



“Noise Pollution in an Open Office”

A Project

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Introduction

The current work environment at the ABC Company is about to change and change drastically. In the past, all of the workers have been assigned to offices. There are two to three people assigned to each office. Most workers are involved in many meetings and call in to teleconferences on a regular basis. The work environment is very quiet and semi private.

In October, the company is relocating from this environment to a newer location. The new location has a completely open floor plan. Everyone will be assigned to cubicles, and the cubicles will have low walls, approximately 4 feet high. The building that houses this office environment has numerous events throughout the year. The events are conferences, seminars, and social gatherings of professional and government organizations. The noise level within the building when these events are occurring is very distracting and may prevent the workers within the company from being able to effectively conduct business.

This project studies the current state, concerns of the employees, and predicted affect that the future state will have upon the performance of the employees, and provides possible countermeasures that may mitigate stress on the employees.

Background

The current work environment at the company includes ten offices that house 24 people. The nature of the work performed is engineering and analysis support services providing directly to the customer. Every employee has years of experience in their respective disciplines. Each office houses at least two people, with some housing three people. Assignments include daily meetings and teleconferences, with some of these lasting eight hours or more. Many of the employees call in to meetings that happen elsewhere in the country. At times, there are up to 200 people on these call in meetings. The host of the meetings arranges for a conference room on the site where

the meeting occurs, with many in attendance, and activates a teleconference for those calling in to the meeting.

The office environment is very quiet. There are no loud noises, other than the nearby airport, and everyone has become accustomed to functioning within this environment.

The typical day in the current office consists of working at a desk on a computer. There are meetings to attend either on site at the customer's facilities, or through teleconference with live presentation via the internet. On average, the office worker must "tag-in" to two teleconferences per week, with some workers tagging-in to as many as four teleconferences per week. Most of the employees have headsets that they use to listen in to the teleconferences. The headsets free up the hands so employees may take notes, or multi-task. There are instances where employees do use their speakerphones, but only when their office mates are not present. Some of the teleconferences that employees tag-in to consist of a large conference room with many attendees on the other end of the line. It is often difficult to hear the speaker on the other end of the line, as they are not always close to one of the telephone microphones.

The new office environment will consist of cubicle arrangements as there are no offices available. The cubicle walls are planned at four feet high. The cubicle dimensions are planned at seven feet square. The office area is on a mezzanine that is open to the floors below, which include a reception area and large meeting areas. The ceilings are very high and are glass supported by a steel structure. There are events held in this building on a regular basis, at least three times per month. Attendance at these events ranges from 50 to 300 people. The noise level in the common and meeting areas is substantial during these times and very distracting.

Analysis

The issue being that moving to the new environment will cause stress upon the workers and steps that can be taken to mitigate the stress level are the discussion points here. An analysis of the contributing factors, work area arrangement, building arrangement, equipment, work styles and office etiquette are presented in this section.

The current work area arrangement has been presented in the background section of this project report. An example of the proposed future work area layout is shown in figure 1.

Figure 1 – Projected Office Layout

The front entrance to the building is in the area just below that stairs shown in Figure 1. All of the traffic in and out of the building passes through this area. The areas below, that are open, are large meeting and gathering areas, and large presentations are often given in these areas. The open areas of the building are quite noisy when there are events happening.

During a recent event, which included 330 people, sound level measurements were taken. The decibel readings in the proposed office environment were measured as:

- Low level before the event began – 43dB
- Average level during the event– 74dB
- Peak level during the event– 86dB

According to the American-Speech-Language-Hearing Association, the sustained level of 74dB during the event is considered to be very loud, however, not in the danger zone for potential hearing loss. The danger zone is above 80dB with sustained exposure².

An attempt to work in the new office environment was made during this event, while the sound levels were being measured. Since being accustomed to the quieter office setting, it was very difficult to concentrate on the task at hand during the event. The noise level was very distracting.

The decibel readings for the current office environment were measured as:

- Low level – 38dB
- Average level – 44dB
- Peak level – 52dB

The average noise level in the current office environment is consistent with what the United States Environmental Protection Agency describes as a level "...preventing activity interference and annoyance."¹ The current office environment is very quiet and reminds one of a library.

All of the desk telephones that each employee will use in the proposed office environment are part of a modern phone system. Each phone is equipped with a speakerphone. The speakerphone volume was tested during the recent event in the new office, and conversation could be heard over the speaker, but only with the volume at maximum level. Speakerphones are rarely used in the current office environment, so as not to disturb other workers. Instead, they are used only in conference rooms where multiple participants are in attendance.

When asked, many of the office workers have expressed concern over their call in meetings. They are concerned that they will not be able to hear the conversation and presentations that are occurring on the telephones. This issue is already causing stress in some of the employees. The information and discussions that are held in these meetings is vital to the work effort. The employees are very dedicated to their work and it is important that they gather all the information that they can in order to provide the best level service possible to their respective projects and customers.

A poll was taken of the current workforce of their concerns over the upcoming relocation. 22 of the 24 employees participated in the poll. Tabulated results of this poll are shown in Figure 2.

Figure 2 – Employee Concerns

The only question asked was “What, if any, concerns do you have with the upcoming office relocation?” Every single participant in this poll identified the anticipated noise level in the new office setting as an issue. Many of the respondents indicated that they were not going to be able to “...hear themselves think...” in this new setting.

