Death of the Cubicle; the Open Office Experiment

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Abstract

Open office environments are critical to the success of Agile projects, but transitioning an organization from traditional cubicles to an open office environment can be difficult and uncomfortable. Our company successfully accomplished this in a stepwise fashion that allowed us to gain acceptance from the developers and management; the end result was an office environment that allows our Agile teams to excel. Part of this transition included an Open Office Experiment where we moved 38 Engineers into an open office environment and studied the impact and implications. This report describes our findings from the Open Office Experiment.

1. Introduction

Our traditional software development environment consisted of cubicles. After transitioning to Agile development practices, we began doing our software development in “labs” that provided work areas suitable for paired programming. Our group found huge gains in the use of programming labs; they significantly increased our team’s communication and collaboration. However, programming labs were not a practical business solution for our organization.

To overcome the deficiencies of labs and support high levels of collaboration within our development teams, we decided to design a new office layout. The office would have low walls to provide direct line of sight between team members, it would have privacy rooms with doors to provide privacy when needed, and it would have “huddle spaces” to provide nearby places for small teams to gather for discussions. We wanted our Agile team members to be able to come to work and work effectively within their own office space.

2. In the beginning

Our development projects typically involve 15 to 30 software developers and twice that number of Verification & Test team members. The projects typically last 2 to 5 years. Prior to 2000, our software development organization used a Waterfall Method approach for developing software. The approach involved “feature owners” who were experts in particular areas of the application. The feature owners would generally spend their days in the solitary confinement of a cubicle; writing code in “their area” of the application. A typical cubicle is shown in Figure 1. Communication between feature owners mostly occurred when a feature owner could not resolve an issue on their own or when working on an interface between features.

Figure 1. A traditional cubicle

Around 2001, we began to apply Agile software development practices. These new practices involved small sub teams using high levels of collaboration to work together on features. We quickly found that the cubicle environment did not support our Agile practices:
they were inflexible and made it expensive to co-locate the team members,
they did not comfortably allow side-by-side pairing,
the high cube walls made it difficult to easily and quickly locate team members, usually resulting in the “cube crawl”.

To facilitate higher levels of collaboration, our projects started to create open lab areas where the project members could more comfortably perform paired programming and be in close proximity to the other team members. A photo of one of our larger labs is shown in Figure 2. Initially, it was difficult to get developers to use the labs. They were reluctant to leave the “privacy” of their cubes to work in an open environment where their colleagues could watch them work. Over time, the development teams became comfortable working in the labs and began to thrive. It quickly got to the point where it was often difficult to find an available workstation in the lab. As new development projects started, labs began forming in all available spaces; empty cubes, conference rooms, and storage areas. Our observations indicated that the most successful Agile projects were those that had a good open space available for the developers. After extensive use of the labs, however, we identified several downsides:

- since each developer has two computers in their cubicle, working in the lab wasted computing resources (at least 4 computers are sitting idle in cubes while two developers are pairing in lab),
- developers constantly needed to walk between lab and cube to check messages,
- the lab is never the ideal size (team sizes change frequently),
- it is harder to find teammates because you don’t know if they are in their cube, the lab, or somewhere else.

3. Out of lab space

When our largest development project outgrew its lab space, we decided that we needed to either find additional lab space or consider a different approach to how we work. At this point, the project had already acquired several large cube areas to serve as additional lab spaces and this was resulting in a separation of the team and a decline in the cross-team communication. After holding several meetings with the Engineers, we decided that the lab approach was impractical and hard to manage. We began designing a new office environment that would allow us to do our work in our offices and provide the collaboration benefits of the lab. We determined that the environment must include:

- low walls to provide open visual communication lines,
- large straight work surfaces to adequately support pairing and multiple pieces of equipment,
- large storage cabinets on wheels to facilitate quick and affordable co-location,
- common meeting areas with plenty of wall space and whiteboards,
- shared privacy rooms with doors to provide true privacy when needed.

We met with Engineers, our Facilities organization, several other functional groups, and an office designer to design an office space of sufficient size to handle 24 Engineers. We felt that this size would be sufficient to meet the needs of our large project and it would allow us to observe the impact of permanently locating our developers in an open office environment. We decided to call the project the Open Office Experiment.
After months of planning, we presented the concept to our Director. The high price of replacing 24 offices fell well beyond the current budget for our department, so our Director was unable to provide the financial support sufficient to implement the experiment. Fortunately, at this time our company announced that they would be building a new facility to bring together all of the groups in our organization under one roof. We used this opportunity to present the concept of our experiment to corporate management and suggest that this experiment could provide valuable feedback to the consultants designing the offices for the new facility. Corporate management agreed and decided to fully fund our experiment. Due to the level of funding for this effort and the visibility at the corporate level, we would be obligated to perform a well organized analysis of the results of this experiment and provide sufficient feedback to our Facilities organization to impact design of the new facility.

