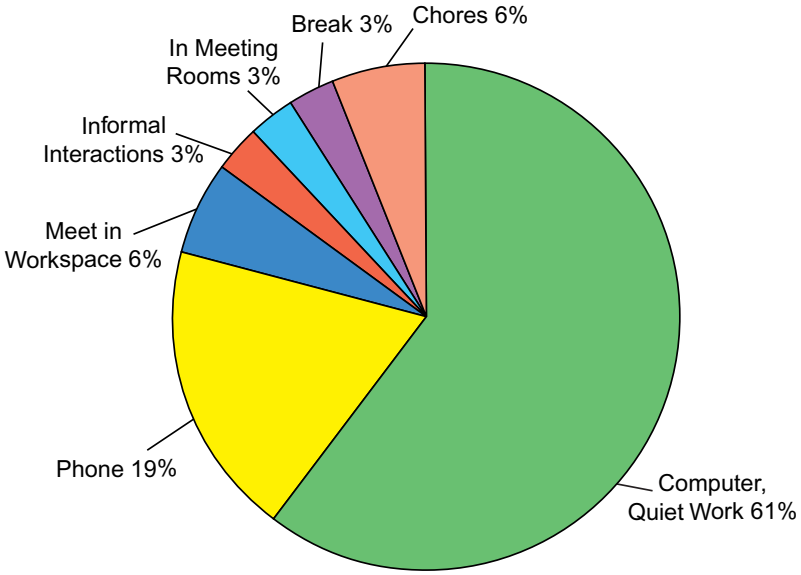


ADMINISTRATIVE

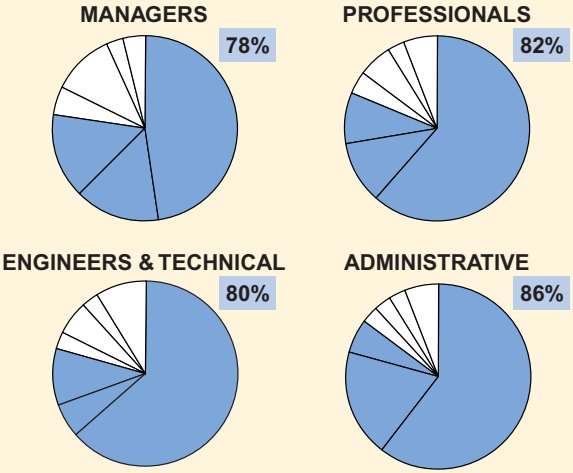


WHERE people spend their time at work

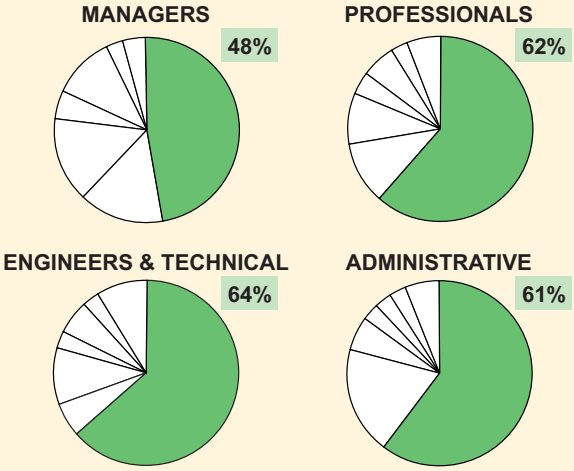
Examining the locations of tasks, we see that at least 3/4 of people's time in the workplace is spent in their own workspace (Figure 1). Thus, **one's own workspace is still the *primary spatial tool for work*, even in highly interactive, team-based organizations.**

Well more than half of *all* time spent in the workplace is spent in focused, quiet work in one's own workspace (Figure 2). Managers spend the least time doing quiet work, but it's still half of all their time in the workplace.

Percent of Time in One's Own Workspace *(Figure 1)*

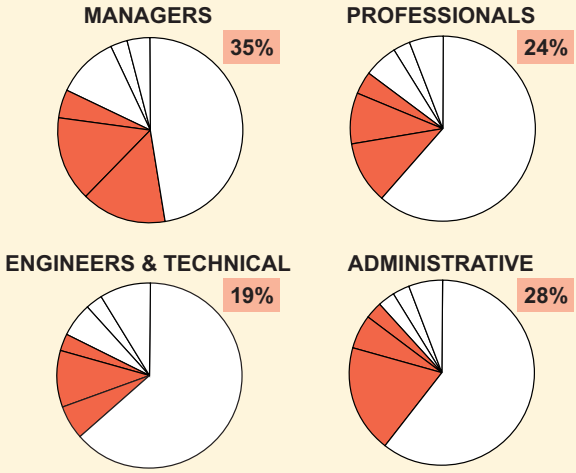


Percent of Time Doing Focused, Quiet Work *(Figure 2)*



Between 1/5 to 1/3 of all time "in" is spent in interactions that produce verbal noise (phone conversations, meetings, chatting) in or near individuals' workspaces (Figure 3). This does *not* include discussions in meeting rooms, or on breaks. **Managers and Administrative staff spend the most time (about 1/3 of the day) producing noise in/near their workspace.**

Percent of Time in Noise Producing Activities in or Near Individual Workspaces *(Figure 3)*



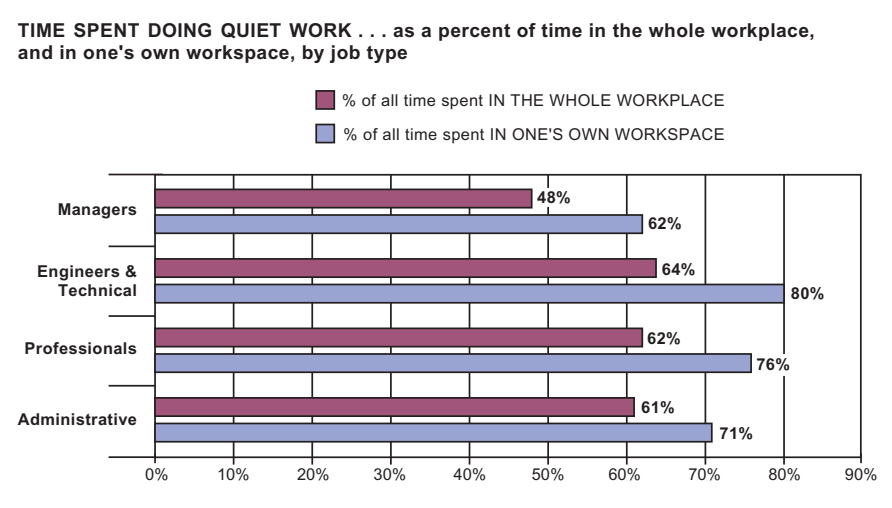
What we see, then, is people engaged in two major sets of activities in the office: quiet work and verbal, noise-producing interaction . . . with both sets of activities occurring *in* or near their own workspace. (Analysis shows that these patterns hold true for people who "hotel" and those who don't.) **And, it is these two sets of activities that have the strongest effects on performance and satisfaction.**

The importance of distraction-free work

Doing quiet work . . . reading and/or editing paper and electronic texts; doing and reviewing calculations; composing and writing text; searching for information; giving order to ideas; analyzing problems; and just plain thinking is the mode of work that all categories of office workers engage in for the most time each day . . . even though many report being interrupted often. Notable exceptions are people in call centers, those assigned to laboratories, and technical systems support staff, whose daily task patterns are quite different.

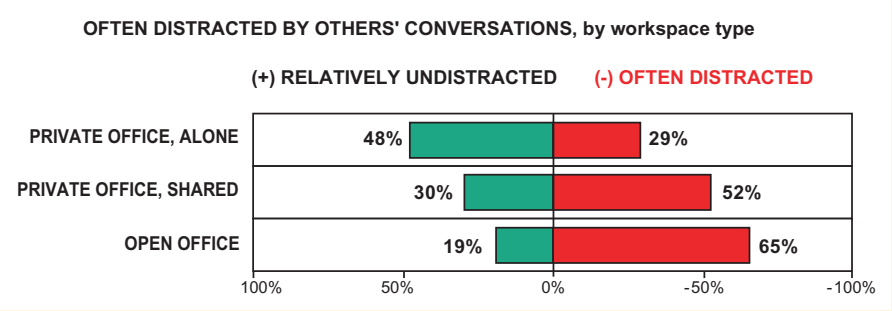
This finding holds as true for organizations that are heavily teamwork

driven as those heavily dependent upon the work of individual contributors, and is consistent across industries. The amount of time spent in quiet work is shown below, both as a percentage of all time spent anywhere in the workplace, and as a percentage of time spent in one's own workspace. For all job types, it is at least 1/2 the time spent in the whole workplace, and about 2/3 of the time spent in one's own workspace.



The ability to do distraction-free work: Given how important the ability to do distraction-free work is to the success of individuals and teams, how well is this quiet work supported in the workplace?

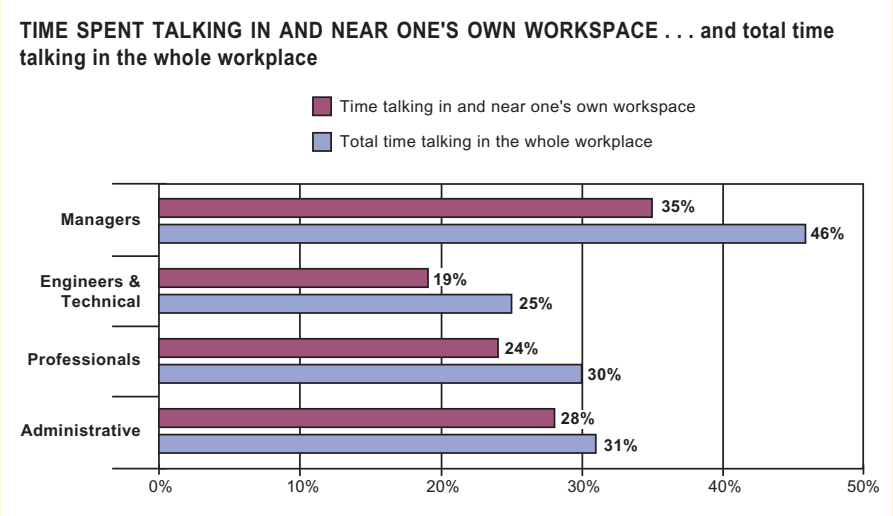
The survey probed peoples' ability to do distraction-free work in their own workspace. The findings reported below clearly show that the more open the workspace, the more distracted people are by others' conversations, with 2/3 of all people in the open being "often distracted."



