

# Aligning Design and Technology Infrastructures for a Collaborative Workplace: Considerations in Architecture and Design Practice

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## ABSTRACT

How may design address the conditions of change and creativity in today's workplace environment, particularly in large (200+) organizations?

Based on investigations of workplace designs for high technology companies, this research project supports the notion that in order to develop effective workplaces, architecture and related design professions not only need to respond to the physical requirements at hand but also need to expand on the role of individual users, supporting technologies and factor in the changing nature of the work space itself.

The paper reports on findings of two case studies that represent conventional design workflows in workplace design. Based on these findings, the paper proposes key criteria for the development of an alternative design model where users could increase their level of participation in the design process and shape their environments within parameters of a negotiated framework. The paper describes opportunities where this multidisciplinary approach could be taken to facilitate for direct and meaningful exchange of creative ideas, knowledge, and physical resources between all project participants and also illustrates an emerging model of workplace design that can leverage technology investments for design benefit and user collaboration in today's increasingly networked office.

## Keywords

Design Process, Architecture, Design Collaboration, Workplace Design, Space Planning

## OVERVIEW: CASE STUDIES, USER EVALUATIONS AND EXISTING DESIGN CONVENTIONS

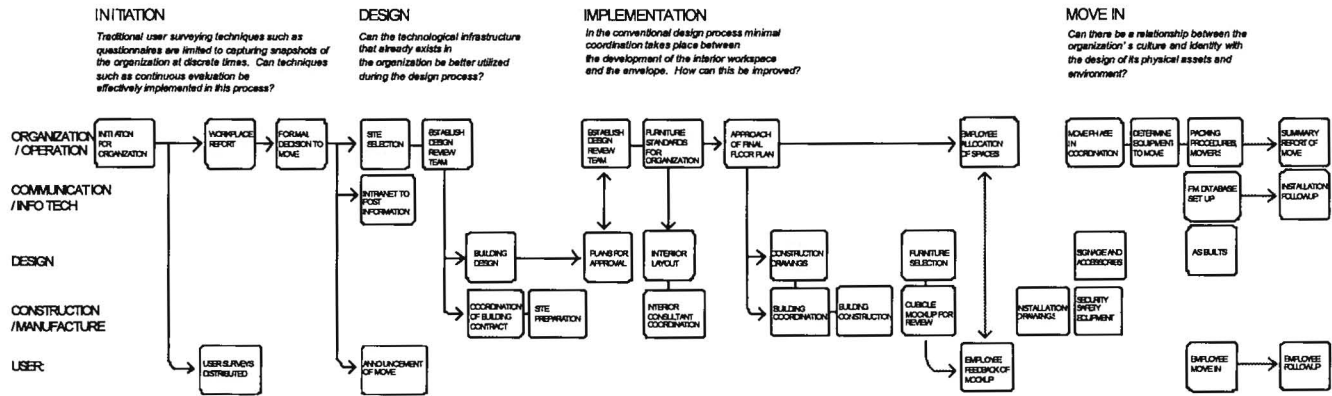
The ideas underlying this investigation were initiated by the motivation to develop more effective means for the physical design of workplaces. How could some of the characteristics traditionally valued in architecture – as an activity to stimulate creative thought, facilitate for social interaction and to solve problems through collaboration – be best leveraged in today's high technology workplaces? The findings from investigations of two software development companies have led to the emergence of an alternative design model for the workplace. These findings are a result of the academic study of *DSP* and *Company C* [1]. Both of these companies utilized user surveys, interviews, and focus groups that characterize the preliminary stages of development for what could be described as a conventional workplace design approach [2].

Figure 1 illustrates the design approach taken by these case studies, which reflect established workplace design processes [3]. This approach leads to one understanding of requirements within a static time frame and does not incorporate changes after the implementation of a design. For the design of *Company C's* facility, for instance, it was found that even after undertaking user evaluation and mockups, the final outcome of the workplace layout was a design that was implemented uniformly throughout the building. The investigation found that the result had less to do with lack of motivation for a more innovative solution than with the mechanics of the design process itself. There was intention on the part of designers, suppliers and the organization to work towards an imaginative solution but the resulting workstation configuration was by and large limited in its flexibility. The interior requirements will undergo constant adjustment during its life cycle as company projects and employees come and go. The workplace design will

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therefore be more effective if it incorporates a framework that can accommodate both specific parameters as well as programmatic indeterminacy.

Figure 1. This chart diagrams the participants and some of their roles in the design process. The conventional approach is characterized by a linear decision making process and efficient implementation for fast track schedules.



Many of the evaluation techniques such as surveys and interviews utilized in conventional design models emphasize strictly technical and empirical approaches. As a result, they leave little room to elaborate on less specific design attributes or unexpected needs. These traditional survey methods limit the level of design discussion and communication exchanges between the users and the designers. Minimal user engagement in the process of evaluating and designing the workplace leads to a level of acceptance of the status quo by employees.