To ensure that the experiment would be well managed, we formed two teams; a planning team and a data collection team. The planning team was responsible for finalizing the office design and managing the operation of the office environment. The data collection team was responsible for implementing several mechanisms for collecting data and observations.

To provide a more complete analysis, Management requested that we include multiple projects and multiple functional groups within the open office area to allow us to observe the impact of distractions between various groups. We increased the size of the office area to support 38 employees which would include at least two different development projects and their related software developers, software testers, project managers, and people managers. The residents were selected by the Project Managers based on the needs of the projects. The 38 members included a mixture of experience with Agile practices and labs. Two people had refused to move into the Open Office and had to be replaced by others; management would not force an employee into the Open Office area for the sake of the experiment. A photo of the initial open office area is shown in Figure 3 and a three dimensional drawing of the area is shown in Figure 4. The area included five “privacy cubes” and three 12’ x 12’ “huddle spaces”. Each privacy cube had high walls, a door, a phone, and a PC. Each huddle space contained a table, chairs, bulletin boards, whiteboards, speaker phone, and either a projector or an electronic whiteboard.

The only “rule” given to the open office residents was that they were not allowed to change anyone else’s personal space without that person’s permission. Otherwise, the residents were encouraged to modify the area where possible to suit the needs of their project.

4. The experiment

The Data Collection Team identified two primary data collection points. There would be a “Reflection Wall” to provide an anonymous mechanism for collecting real-time feedback related to the Open Office area and there would be a survey at the end of the experiment to determine the effectiveness of the open office area.

The “Reflection Wall” was constructed on the outside wall of the Open Office area. It consisted of two areas where employees could post index cards indicating their likes and dislikes related to the Open Office. The contents of the wall were then used as talking points during reflection meetings that included all members of the Open Office area.
4.2. The reflection wall

The Reflection Wall proved to be an excellent mechanism for collecting anonymous feedback. After making the wall available for several weeks, we held reflection meetings with the OOE residents to discuss the postings on the reflection wall. The feedback from these reflections was used to make changes to the OOE area. Positive comments posted on the wall included the following:

- “More space for scrums & testing with PC, Good!”
- “Having huddle areas where don't need to reserve conference rooms.”
- “Open space is happy medium between personal space & lab space.”
- “I like that I don't have to worry about a huddle room being reserved.”
- “Open space fosters inclusion.”
- “Mobile carts with programmers and breadboards are convenient. It's nice to be able to move this stuff around easily.”
- “Furniture on wheels makes my office more adaptable.”
- “Plugs and network connections at desk level make setup and programmer loading MUCH easier.”
- “It's great to share a view out the windows with the whole group.”
- “Plenty of room to fit multiple people in my office.”
- “More aware of activities on other projects.”
- “I love the fact that we are empowered to fix the problems we find with the space.”
- “More comfortable than the lab.”
- “The level of noise in OOE is the same as it was in cube land. I would not mind if it was a little noisier in OOE.”
- “Equipment on carts makes for more efficient use.”
- “I am more connected to my team as a result of being in the open space than I was when we were in cubes.”
- “The low walls make it easy to find people and resources quickly and adds more natural lighting.”
- “Our huddle area is great! There is always at least one person using this area throughout the work day.”
- “OOE is great! I can actually see over the wall now.”
- “Clean open lines to outside windows help provide quick mental breaks.”
- “Proximity & visibility of colleagues really does foster & promote collaboration.”
- “Co-location is a huge bonus! The lower walls make it easier to ask questions of my team mates.”

Negative comments posted on the wall included the following:

- “It would be nice to be able to reserve a huddle area, so I can count on it being available at a certain time.”
- “Need guest chairs” - resolved by using guest chairs from the huddle spaces
- “The privacy cubes are not being used. I do not think we need as many as we have.” - resolution: 2 of the 5 privacy spaces were converted into an equipment area
- “Very dreary colors” - provided this feedback to Facilities
- “Need coat hooks” - resolved by providing moveable coat hooks to each OOE resident
- “File cabinet/stool idea is seriously flawed; they are too heavy to be moved as one moves a chair, they offer no support for appropriate posture, they lack enough padding” - resolution was to use guest chairs from the huddle spaces
- “Large user demos (with large speakers) are disruptive to the rest of the open office users and exterior neighbors. This type of meeting may be better performed in a large conference area.”
- “A lot of people stare at me.” - resolved by that individual by stacking things on shelves in line-of-sight
- “Outlets on the carts are nice, but they need to be spaced farther apart... some of the plug-ins are large.”
- “Need more carts.”
- “Need more analog phone lines for telecoms. Especially in the large privacy cube.” - resolved by adding appropriate lines
- “Wires seem to clutter workspace. Wireless mouse and keyboard would really help. Flat panel monitors help maximize workspace. Mounted cordless phone would also maximize workspace.”
- “Task light is awkward, We need the lighting, but the task light gets in the way or can't be moved to where it is needed easily” - note: in the reflection meetings, most people stated that they liked the task lights
- “Reflection meeting in one huddle was too loud for neighboring huddle - couldn't hear the polycom.”
It is interesting to note that many of the positive comments were related to productivity or team performance while most of the negative comments were related to issues of personal taste and could easily be resolved by minor changes to the furniture or environment.