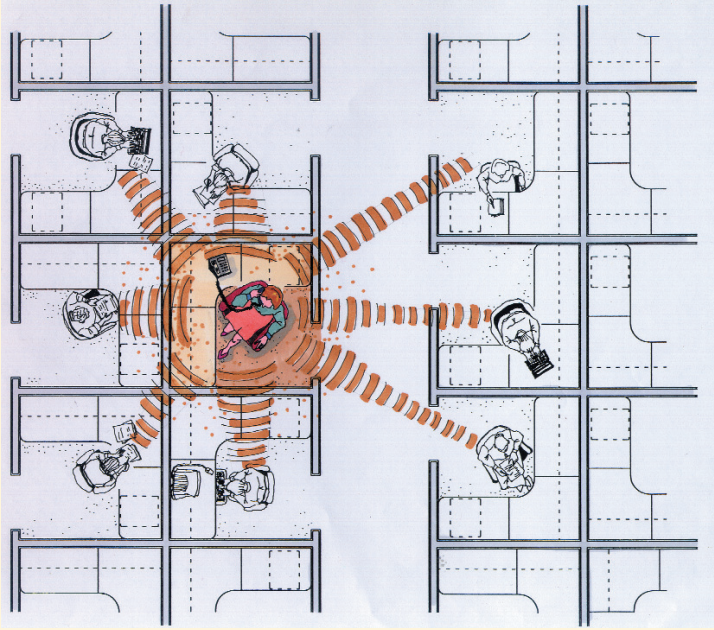
The importance of interactions (especially impromptu ones)

Noise-producing verbal interactions with others . . . on telephones and speakerphones; in video conferences; meeting face-to-face, one-on-one or in larger groups; and just chatting . . . is the mode of work that all categories of office workers engage in for the second largest amount of time each day. While occupying less time than quiet work, it is critical to business-success. This holds true for all types of jobs (managers spend more time interacting than all others), in all companies surveyed, even across industries. The amount of time spent in verbal interaction is shown in the following chart.

All people (on average) spend about 1/4 of their time **talking in and near their own workspace**, far more time than spent talking elsewhere in the workplace. Thus, **PEOPLE'S OWN WORKSPACES ARE THE SITE OF MOST NOISE PRODUCTION.**



How this talking affects others "in the open": Since people, on average, spend about 25% of their time in and near their workspace making noise, and if the typical workspace in an open office "grid" has 8 people directly adjacent (see diagram) *then* it's very likely that at least one of those 8 is making noise at any given time. So, it's very likely that there will be relatively few periods of quiet in the course of a typical workday for any occupant of a densely-packed open plan workplace.



Accoustic Pathways

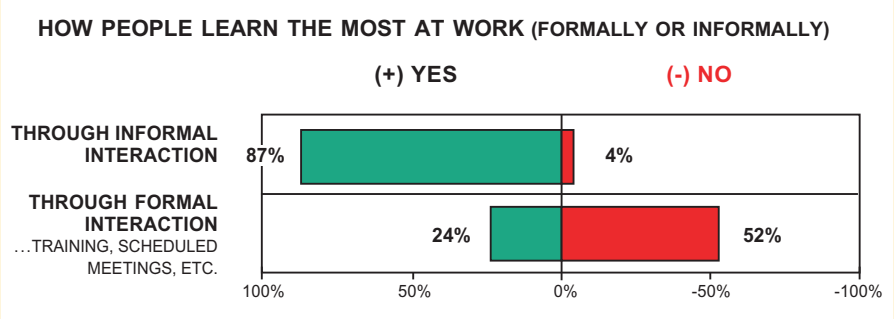
Must these noise-producing interactions happen in or near one's workspace?

Yes: The noise making activities of telephone use and meetings most often *need* to be in one's workspace. It is not practical to "go somewhere else" to have either spur-of-the-moment or scheduled conversations, particularly with increased use of in-meeting electronic data and document reviews, and the pace at which decisions need to be made. There is often a need to look at a screen side-by-side during some meetings, and to use on-screen information during phone calls, tying people to their workspaces' screens. As well, the increases in pace and pressure now commonly lead to more "heated discussion" phone calls and the need to pull people together quickly into conference calls, in-workspace meetings, or impromptu hallway discussions . . . all in response to time pressure and just-in-time handling of matters.

The importance of informal interactions for learning: Verbal interactions are important not just for transactions, but are the way most people learn the most about their discipline, their projects, and their organization. For many organizations, continuous life-long learning is now being formally articulated as a "core value." This learning is obviously necessary in a rapidly changing business climate; where new customer needs and problems constantly arise; where in each discipline, new information is being rapidly developed and deployed; and where information overload is for many, the norm. Embedding learning into the day-to-day life of the organization is especially important in those with short product life cycles.

Our research explores the relative value people place on event-driven, or *formal* learning (in classes, or self-training modules) versus *informal* learning (through casual conversation, impromptu problem solving sessions, and just working together). **A consistent finding for all job types is that people find informal learning, through informal interactions, far more important and valuable than formal learning.**

The diagram below shows how people learn the most at work.



People in all workspace types (from fully private to fully open) have very similar scores. Thus, those in the open *don't* learn more through informal interactions than those in enclosed workspaces.

Given how important informal interactions are to the success of individuals and teams, how well are these interactions supported in the workplace? Most people seem satisfied with their *opportunities* for interactions with colleagues:

80% are satisfied

7% are not satisfied

This overall level of satisfaction is true for all four job types and all workspace types. However, on closer examination it would seem that

while the *opportunities* for interaction are satisfactory, many of the important work related issues and outcomes are not.

- Most employees find it difficult to *find out what they need to know to be useful contributors* (44% find it difficult and only 32% find it relatively easy).
- Only about 1/3 (36%) of employees find that the workplace helps in doing *undistracted **group**work*.
- Only about 2/5 (40%) of people find the workplace *supports impromptu meetings* and encounters.
- Only about 1/2 (52%) find the workplace supports *dropping in to chat with others*.
- Only half (50%) find it easy to *meet with one other person* in their own workspace.
- Only about 1/3 (36%) find it easy to *find other people's workspaces*.

Clearly, there is still work to be done to make peoples' interactions more efficacious, in which workplace design can play a strong role.

A major conflict between the two most important modes of work: "Noise" is both necessary for the business (because it is integral to verbal transactions, informal learning and collaboration) and also distracting to neighbors trying to concentrate. Given the effects of distraction, this business-necessary noise is a productivity and satisfaction *enhancer* and, simultaneously, a *reducer* for others. There is an obvious conflict here.

The conflict will worsen: As organizations move towards more enablement of individuals and teams, more remote management and remote teamwork, and the pace of work quickens, there's just more interaction necessary. Both quiet work and verbal interactions happen largely in individuals' workspaces. However, verbal interaction in one's workspace reduces the ability of adjacent people to concentrate, the task everybody needs to do most. In this situation, the most rational and performance-beneficial design solution is one that provides a substantial amount of acoustic privacy for each individual and for groups in meetings.

Acceptable levels of acoustic privacy can be attained in an open plan environment characterized only by normal levels of voiced communications, **and then only if all system components (partitions, ceiling, floor covering, furniture, and sound masking) are coordinated, designed, installed, and maintained correctly.** Acceptable levels of acoustic privacy are **not** achievable in an open plan environment characterized by

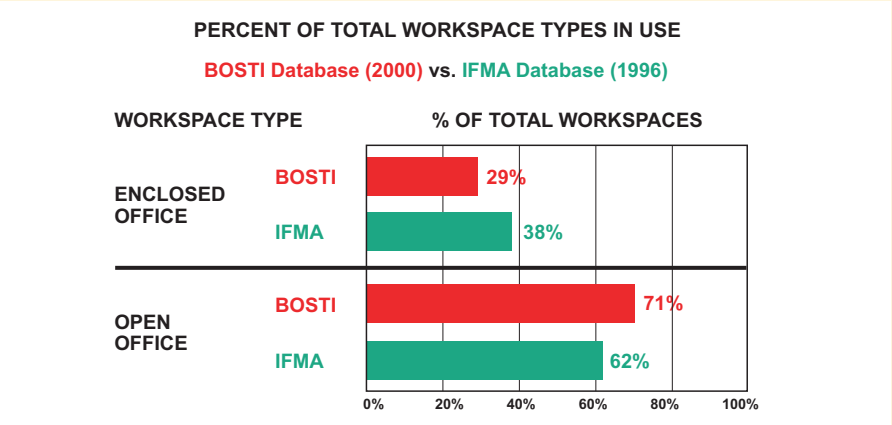
raised voice situations, where speakerphones are in frequent use or at high volume settings, or where group activities and discussions regularly occur within the area of individuals' workspaces . . . all an increasingly common set of conditions. (See *ASID Sound Solutions*: Increasing Office Productivity Through Integrated Acoustic Planning and Noise Reduction Strategies, American Society of Interior Designers, 1996.)

Design criteria for acceptable acoustic privacy must be tailored to accommodate the work behaviors of the space's occupants. Noise-producing behaviors vary somewhat from group to group within an organization. An acceptable acoustic environment may be achieved in an open plan setting for only some of those behavior patterns. However, the need for workplace flexibility makes a uniform workplace design that *meets the needs of all* the ideal approach, and precludes the use of workplace acoustic design characteristics that vary significantly from group-to-group. A common-to-all solution is best.

Research shows that virtually all organizations have groups and individuals that generate significant amounts of noise in or near their individual workspaces. So, an *acceptable and flexible environment* for the required distraction-free workplace is, in most situations, best exemplified by a design scheme with enclosed individual workspaces, ones with four walls to the ceiling and a door for each occupant, and properly constructed to provide acoustic integrity.

The types of workspaces people have versus what they need:

The widespread use of open office planning is a major contributor to this conflict between the two most necessary and time-consuming facets of work, and the two that have the strongest effects on performance and satisfaction. Examining the types of workspace in which individuals are housed shows a vast majority in open office situations. The following chart compares the portion of people in enclosed vs. open offices in both BOSTI's database, and from the IFMA (International Facility Management Association) benchmark study in 1996. They are roughly the same, so we can generalize from BOSTI's database.



This includes managers . . . if they were excluded, the percent in open workspaces would increase.

A PUZZLEMENT: Of all their time, people in all job types spend by far the most doing quiet work. Supporting quiet work is one of the two top productivity enhancers and job satisfiers. However, two-thirds of those in open offices (the most prevalent workspace type) are "often distracted by others' conversations" and can't do undistracted work.