Another limitation is the separation between technology infrastructures and the physical design strategies. In many instances, technologies relating to the organization's core competencies are being implemented in the new workplace. Advances in monitoring systems, computer facilities management and network infrastructures have been introduced in many high technology office environments. For example, *Company C* has acquired facilities management software and with their in-house skills, has re-programmed their specific needs into the application [4]. In addition, in both case studies, user mobility within the office environment has been increased as information technology departments consider the implementation of wireless technology solutions. There is no doubt as to the effect these technologies have on the spatial aspects of the office, yet the physical design has minimal consideration of aspects such as the relationship between wireless technologies and user interaction.

In most aspects the impact of forces outside of physical

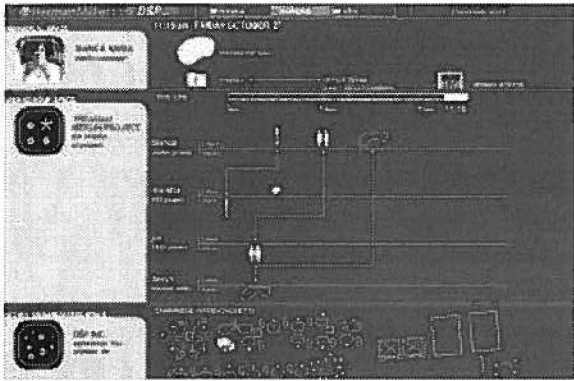
aspects of environments and objects has remained unexplored in architectural design. Examining the intersection between user interactions, organizational aspects and physical space will have a significant impact on the design of new or existing workplaces. The challenge emerges: how to identify specific issues and situate them in existing design processes in order for architects and designers to rethink the design of high technology office environments.

## TOWARDS AN ALTERNATIVE DESIGN MODEL FOR WORKPLACE DESIGN

Developing key factors that are critical towards incorporating computer-assisted technologies for better design outcomes have been one of the main aspects of this investigation. Software applications, typically seen as a tool that is separate from the physical environment, have the potential to not only facilitate for functional processes but also mediate to actively promote design innovation within the organization. The objective of the investigation is to develop an approach to provide for an effective interface between the organization, the individuals and designers. This approach could also improve over traditional user surveys in soliciting data through both manual and automatic input and be more effective as an incremental development technique that yields designs to respond to changing needs of the office space.

This premise provides the basis for an ongoing academic design project that has been undertaken as a response to the workplace investigations [5]. This project is called *Officeware* and is an office design concept that incorporates software, furniture, and communication-collaboration between users, designers and an enlightened facilities management. In addition to outlining key design criteria, several design concepts from the *Officeware* project are illustrated in this paper.

Figure 2. *Officeware* is the interface that mediates the physical environment with user communication.



### 1) Developing Communication Tools to Cultivate a Design Community for Users and Providers

Effective qualitative approaches need to be developed where user experience can be documented in a manner that traditional methods such as manual surveying and marketing-centered techniques cannot provide. The development of a communications platform to effectively map exchanges of ideas generated by large numbers of participants to visually analyze the process, show consensus and collective support or dissatisfaction when a design move is needed. This communications tool could mediate information exchanges between individual workers involved in various design activities within the project group, within the larger office, as well as provide a platform to visually explain such exchanges and needs to the facilities management and the designer.

The role of communications media can be an important contributor to the process of designing an office space. Successful communication in design, for instance, could result from the increase in scope and complexity of the design product as a result of the benefit from resources of multiple inputs and expertise. The communications tool could be embedded within existing information technology infrastructures that are already in place for managing and maintaining building and physical assets within the organization. This integrated systems approach could address pragmatic and design issues of various specificities.

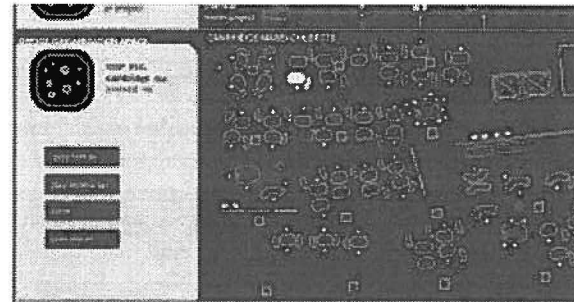
In order for this technique to be effective, the presentation of choices that are provided to the users should be associated with how they organize their daily habits in the workplace. This framework could allow the user to change their work style to a larger degree without raising undue inconvenience. The decision-making can begin as a reflective action [6]: why do I do this in this space, why do I like that about the office, how are others doing it as well? For instance, people often interpret their workspaces and give it meaning through the uses and rituals that

accompany the objects they use daily. This has a value in mapping people's relationships to the objects in order to provide a context in which the objects are used. This approach benefits the design of environments and interactions based on forming experiences that unfold over a longer period of time.