HFE Countermeasure

The most obvious way to avoid this issue all together is to not move to the new office environment. This resolution has been discussed, at length, and it has been concluded that the move will take place. The costs are much lower to have the entire office situated within one location, instead of being split between two locations. The newer office location was chosen just for the reason that it has been named, newer. The current office location was built in the 1950's and the newer location was built in the 1990's.

The concerns of the employees have been communicated to site management and have not fallen on deaf ears. Management is very aware of the potential for there to be some stress associated with the relocation. Currently, site management is, and has been, located within the same building as the new office location. Management is aware of how much noise is generated within the building when there is an event, and has requested that the author of this project propose solutions to mitigate or eliminate any potential stress on the employees.

The first proposal is to extend the cubicle wall height to six feet. The extra two feet may not seem like much, but the extra two feet can help reduce the spread of noise significantly³. In addition to extending the wall height, thicker or better insulated walls are recommended. The better the insulation the more noise reduction or cancellation. In light of the costs to purchase the higher and better insulated walls, management has decided to proceed with the four foot high cubicles. This decision has been based entirely on cost. Additionally, there will be no change in the floor plan.

The second proposal is to purchase and issue higher quality wireless headsets for each employee to use when on a conference call. The headphones can easily connect to the modern phone system in place at the new office environment, and the wireless capability allows the user to move to a quieter area, if needed. Many of the employees have expressed this to be a good choice and one that will help them cope with, or adjust to the new environment. Management has agreed to purchase the wireless headsets for every employee.

Third, there are two conference rooms available for meetings. Rarely are these conference rooms occupied at the same time. The conference rooms are identical and can comfortably accommodate twelve people. There is a speakerphone with extended range microphones, and the chairs are modern with sufficient adjustment for comfort of almost everyone. It has been recommended, and approved, that both of these conference rooms be made available to the employees. There will be an electronic calendar in the email system for each conference room. Each employee will have access to these calendars to view the schedule and reserve time. The conference rooms are to be used when employees need to call in to longer conference calls. Noise level measurements taken within both of these conference rooms, with the doors closed, during the previously noted event resulted in no measurement above 40dB. This is very quiet and should allow the employees to participate in and hear everything going on during the teleconferences. This proposal was presented to the employees at a recent staff meeting and was very well received. Some of the employees expressed that they were very concerned about the noise situation in the new office setting, and

stated that this measure is one that they find very acceptable. These particular employees looked especially relieved, as if a burden had been lifted.

A schedule will also be published and posted displaying when all of the events are happening within the building. This small measure may allow employees to make adjustments to their schedules and work arrangements around some of the larger events, as these events can be the noisiest.

Some of the current employees call in to most, if not all, of the meetings that are a part of the projects that they work on. Project level meetings do occur on the customers' site, which is right next door to the new office environment. The expectation will be communicated that employees should attend more of these project meetings in person, rather than sitting at their desks and "tagging-in" to the meetings. The employees that practice this the most have the longest tenure with the company. They are very set in their ways and have expressed displeasure with this new expectation. In a brief and very candid discussion, it was suggested that these employees are more than welcome to continue with their past practice, however, with the new environment and all of the noise, it may be a good idea for them to attend more of the meetings in person. Some of these employees are very much against this, while others are not. It will be worth observing after the move if those against this proposal eventually begin to attend more meetings in person.

Conclusion

The employees at ABC Company have grown accustomed to their current office environment which is semi-private and very quiet. This environment allows them to participate in many teleconferences as part of the projects that they work on each day. In an effort to reduce costs, this set of employees is being required to move to a newer office location. The newer location is an open office environment that affords no privacy and is very noisy. This noisy environment will cause stress upon the employees, as they are being removed from the comforts that they have grown accustomed to, and the

noise levels within the new environment will cause enough distraction to prevent them from conducting their assigned tasks.

In an effort to alleviate or prevent this pending stress, this project has determined that there are a number of countermeasures that need to take place. First is the use of higher and better insulated walls. Second, wireless headsets for each employee's phone are recommended. Third, the use of private conference rooms for the participation in teleconferences. Fourth, the publication of events held in the new office environment to allow employees to plan effectively. Requiring employees attend more of their meetings in person rather than calling in to them is the final recommendation.

All but the first recommendation have been accepted and approved by ABC Company management.

A formal meeting was held with the employees to present all of the facts regarding the move, listen to the employees concerns, and present the mitigation steps outlined here. Most of the employees expressed that the noise level in the new office environment was of major concern to them and that this had the potential of affecting the quality of the work that they provide to the customer. All of the recommendations here were presented and well received by the employees. Many of the employees were visibly relieved when prevented with these actions, with some noting later that, "... perhaps this move won't be so bad after all."

This project began by identifying a potential human factors issue that would have placed additional stress upon a group of workers. Mitigation recommendations were investigated and proposed to management with acceptance of most. It will be interesting to witness the reactions and adjustments by the workers as they are relocated and acclimated to their new work environment in October.

References

¹EPA Identifies Noise Levels Affecting Health and Welfare
<http://www.epa.gov/history/topics/noise/01.htm> September 21st, 2007

²American Speech Language Hearing Association
<http://www.asha.org/public/hearing/disorders/noise.htm> 1997-2009

³ Refurbished Office Furniture <http://www.rofinc.net/cubicle-walls.php> 2009