THEN WHY ARE OPEN OFFICES SO PREVALENT?

There seem to be a set of assumptions about open offices that have acquired the status of myth, ones that have never been rigorously examined but can now be explored with these research findings. These widely held myths seem to be:

MYTH 1: **"We can't have *both* distraction-free work and easy interactions. They're opposites."**

MYTH 2: **"We can provide a distraction-free *open* office."**

MYTH 3: **"We are moving towards being a more *open organization*, one with better communications."**

MYTH 4: **"We *learn* more in the open from overhearing others' conversations."**

MYTH 5: **"We can't have all enclosed workspaces . . . our *space utilization rate* will skyrocket."**

MYTH 6: **"We *can't afford the cost* associated with providing enclosed workspaces."**

Let us examine each of these myths:

MYTH 1: "We can't have *both* distraction-free work and easy interactions. They're opposites."

REALITY: **YES . . . it is easily accomplished.** It is quite possible to design workplaces so that *both* these critical needs are met, without having one compromise the other. Many organizations have built or are contemplating just such designs. The designs vary, depending on how close group interaction spaces need to be to individuals' workspaces, and whether the interaction spaces are dedicated to a group, or for use by all. We must remember that one's own workspace is the site where people engage in more verbal interaction (as a percentage of their workday) than any other space in the workplace.

Given the business benefits of informal interactions, all organizations would benefit from workplaces that increase the frequency of chance encounters and interactions for individuals, within and across teams. Cross-team and cross-functional interactions can be supported by workplace design that brings people together naturally during the normal

course of the day, both in circulation spaces and at destinations, like the cafeteria, parking lots, copy centers, outside the washrooms, at coffee and mail areas. One circulation scheme that brings people together is a Main Street (Figures 4 and 5), where services, support spaces, and important destinations all front on the primary circulation path. Conversely, individuals' workspaces are segregated from the noise and activity of Main Street, enabling both frequent interaction *and* distraction-free work.

Figure 4 — Main Street, Perspective

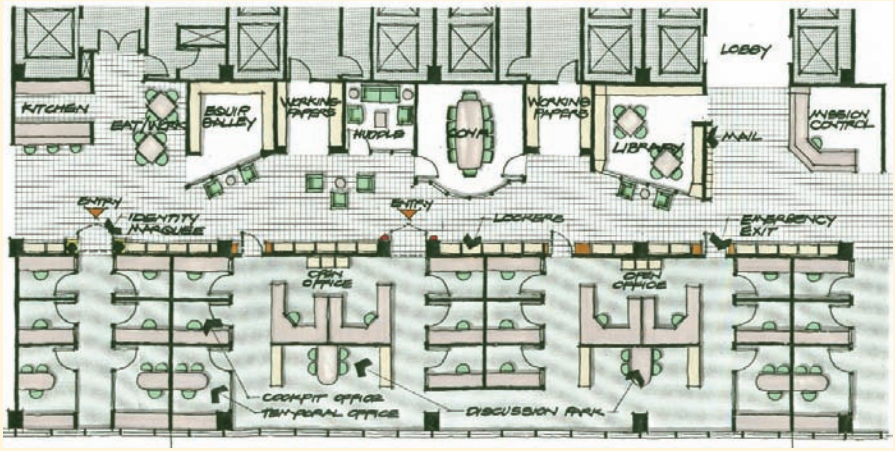


Figure 5 — Main Street Plan
(Note full-height hard wall between Main Street and individuals' workspaces)

An in-use example of a winding Main Street is the multi-storey Dallas Office of a major financial services firm, shown in Figure 6. It too, consists largely of workspaces that are acoustically private and small.

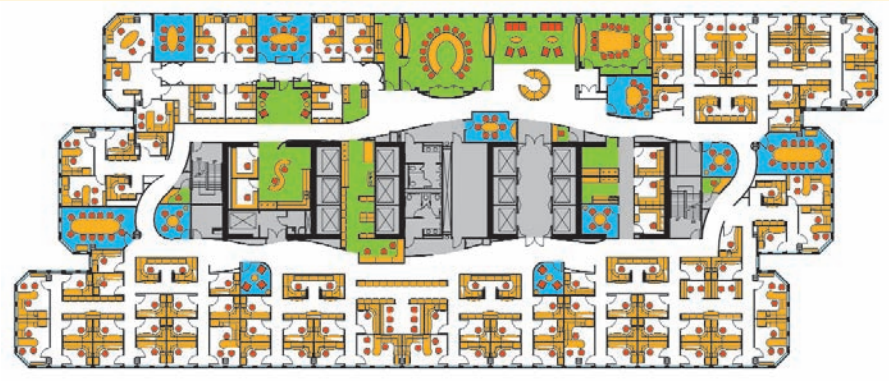


Figure 6 — Financial Services Firm, Dallas, TX
Workplace Analysts: BOSTI Associates, Buffalo, NY
Interior Architect: Sverdrup Facilities, Inc., St. Louis, MO — Built

An example which locates small enclosed workspaces surrounding an enclosed team-use interaction space is Deloitte & Touche's Pittsburgh Consulting Office (Figure 7).

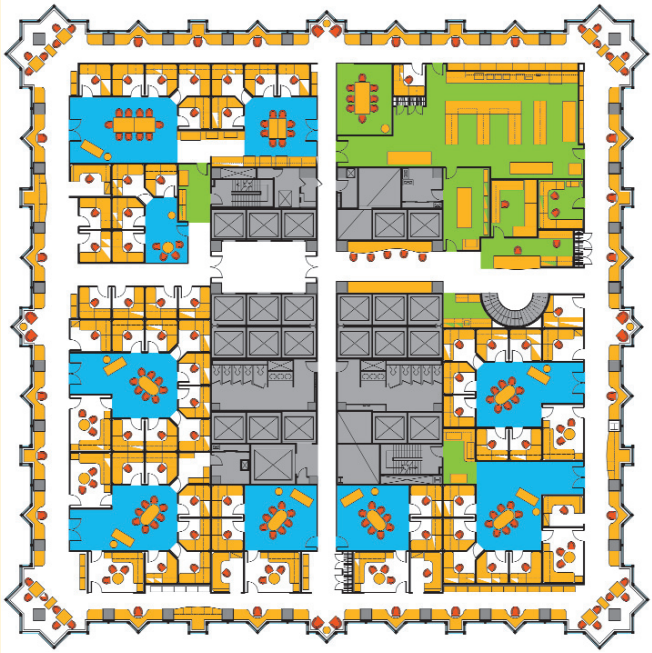
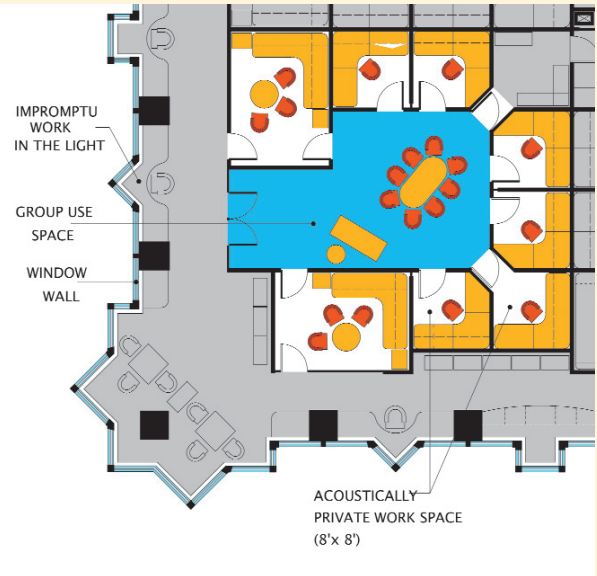


Figure 7 — Deloitte & Touche Consulting Group, Pittsburgh, PA
Architect: Burt Hill Kosar Rittelmann Associates, Pittsburgh, PA — Built



Detail of Figure 7 — Deloitte & Touche Consulting Group, Pittsburgh, PA

The proposed U.S. General Services Administration's Public Building Services Region 9 offices in San Francisco (Figure 8) has fully enclosed individual workspaces served by a 10-foot wide Commons space, useful for group drawing review and small meetings. The Commons includes secondary or local circulation for 8 to 10 workspaces. In all these schemes, *major* circulation does *not* run through these group-use spaces, giving them the ability to do distraction-free *group* work.

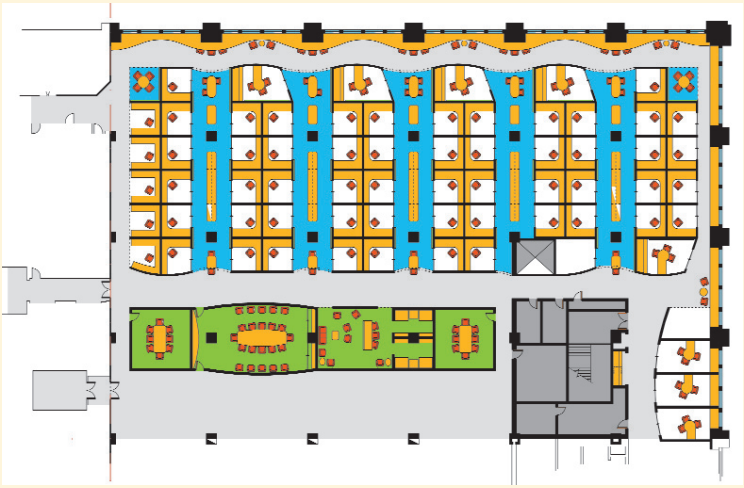
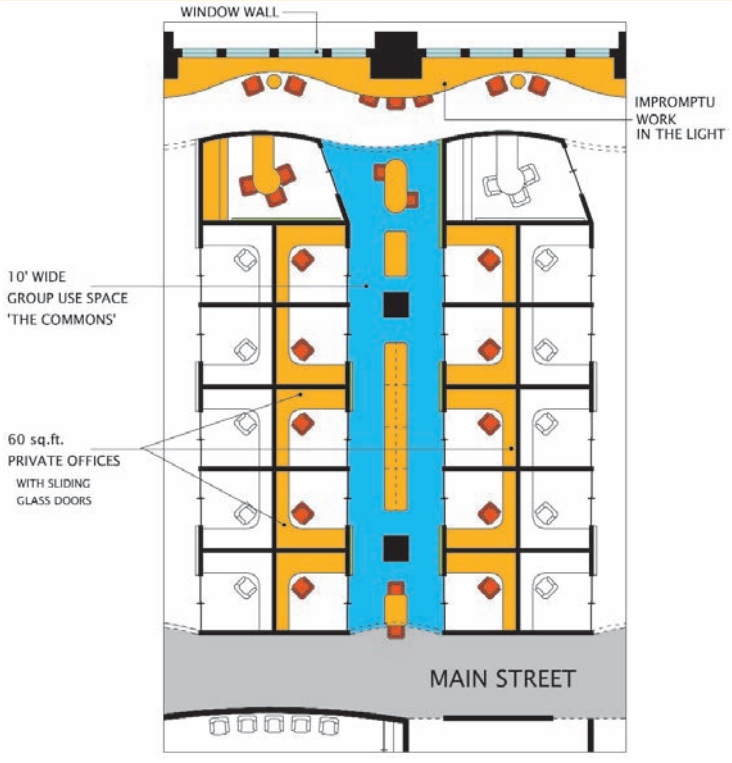


Figure 8 — GSA/Public Building Service, Region 9, San Francisco, CA — Demonstration Project
Workplace Analysts: BOSTI Associates, Buffalo, NY
Interior Architect: Carter-Burgess, Dallas & Ft. Worth, TX — not yet built



Detail of Figure 8 — GSA/Public Building Service, Region 9, San Francisco, CA

Are having good communications and supporting distraction-free work really opposites?