4.3 The survey

After the open office area had been in use for about three months, we distributed a survey to our entire department including everyone working inside and outside of the open office area. The intent of the survey was to determine if the open office area was a suitable replacement for cubes and labs. 36 out of 38 of the Open Office residents responded to the survey. 50 out of 115 of the employees outside of the Open Office responded to the survey.

The most relevant questions asked in the survey are listed below. In these questions, OOE refers to “Open Office Environment”:

- Do the ergonomics of your work environment satisfy your needs?
- Does the arrangement of your work surfaces, storage and equipment satisfy your work needs?
- Do the sizes of your work surfaces satisfy your work needs?
- Does the amount of available storage satisfy your work needs?
- Are you satisfied with the overall sound level in your work environment?
- Are you comfortable working with confidential materials in your work environment?
- Does your work environment make it easy for you to locate coworkers when you need to discuss issues?
- Does your work environment allow you to quickly shift from individual work to collaborative work with others?
- Are you comfortable conducting small group meetings in your work environment?
- Are you satisfied with the flexibility of your work environment?
- Overall, does your work environment help you to focus on your work?
- Overall, does your work environment contribute positively to your productivity?
- Overall, does your work environment contribute positively to your work enjoyment?
- Have your impressions changed about an Open Office environment since the OOE has been installed?
- Would you prefer cube only at the new CRDM campus?
- Would you prefer cube plus lab at the new campus?
- Would you prefer OOE at the new campus?

From the results of this survey, the Data Collection Team identified the following themes in the data:

- workers adapt quickly to OOE,
- it is slightly easier to focus in a cube environment,
- employees feel more comfortable working with confidential material in a cube environment,
- OOE is well suited for development teams because of its flexibility and support for collaboration and colocation,
- OOE has a positive impact on productivity,
- OOE has no significant impact on ergonomics,
- OOE residents believe that “cube only” is not acceptable solution for their area in the new campus,
- between OOE or a cube and lab layout, OOE residents have a slight preference for the OOE layout.

After studying the results of the survey, the Data Collection Team decided that there was not enough information to determine the impact of Open Office on roles that do not involve heavy team interactions (e.g. Directors, Managers, Product Support, administrators, single-person development efforts, etc.). To gather additional information, the Data Collection Team decided to hold reflection meetings with two separate groups; People Managers and Project Managers. At the reflection meeting with the People Managers, the Data Collection Team wanted to find out what the Managers' direct reports were saying about the open office area (i.e. what is the “vibe” of the entire organization?) They also wanted to determine if the open office area was appropriate for the People Manager role. At the reflection meeting with the Project Managers, the Data Collection Team wanted to
find out if the open office area was appropriate for the Project Manager role and determine if the projects had any roles that would not be appropriate for the open office area.

After meeting with these two groups, the Data Collection Team identified the following themes related to the open office:

• development teams come up to speed much more quickly in an open office environment,
• the open office is a suitable environment for Project Managers because it allows them to observe the team dynamics on a regular basis, makes them more available to the team, and allows them to interact more with the team,
• the open office is a suitable environment for People Managers because it allows them to observe their reports on a daily basis and makes them more available to their reports,
• there are no project roles that could not be performed well in the open office,
• employees that have not worked in the open office area remain skeptical,
• the benefits of the open office area are diminished if team members are not co-located when needed.

5. Impact of the experiment

After following the Open Office Experiment for three months, the Planning Team was required to provide a recommendation to the Facilities organization for office design in the new campus.

Since there was only enough time to allow a small percentage of the organization to experience the open office area, there was still a fair amount of skepticism about the benefits of open office. Additionally, the data did not indicate how many people in the organization would find it difficult to work in the open office area due to visual distractions.

Due to these considerations, the recommendation of the Planning Team was to provide an office environment that is as flexible as possible. We desired the ability to create open office spaces where applicable and build up walls where necessary. Additionally, the environment must support quick and affordable collocation.

The proposed furniture selection is shown in Figure 5. The modular design of the furniture allows walls to be raised and lowered where necessary and the desktop and table heights are easily adjusted by the occupant. Additionally, small “team rooms” will be provided on each floor to facilitate scrum meetings and small impromptu meetings.

6. Conclusion

We learned many things from this experiment. The most apparent lesson was that most people need to work in an open office area before they will agree that it can be a comfortable and productive work environment.

In the months since the experiment concluded, our organization has continued to co-locate teams within the open office area and has found that small co-located development teams work extremely well and enjoy the environment.

Our organization believes strongly in the benefits of open office environments and plans to continue refining their use.