Let's start with some history: The major premise of Open Office, first introduced in the 1960's as "Office Landscape," was that *reducing physical enclosure* for each worker and between groups of workers would promote useful interaction and communication among workers. Office Landscape came with a set of rules which, if followed, would supposedly lead to a high performance office. The underlying assumptions of these rules were:

- Easier communications among workers are an important organizational benefit.
- All communications, even organizationally important ones, are hindered by enclosure.
- The absence of physical barriers between people increases the frequency and quality of communication.
- The loss of physical barriers and the attendant loss of privacy is a reasonable cost to pay for such enhanced communication.

No one would argue with the first assumption, *but the others have never been tested seriously*. These untested underlying assumptions live on and shape many of our workplaces and our dialogue about workplaces.

In testing these assumptions, the important questions seem to be: Does physical enclosure reduce ease of communication? Does physical openness enhance it?

Open offices' assumptions have it backwards, for the reverse seems to be the case: a high degree of physical enclosure provides the climate for high ease and quality of communication, while a low degree of physical enclosure is a causal factor in low ease and quality of communication. **Therefore, a high degree of enclosure supports *both* distraction-free work AND good interaction and communication. There appears to be little conflict in providing both. Tradeoffs between providing for distraction-free work and good interactions and communication are not necessary.**

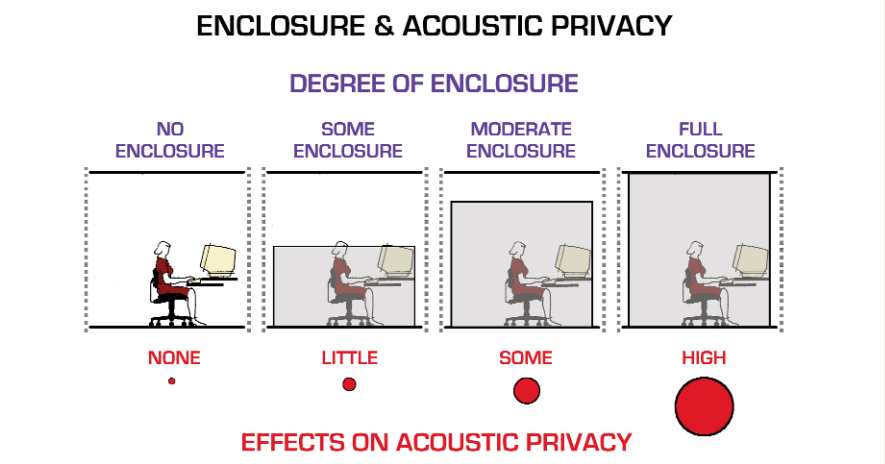
BOSTI's 1985 2-volume work *Using Office Design To Increase Productivity* included findings showing the effects of how much physical enclosure an individual's workspace has on support for communications and interaction. That database, of some 10,000 respondents, included a wide variety of levels of enclosure for individuals' workspaces, from no enclosure at all (the now seldom-seen "bullpen") to those with four walls to the ceiling and a door. In this work, we categorized the range of workspace enclosures into a gradient of 14 categories, each one being an increase in how many sides of the workspace are enclosed, and/or in the height of those panels or walls.

There were 5 levels of sides enclosed: From none (in the "bullpen") to four sides enclosed.

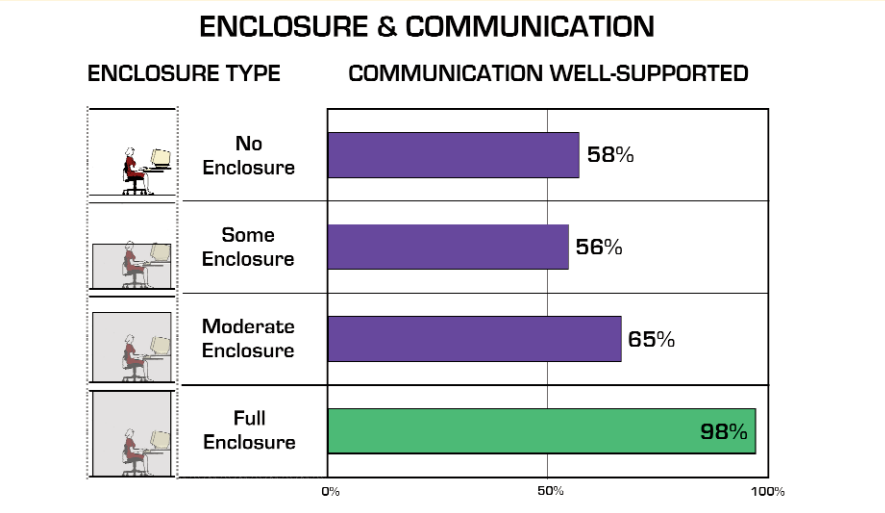
There were 4 levels of height of panels: "None"; "Low panels" having tops above seated eye height, but below standing eye height; "High panels" being above standing eye height but not to the ceiling; "Full walls," which reach the ceiling.

Analyses of how much acoustic privacy the 14 different levels of enclosure provide shows it is not a smooth gradient, where acoustic privacy increases a little as you add to sides or height. Analysis showed these 14 enclosures actually grouped into only *four levels*. *Within* each level, all enclosure types are roughly equivalent in providing acoustic privacy. In

the following diagram, the Group entitled "no enclosure," which *includes* the bullpen, offers little or no acoustic privacy. Those in the Group entitled "some enclosure" offer slightly more privacy, those in the Group entitled "moderate enclosure" more still, and then there is a very substantial increase in acoustic privacy for the Group "Full Enclosure," the workspace with four walls to the ceiling and a door.



These four Groups of enclosure and their attendant acoustic privacy were then compared to how well they *support communication and interaction*, as reported by people in these different enclosure levels. The findings, shown below, demonstrate that even 15 years ago it was clear that **low degrees of enclosure inhibit communication and interaction and high degrees of enclosure support it.**



MYTH 2: **"We can provide a distraction-free *open* office."**

REALITY: **You can't achieve this in situations where raised voice communications occur, in environments characterized by regularly occurring impromptu team activities and discussions, or where there is high speakerphone use in or near individuals' workspaces . . . all increasingly common conditions. The expectation of widespread voice-activated computing, 3 to 5 years out, will transform much of quiet work into noise-producing work.**

The previously mentioned ASID Professional Paper (*Sound Solutions*) states:

> "The most serious problems with distraction from productive work are caused by overheard conversations that can be clearly understood by individuals who are not intended to be part of communication flow. Such conversations engage even passive listeners from adjacent workstations and contribute to the heightened sense of being distracted, with its resulting loss of attention to tasks at hand, and thus at a cost to the passive listener's productivity."

If these conversations are the only source of distraction, and if they are all conducted at normal levels of voiced communications, then the ASID paper concludes that normal levels of speech privacy can be attained in the open office "through *integrated* use of four types of products simultaneously" (ceiling, systems furniture panels, sound masking, and carpet).

However, in most situations there are additional sources of distraction . . . and raised voice communications *are* common. This same source also goes on to state:

> "In addition, a confluence of other factors has resulted in office buildings becoming noisier and noisier over the past five years. Just a few of these factors include:
>
> - Significantly higher workstation densities, with more people occupying the same physical space, working in closer proximity to one another in open offices.
> - The widespread use of speaker phones and the tendency of office workers to speak more loudly when using them.
> - Greater use of video conferencing equipment, adding more noise and concentrating louder noise levels in specific areas of the workspace.

- Creation of office team areas which require more interpersonal interactions, combined with reduced height furniture systems which allow more speech noise to pass over office divider panels.
- The advent of voice-activated computers, with their potential to contribute to the level of noise as individual workers input and receive information in verbal form.
- An increase in the size of computer screen, from a 13" standard to 17" standard, with a resultant increase in the reflection of noise within the individual workspace."

And, it states:

> "It must be noted, however, that all of the resultant (open) office acoustical design solutions are based on the assumption of "normal" levels of voiced communications in the environment of interest. Raised voice situations and speaker telephones turned to high volume settings do not lend themselves to being resolved (in the open office) even with state-of-the-art integrated methods . . ."

Acoustic isolation of team work areas is effective both in containing its noise and in eliminating distraction for the group's focus on work. However, such isolation does nothing to protect individual workers from noise being produced in or near their own workspace area. Acoustic isolation of the frequent, valuable impromptu encounters that can occur anywhere (often near workspaces) is not feasible.

Thus, the most practical way to contain noise from conversations, meetings, telephones, and speakerphones (and voice-recognition computing, when it becomes widespread) that originates within individual workspaces is to enclose them with properly constructed floor-to-ceiling walls and a door. This also protects individuals from the nearby noise created by informal interactions which regularly occur in corridors serving individual workspaces and in informal meeting areas interspersed among them.

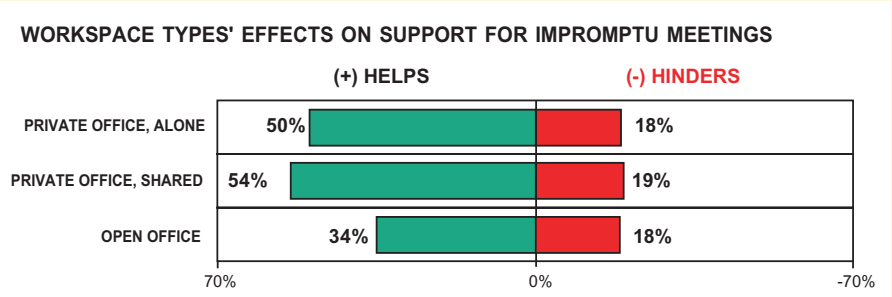
MYTH 3: **"We are moving towards being a more *open organization*, one with better communications."**

REALITY: Open offices do not an open organization make . . . in fact, open offices often impede the open communications necessary to organizational openness. Many managers say they want "a more open organization" and this is often unthinkingly and inappropriately translated into a call for *physical* openness. What managers really mean when say they want "a more open organization" is a place where people communicate rapidly and easily with each other and can have impromptu, as-needed interaction, so that:

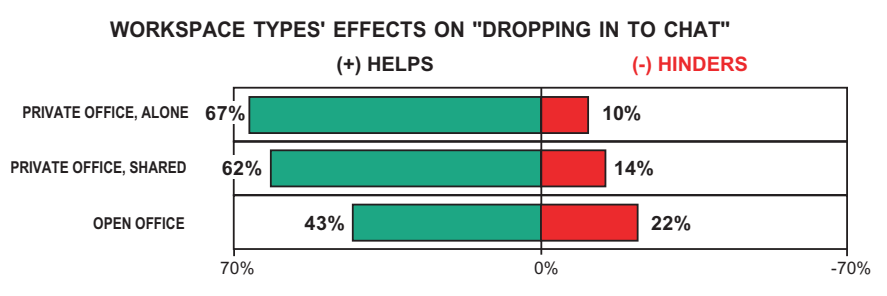
- New customer solutions can be swiftly developed using all skills necessary.
- Cross-functional work and learning across disciplines and business units is supported.
- Barriers to collaboration are removed and incentives to it installed.
- People at all levels can comfortably speak their minds.

These are *not* about physical openness. These are about the removal of hierarchies and other barriers that limit the flow of ideas and collaboration, and about ways to increase the frequency and utility of work-useful informal interactions and groupwork.

The chart below shows people's responses to questions about how well or how poorly the workplace supports informal interactions and impromptu meetings by **workspace type. It shows that the open office, rather than helping support such interactions, helps people less than in enclosed workspaces. So, physical openness somewhat interferes with good communications and creates barriers of its own.**



Our survey asks respondents whether the workplace supports people dropping in to chat in their workspaces (one of the components of informal impromptu interaction). Analysis shows that overall, 52% of people feel the workplace does support "dropping in to chat" (and 18% don't). Examined by workspace type, more people in private offices than in open offices feel the workplace supports "dropping in to chat." The chart below illustrates this point.



About "Caves and Commons": One of the current popular ideas about the workplace is "caves and commons" . . . a concept where individuals have small distraction-free workspaces ("caves") grouped around an *open* common space that serves both as circulation and as meeting space ("a commons").

This concept assumes that group work can be effective when done in the open. Our data show that one of the top 10 priorities (#3 actually) affecting performance and satisfaction is provision for *un*distracted groupwork. Clearly, groups need the same freedom from distraction to get group-focused work done as do individuals. Thus, a high-performance workplace must allow group work to be sequestered in spaces designed for that activity. Unfortunately, only about half (54%) of the people in our database find undistracted groupwork well supported. So "caves" is a good idea, but working in a "commons" with major through traffic (and its accompanying noise and distraction) isn't.

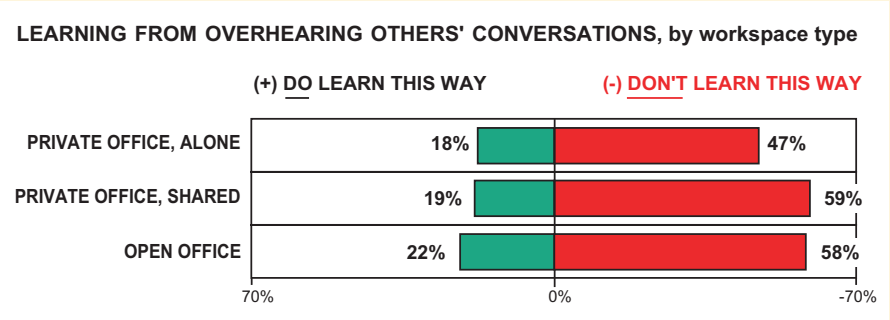
MYTH 4: "We *learn more* in the open by overhearing conversations."

REALITY: In general, most people don't learn much this way, and people in the open learn no more from overhearing others' conversations than do those in private offices. And, those in the open don't find out what they need to know to be a useful contributor any more than those in more enclosed workspaces.

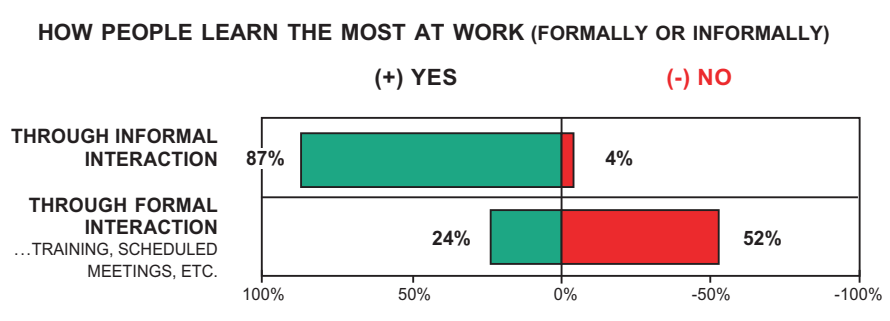
Contrary to the preconceptions of many who think more open

communications would be better served by more physical openness, few employees learn very much from overhearing others' conversations, regardless of their workspace type. So, this (supposed) virtue of the physical openness of open offices is not really true.

The chart below shows the percentage of people, by workspace type, who do and don't learn a lot from overhearing others' conversations. It demonstrates two things: 1) most people don't learn much from overhearing others' conversations, and 2) it is not helped by being in an open office, since the chart shows similar scores for those in all workspace types.

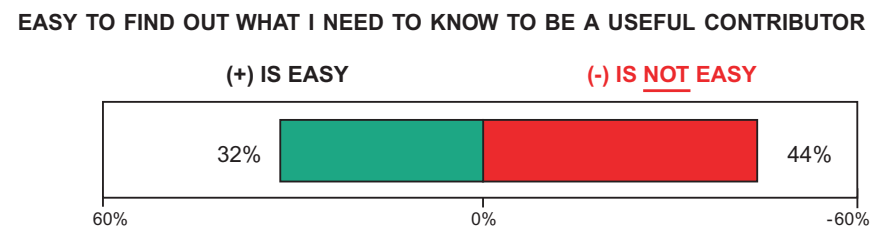


If people *don't* learn by overhearing others' conversations, how do they find out what they need to know to be useful contributors to the business? First of all, they learn far more through informal channels while doing their work than they do through training and formal meetings.



But a finding that suggests a problem for many organizations is that for most people, it is not easy to find out what they need to know to be a useful contributor to the organization . . . **44% *don't* find it easy, while only 32% do.** Given that this type of knowledge is typically obtained through informal channels, the average workplace is not being very supportive of these modes of interaction. **And this finding is *not* affected**

by whether people are in enclosed workspaces or open workspaces because people in the open score no higher, and in some cases lower, than those in enclosed workspace on "ease of finding out what I need to know to be a useful contributor."



MYTH 5: "We can't have all enclosed workspaces . . . *our space utilization rate* will skyrocket."

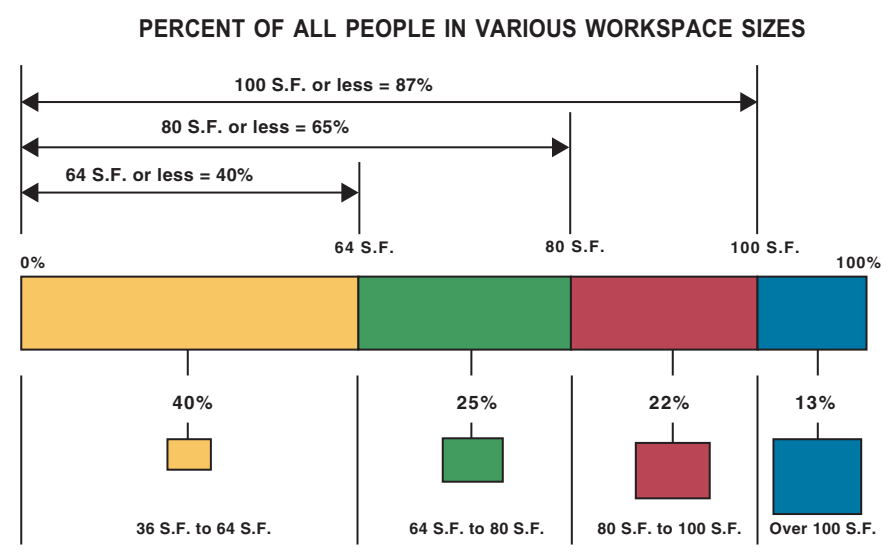
REALITY: Enclosed spaces don't have to be large. The size of an individual's workspace has little to do with its ability to reduce distraction. Only its enclosure does.

If we look at the effects of providing for more acoustic privacy versus providing workspaces of larger size, we see that being able to do distraction-free work matters far more than larger size.

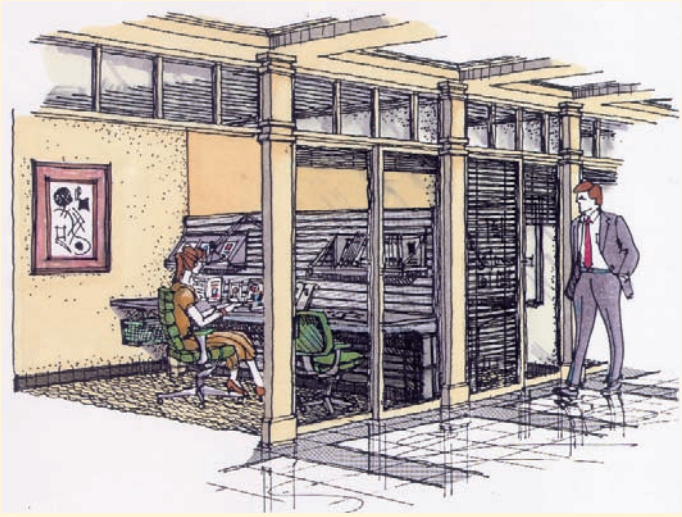
About distraction: The data show that people housed in acoustically-private workspaces (even small ones) as compared with those who work in open workspaces, have higher job satisfaction; are more productive; do better teamwork; have more productive meetings in the workspace; are involved in more useful informal interactions; can do more focused work; have fewer visual distractions; are more physically comfortable; learn more from others; and communicate with peers better.

About workspace size: The data show that people housed in larger workspaces, compared with those in smaller workspaces, benefit on only a few factors obviously related to size. They are more likely to feel they have enough space; their worksurfaces are large enough; and are more satisfied with their workspace.

In examining workspace sizes in our 13,000-person database, we find that the vast bulk of workspaces (87%) are 100 sq.ft. or less; two-thirds of them are no greater than 80 sq.ft.; and 40% are no greater than 64 sq.ft. The trend has clearly been towards smaller workspaces.

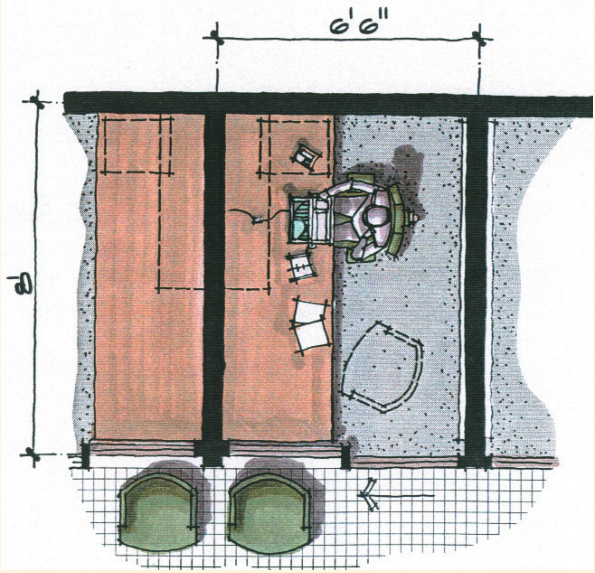


So, it is far more important (for the business and for individuals) for the individual's workspace to provide for a distraction-free environment than it is for it to be large. For people doing mostly solo work or interacting side-by-side with one other person in the workspace, **the "very small private office" makes good business sense . . . one of 52 to 64 sq.ft.** We've called them **"Cockpit Offices."** People with more interactive jobs and who frequently need to meet with *two* others in their workspaces need larger ones to accommodate two visitors' chairs and a transaction surface . . . 75 sq. ft. to 110 sq. ft.

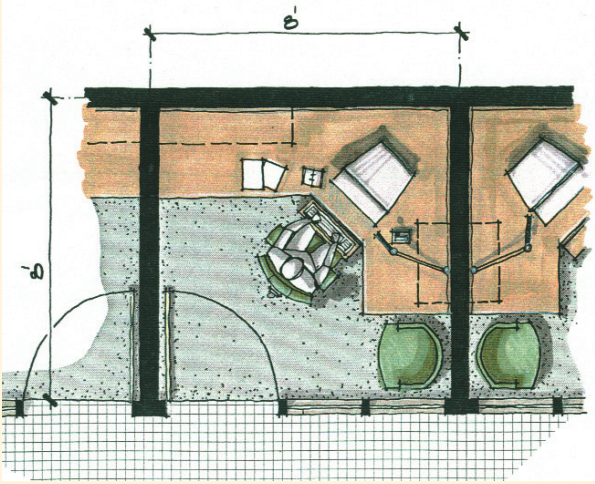


Perspective of Typical Cockpit Office

A question sometimes asked is "will a small private office feel too constricting, like a phone booth?" Many such "**cockpit offices**" have been built in financial service companies, software development companies, and in sales offices, and they've been deemed highly successful by their occupants and by the company.



Plan of Typical 6′ 6″ x 8′ Cockpit Office



Plan of Typical 8′ x 8′ Cockpit Office

MYTH 6: **"We *can't afford the cost* associated with providing enclosed workspace."**

REALITY: That only seems to be the case when the facility metrics used are based on cost alone. If you factor in the monetary value of the business benefits, you can't afford *not* to do it when enclosed workspaces support the business more effectively.

Clearly, some costs can increase with having enclosed workspaces, even small ones. The first cost of heating, ventilating, and air conditioning (HVAC), for example, increases with more enclosed workspace, if each workspace is its own zone with its own controls.

Real Estate and Facilities groups are traditionally judged by cost metrics only . . . like cost/person and cost/square foot. **The assumption underlying these metrics is that the workplace is seen as a necessary cost, not as a business tool.** Decisions about office workplace investments are primarily viewed in a cost-only manner, and decisions seem to be a choice between spending more or spending less. In these cases, less usually wins. Cost- benefit analyses are seldom done, because data about the benefit side of the equation of a high-performance workplace have not been readily available.

The research described earlier has shown that the design of the workplace and workspace *has* substantial effects on individual performance, team performance, and job satisfaction. A research-based approach to workplace needs definition can identify those workplace qualities and features that have the strongest direct effects on these bottom-line measures. Predictive relationships can be determined . . . for example, improved support for particular work activities can predict improvements in performance and/or satisfaction. The approach also identifies those aspects of the workplace that are providing the poorest support for work in the current environment.

Using this approach, the benefits associated with specific workplace changes that address unmet or poorly supported needs, such as acoustic privacy attained through enclosure, can be predicted. The improvement in performance can be translated into dollars using an organization's accepted practices for economic analyses. Using pre and post-occupancy surveys, improvements can be measured after implementation to substantiate the benefits actually realized and build a database of information for use in subsequent economic analyses.

Being cost-competitive is important to any organization, and is a major responsibility of a facility manager. Both sides of the equation have to be considered. It doesn't make sense to avoid expenditures if they will produce benefits and offer a return greater than their costs to the organization. It doesn't make sense to become more cost-only competitive if the result is

damaging to job performance or negatively impacts job satisfaction enough to cause problems with the recruitment and retention of good people. A change in the culture is often necessary to allow development and consideration of a business case that places the incremental costs associated with workplace design and construction in perspective with their benefits.

A post-script to our examination of these myths

If this research clearly shows that open offices are performance and satisfaction reducers, and are often barriers to interaction, then why are there so many open offices . . . and why have there been recent trends in some places to make things even more open. Some reasons seem to be:

About understanding the effects of the workplace: Many business unit managers, facility managers, and designers just have not been fully aware of research demonstrating the powerful, beneficial effects that enclosure has on important business outcomes. While other research with similar findings has been available, it has, strangely, not been heeded. Perhaps because, until now, there was little information about the magnitude of the business *benefits* of more enclosure as compared with the costs of more enclosure. The business case just wasn't established.

There may also be a benchmarking effect where, if many others have open offices, companies think it must be good for them too. We hope that these research findings help to change this so that each organization does the analyses necessary to realize a workplace that would help *its* workers and *its* business be more productive and satisfying.

About the force of marketing: Another reason is that the open office, most often built of integrated systems of partitions and furniture, is a *product*, one that is heavily marketed, and the industry that makes these products is a forceful lobby, both in the design and the business community. Conversely, the private or distraction-free workspace is *not a product*, but built of a collection, from different vendors, of products and materials (like drywall and studs or demountable partition components) that can form many kinds of spaces. While some vendors have developed and marketed fully enclosed workspaces, it has generally not been developed as an easily marketable commodity, and there is no effective lobby for it.

This is not meant to belittle the many fine attributes of systems furniture products. Freestanding versions of systems furniture are what BOSTI most often recommends for use inside individual workspaces . . . they offer good ergonomic support for tasks, with many worksurface and

storage options. Many current open plan wall products offer excellent wire management capability and flexibility of reuse and reconfiguration for applications where satisfactory acoustic privacy can be achieved in an open plan setting. The marketing of the open plan office has highlighted these advantages, but downplayed or ignored the shortcomings.

Workplace design should take advantage of the many excellent products and materials available, but they should be used wisely to provide maximum support for work important to the organization's real needs.

The outcome of BOSTI's research findings (both in 1985 and now) should offer reason to business managers and their designers to rethink the open plan approach and carefully consider its limiting effects on successful interactions, job performance, and satisfaction.

About the idea of flexibility: Many believe the open office to be more flexible considering our climate of frequent reorganizations. Flexibility strategies other than the open office are becoming widespread. Flexibility is now increasingly achieved through the use of one or two-sizes-fit-all workspaces in a modular floorplate planning grid (both a boon for the facility manager). In such a scheme, the ability to relocate and reconfigure open office products is less and less frequently exercised. And if flexibility of reuse and relocation is needed, it is quite achievable with full-height partition systems.

About the force of images: There seems to be another myth emerging about openness, that physical openness leads to more energy, more "buzz." This idea seems to spring from New Economy dot.com start-ups and internet ventures. These start-up workplaces are highly imageable and much published in the design press, which helps propel this emerging myth. The idea offered is that when you tear down the walls, the energy level, the "buzz" increases, and furthermore, that opening up individuals' offices also (somehow) frees their minds. One wonders what, if any, rigorous information supports those claims. Our research on 13,000 people in many types of companies shows that physical openness does not support: useful business discussions; learning by overhearing; focused individual work; or focused teamwork. And these findings are echoed in most other studies.

There are assumptions behind those New Economy workplace ideas that need some serious scrutiny. One is that tearing down the walls creates "energy." In any company that's run right, where people pull together, and where there are good communications, the *"energy" is there, already*. But, in a place where people have enough enclosure to accomplish

their focused work, *you just can't see it* . . . can't see the many conversations that take place in people's workspaces, the work side-by-side at a screen, the whiteboard discussions, and the very animated phone conversations, often on speakerphone with several others. Tearing down the walls does not *make* the energy, it may just *expose* what is already there to view. The research evidence shows that informal interactions are, in fact, *hindered* by fully open workspaces. And confidential, formal, or personal conversations (all of which occur in the workplace) can*not* occur in openness, if others are around.

Tearing down the walls may be a good approach in some specific instances, but *only* where that type of workplace actually supports both individual and team performance *better* than any other approach. Almost every workplace can benefit from open spaces used for group interaction and to create a sense of group identity, but those are not the places where individuals or teams can get focused work done.

Another assumption is that tearing down the walls frees people's minds. The opposite is true. The research shows that for *most* of the work day, the individual's mind needs to focus and be creative without distraction, without interruption of that sublime state that software developers call "flow."

The workplaces of e-startups are, most often, highly constrained design problems . . . ones with *very* low budgets, *extremely* fast schedules and dealing with much uncertainty ("we could double in size in a month, *or* be out of business"). A seeming best economic strategy for e-startups is to spend their precious resources solely on product development, to get it to market fast and to secure further funding. Many employees make some near-term sacrifice, accepting a lesser salary for stock options, their personal bet on the product's future. *Very* little is budgeted for the workplace. Such conditions lead to use of least cost, often high-image designs, many using colorful fabric on frames as space dividers (if there are any), mobile off-the-shelf industrial furnishings, and found materials, often touted as a "fun office." The most oft-reported problem in these fun offices is that there's no place to concentrate, and many e-employees work at home, or seek out the few enclosed spaces available.

Many New Economy employees, of an age who've never worked in offices before, have little sense of the ways in which more appropriate workplaces could better support their work . . . both their needs for distraction-free work and for interaction. It is critical to remember that even in the most team-oriented New Economy software development companies in BOSTI's database, 1/2 to 2/3 of all time is still spent doing focused work alone. That's where most of the true energy lies.

WISE USE OF RESEARCH FINDINGS

The focus of this booklet has been on the two top priority workplace strategies, the ones that have the most consistent and powerful effects on individual and team performance and on satisfaction. These are 1) reducing the distractions from conversational and other noise made by colleagues and 2) increasing the levels and types of support for informal interactions. Both of these can be accomplished without one compromising the other. If one (or both) is compromised, there are real costs to the business, in both lost productivity and higher attrition, and more difficult recruitment of the best and the brightest — a company's "intellectual capital."

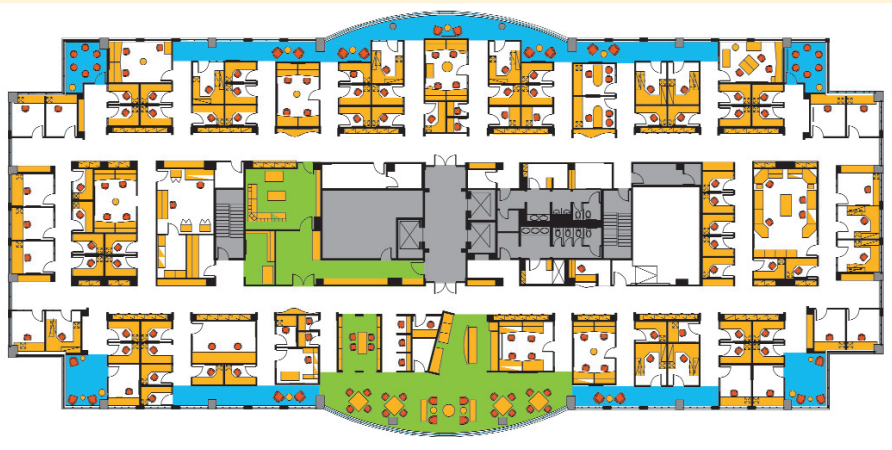
Strategies for Increasing Productivity and Satisfaction By Reducing Distractions

There are three general sources of distraction:

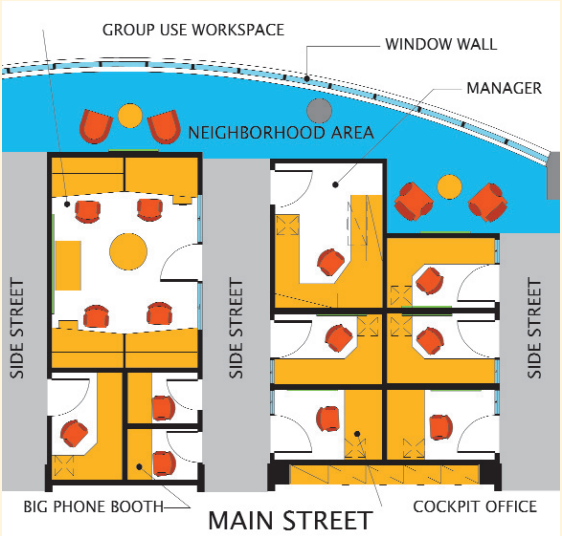
SOURCE 1: Noise from the general office area, public spaces and circulation.

To solve Source 1: Always segregate individual workspaces from these public and circulation spaces.

Example: Below is a floorplate design that has two busy "Main Streets" next to the core. **All workspaces open onto quiet, short "side streets" and none onto a Main Street.**



Sun Microsystems Sales Office, Atlanta, GA
Workplace Analysts: BOSTI Associates, Buffalo, NY
Architect: HOK Design, Atlanta, GA — Built

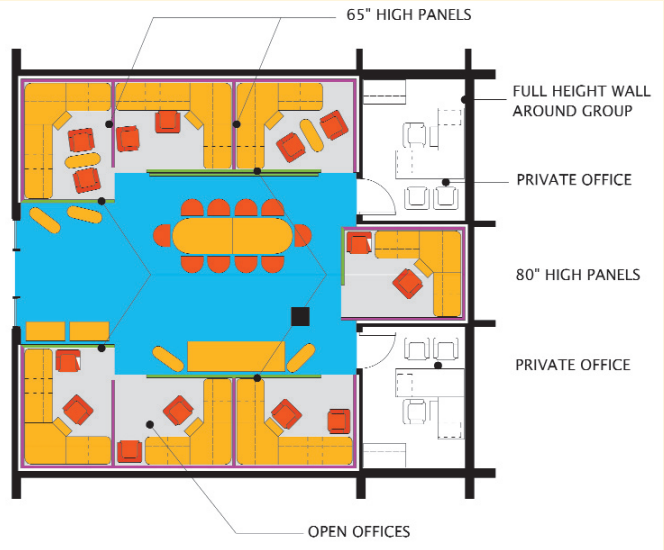


Detail of Floorplan above — All doors open on quiet side streets

SOURCE 2: Noise generated in workspaces of adjacent work**groups.**

To solve Source 2: Enclose each work*group* within sound-isolating walls, but provide the group with open office workspaces. Sometimes this kind of solution isn't flexible enough because workgroup sizes do vary. However, it is a very good strategy if the best solution (enclosed workspaces) is not achievable.

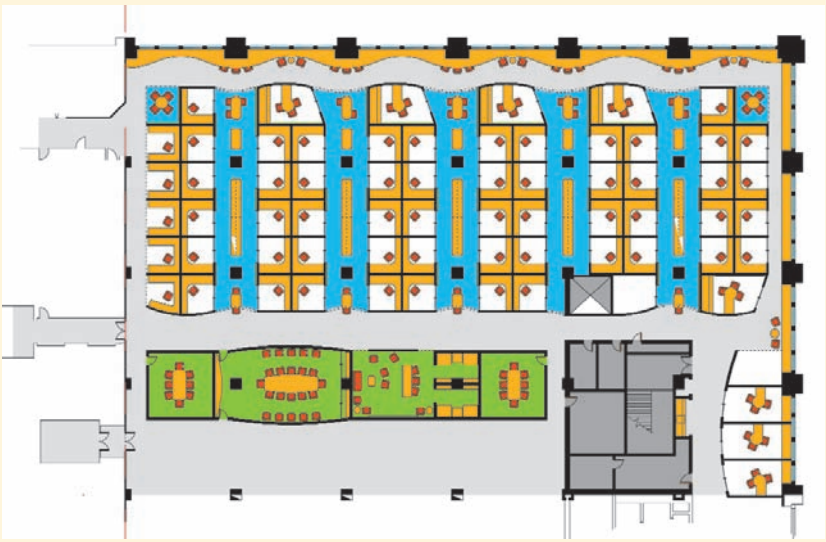
Ericsson, Raleigh, NC
Workplace Analysts: BOSTI Associates, Buffalo, NY
Architect: ARCADIS, Geraghty & Miller, Raleigh, NC — Built



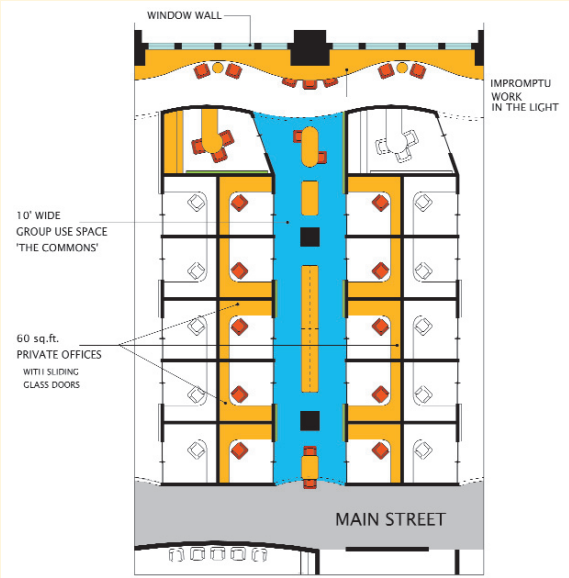
Detail of Acoustically Isolated Workgroup

SOURCE 3: Noise generated in the workspaces of one's own workgroup.

To solve Source 3: Provide ceiling-high walls and doors for each individual. This is flexible (if one-or-two-sizes-fits-all workspaces are utilized) because group boundaries can easily change and is effective in the face of speakerphone use and interaction noise.



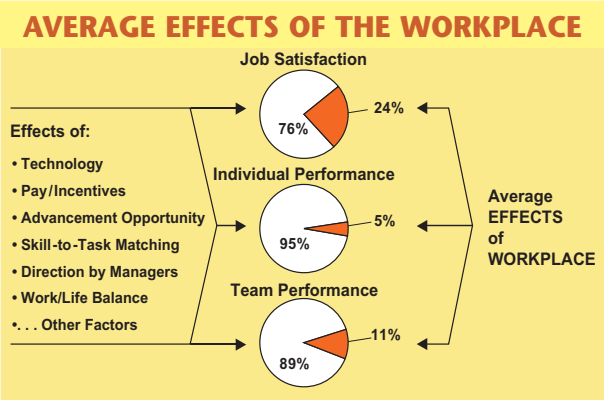
Partial Floorplan
GSA/Public Building Service, Region 9, San Francisco, CA
Workplace Analysts: BOSTI Associates, Buffalo, NY
Interior Architect: Carter-Burgess, Dalllas & Fort Worth, TX — Not yet built



Detail Drawing of Partial Floorplan

A Strategy for Making Wise Office Workplace Investments

A best strategy: By quantifying specific aspects of the workplace that have the strongest effects on productivity and job satisfaction, we can set real planning and design priorities. These can maximize the value of any facility investment to the business. By using these priorities in planning and design, which carefully examine what individuals and workgroups really do, high-performance work environments can be developed and tailored to an organization's specific work needs.



Not every aspect of the workplace affects performance or satisfaction. Many aspects of the office that do affect performance and satisfaction act fairly independently of each other. Thus, with more precise information, incremental improvements can be made without total office redesign and major investments. Knowing which aspects of office environment affect bottom line

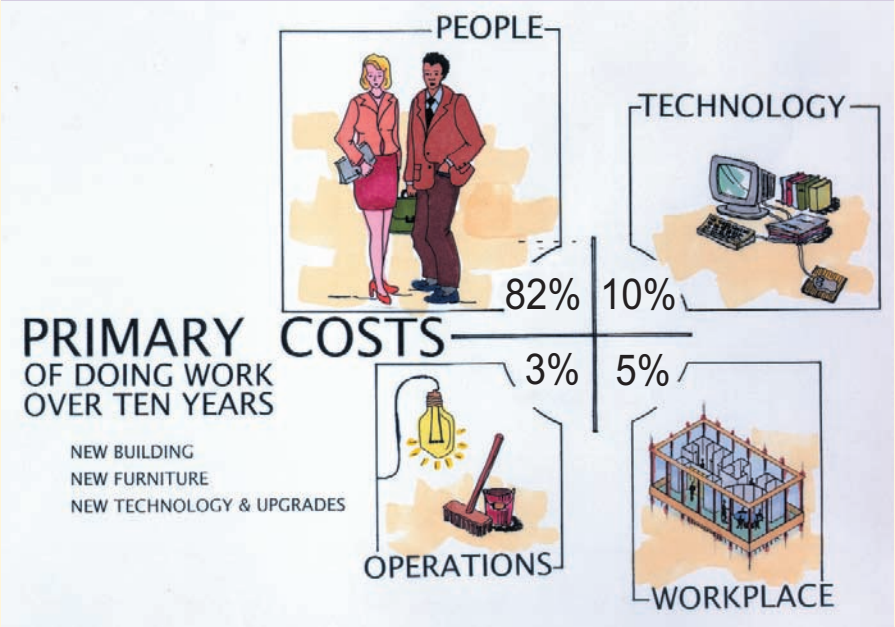
measures and which don't, and how they interact, should alter what managers demand in new facilities, what designers emphasize in designs, and how workplaces get managed.

WORKPLACE QUALITIES WITH THE STRONGEST EFFECTS / RANKED
Ability to do distraction-free solo work
Support for impromptu interactions (both in one's workspace and elsewhere)
Support for meetings and undistracted groupwork
Workspace comfort and enough space for work tools
Workspace supports side-by-side work and "dropping in to chat"
Located near or can easily find coworkers
Workplace has good places for breaks
Access to needed technology
Quality lighting and access to daylight
Temperature control and air quality

Sometimes the company suggests that Real Estate and Facilities groups use metrics for success that *don't* recognize the productivity and satisfaction benefits of a high-performance workplace (like cost per sq.ft. or cost per person). If this continues, then the only goal can be less space and less cost, goals highly likely to backfire on any business dependent on the performance and satisfaction of individuals and teams.

The office is more than just a cost center. It can be an investment with clear benefits and a measurable return and is yet another productivity tool to be used intelligently. The major strategic workplace breakthrough we see is not any emerging new technology, design theme or physical layout, but a "thinking breakthrough" about what office design is *for* . . . the idea that **carefully designing your workplace to support what your people and teams actually do is an investment that pays off in both business terms and in positive changes in corporate culture.**

PROPORTIONAL COSTS OF WORK (10 YEARS)



APPENDIX A

BOSTI'S QUESTIONNAIRE — ABOUT SELF-REPORTING OF PERFORMANCE METHODOLOGY

One seeming limitation of our research is our reliance on individuals' self-reports of performance, and the possibility that people may inflate their ratings of their own performance. We use this method because it is low-cost, efficient and effective, and we take the proper steps to reduce bias. Respondents to our survey are promised anonymity and confidentiality. Research within the psychological literature has shown that guarantees of confidentiality and anonymity increase response rate and reduce self-report bias. Even supervisors' ratings are likely to reflect some bias in judgement based either on pre-existing expectations or amount of exposure to the worker.

In today's knowledge-worker economy, where performance cannot be linked specifically to "number of units" produced as is typically the case with factory workers, it is very difficult to develop a clear-cut non-biased metric for performance evaluation. In our extensive research on this topic, we have not come across any objective "gold standard", nor are there any clear and consistent metrics used across individual organizations. Therefore, **our reliance on self-ratings of *concrete* performance-linked behaviors (e.g., frequency of meeting deadlines) is among *one* of the best methods of evaluation that we have available to us.**

In BOSTI's previous nationwide research program involving some *10,000* responses across some *70* organizations, we received both individual self-ratings and supervisors' ratings. Analysis showed very little difference in the *pattern* of strengths and weaknesses reported by the individual and the supervisor. Supervisors' evaluations were consistently one point lower than self evaluations. Because we are interested in comparing *relative* performance (e.g., the performance of those in private offices versus those in cubicles), and not absolute levels of performance, error introduced by self-inflated ratings of performance is not likely to result in any great error in the estimation of relationships among variables.

APPENDIX B

ABOUT THE JOB TYPES IN THE RESEARCH DATABASE

The findings are strong and consistent across a wide variety of industries, and varied some by major category of job type. These major categories, in which many job titles can be placed are the products of analysis. So, while there are several hundred specific job types in the data base, analysis of them was simplified by the discovery that many of these various job types behave much like others, and that most of these job types can be grouped into a few *sets* which exhibit common work behaviors.

We call these sets **"FUNCTIONAL JOB TYPES"**. There are four that are common to all organizations in our database and account for the vast bulk of the workforce in all companies: **Managers, Engineers & Technical, Non-Engineering Professionals, and Administrative.** Since it is behavior that design affects, these four *behaviorally-based functional job types* have been used in both our consulting projects and in reporting the research.

In our database, the relative proportion of these four major **functional job types** is shown below, as is a **sample of the job titles** in each functional job type category:

• **MANAGERS**	**26%**	Directors, Partners, Managers, Program and Project Managers
• **PROFESSIONALS**	**34%**	Financial Analysts, Management Consultants, Auditors, Procurement and Contracting, Sales, Human Resources, Marketing, Site Services
• **ENGINEERS & TECHNICAL**	**28%**	Software, Hardware, Systems, Mechanical, Test, Electrical and Aerospace Engineers, and other Technical job types
• **ADMINISTRATIVE**	**9%**	Administrative Assistant, Clerical Support
• **OTHER**	**3%**	

ABOUT THE INDUSTRIES IN THE RESEARCH DATABASE

The database consists largely of some 13,000 responses from three major industries: Manufacturing, Financial Services Organizations, and Engineering and Technology (software and hardware).

The percentage of responses in the database are:

• **MANUFACTURING**	**37%**
• **FINANCIAL SERVICES**	**32%**
• **ENGINEERING AND TECHNOLOGY**	**30%**
• **OTHER**	**2%**

Database growth:

On average, our database grows by 3,000 responses per year. We have an average response rate of 40% of all those surveyed, so the 13,000 responses are quite representative of the workplaces of the industry types in the database.

APPENDIX C

10 YEAR WORKPLACE COSTS VS. PEOPLE COSTS, 1998 – 2008

ASSUMPTIONS & DATA SOURCES **TEN YEAR COSTS** (rounded)

- **Square feet per worker = 286 S.F. "all in"**
  (IFMA Benchmarks III Report, 1997)
- **New Building and Interior @ $130/ S.F. x 286 S.F. $37,200**
  (April 1999, Building Standards, Class A Construction, NYC)
  For a high workplace cost scenario, we use the very high cost construction market of New York City. Costs are for hard costs of construction, and do not include development and finance costs, which vary so widely as to preclude any estimate.
- **Furniture set = $5,000 with $3,000 of upgrades over 10 years $8,000**
  (Industry standard: $3,500 to $5,000)
- **Operations costs @ $9.86/ rentable sq.ft., up 4%/yr: $118.34/RSF x 286 S.F. $33,800**
  Includes: maintenance, janitorial, utilities, environment, life-safety, security, project costs, space planning, amenities (IFMA Benchmarks III Report, 1997)
- **Technology Support (hardware, software, infrastructure, training) $100,000**
  (From survey of BOSTI clients: $10,000/ year)
- **Salary: 1998 Computer Programmer @ $49,570, up 3.62%/ year 10 year total $585,000**
  Median Annual Wage: U.S. Occupational Employment Statistics

  Up 3.62% per year: past ten year wage and salary growth (1988-1998): Bureau of Labor Statistics, employment cost trends
- **Benefits: .35 x salary $205,000**
  Private industry white collar workers, Bureau of Labor Statistics, news release, June 29, 2000

$790,000

ANALYSIS OF TOTAL COSTS OF WORK, 10 YEARS, ONE EMPLOYEE			
COST COMPONENT	**FOR 10 YEARS**		**% OF TOTAL**
New Building and Interior	$37,200		3.8%
Furniture Set	$8,000	**8.1%**	**0.8%**
Maintenance & Operations	$33,800		**3.5%**
Technology Support	$100,000		**10.3%**
Employee Salary and Benefits	$790,000		**81.5%**
TOTAL	**$969,000**		**100%**

4.6%

BOSTI ASSOCIATES

This publication is the result of a highly collaborative effort among 5 major contributors at BOSTI Associates: Michael Brill, President; Dr. Sue Weidemann, Director of Research; John Olson, Vice President; Ellen Bruce Keable, Vice President; and Dr. Lisa Allard, Senior Research Associate. BOSTI (the Buffalo Organization for Social and Technological Innovation), is a Buffalo, NY based group with a 30 year history of continuous innovation in workplace research, planning and design. BOSTI has pioneered in the research-driven application of innovative workplace solutions . . . high-performance design to support new forms of work, hotelling, and work-from-anywhere. BOSTI's work, oft published, quoted and emulated, has changed the business landscape profoundly.

MICHAEL BRILL

Michael Brill is a founder and President of BOSTI Associates and Professor of Architecture at the State University of New York at Buffalo. Brill has published more than 70 papers, articles, monographs, books, book sections, and authored a monthly column for *Interiors Magazine*. He has won many awards for his design-research, including the 1998 Star Award from IIDA (International Interior Design Association) and "Distinguished Author of the Year" from IFMA (International Facility Managers Association) in 1990. His research projects have won 7 national awards from various design magazines.