New representations are needed to partially function as graphic tools to diagram as much as possible these design and decision-making processes. These representations need to effectively document the flow and exchanges of the ideas generated by a large number of participants but also visually analyze the process, show consensus and collective support or dissatisfaction with a design move. The development of the temporal aspect in the representations will allow for the construction of narratives while leaving visible the possibility of change.

### 2) Tracking Movement in the Workplace

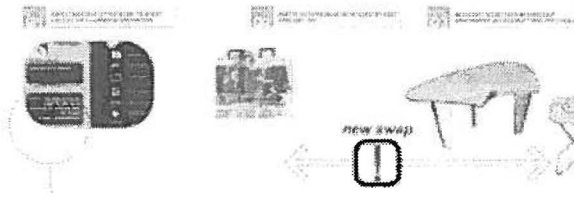
Figure 3. Automated process to measure space utilization of public zones of office spaces. The results can be used to assess how different designs prohibit or induce movement or can measure the effectiveness of a new design compared to the previous one.



An integral part in the *Officeware* project is the making of a digital environment that can systematically capture informational knowledge [7]. This can be done through tracking movement and usage patterns in order to provide empirical information to better assist the evaluation of a spatial layout as it was designed and constructed. This technical component plays an important role in this method because they minimize the human effort required to collect the data. And obtaining objective and timely data were significant conclusions that arose from our workplace research. Furthermore, by mediating communication through a computer interface, a certain level of information related to design issues of the office could be formalized. This can further reinforce the notion of design as a relational activity that could affect larger scales of architecture, and the integration of the building and the surrounding environment.

### 3) Continuous Design and Prototyping

Figure 4: Integration of software interface, user participation and furniture testing



In developing a new design strategy, the concept of continuous prototyping needs to be incorporated to respond to various design problems that occur in the office. This approach increases the possibilities for achieving results through the utilization of iterative prototype development while potentially minimizing time taken off the user's work obligations. This collective 'brainstorming' results in an increased chance of developing options that are novel and useful. In addition, ideas that might seem wild, unrelated or useless at first can function as springboards for future projects.

A mass customization approach is required to take advantage of these material developments and for assembling individual products and services to meet the unique needs of users at a similar cost to a mass-produced product. By integrating with the computer-assisted communications system, users and designers can work together to assemble products to meet specific and individual requirements while reducing lead times, costs and delivery. Over time, the products can be amended so that they continue to meet changing needs and continue to reinforce the relationships between the user and the designer. The implementation of the mass customization approach requires a revising of the existing working contract between the organization, the designer and the manufacturers. There needs to be commitment by the organization to allow the designer to establish a long-term collaboration with the organization. Through this process certain innovations can be made from interplay between the various participants of the collaboration.

Ultimately, the initial programmatic requirements should be given less emphasis in the development of the workplace design. Instead, the focus should be on developing a tactical strategy that can benefit from the accumulation of individual design interventions that occur throughout the life cycle of the office (30+ years). This obviously must be achieved in both an efficient and innovative manner, while at the same time maintaining a relatively stable corporate and aesthetic identity of the organization. The underlying principle of ongoing indeterminacy as a basis of designing

interventions allows shifts, modifications to unforeseen events and strategies for change to occur without creating chaotic environments.

### 4) Committing to Ongoing Collaboration

New strategies are needed to consider the level of investment designers and manufacturers make in committing to an ongoing collaboration. Techniques need to be established to provide for continuous reevaluation of design interventions and results. The designer in turn could monitor the spatial organization and performance of the company and could make adjustments and improvements as new conditions occur. The computer-assisted interface could therefore be further developed as a mediation device for managing more directly and efficiently the physical and communication aspects of the work environment for both the client and the designer. In addition, by involving users in the ongoing design process, improvements can be made towards the chances of success in the office design.

The approach is one that is participatory, collaborative and ongoing: the result potentially could be the workplace as a catalyst for transforming the work organization, engaging the user as part of a cooperative development environment, and potentially changing the very nature of work in their respective fields.

#### SUMMARY

*Can a building promote creativity? Creativity needs an elusive dosage of order and chaos, fixity and improvisation.*

*Rem Koolhaas [8]*

The development of an alternative framework for designing the workplace acknowledges the fact that the office is an intersection of conflicting and complimentary interests. This framework allows for a design community to emerge between the users, the management, and "outside designers" and to formulate their own common language. Specifically, one of the aims is to provide a scalable approach that can be implemented incrementally over time. The strategy attempts to encourage the involvement of the purchasers, the individual managers and the users themselves for the benefit of all participants. The benefits for the organization include the idea that the integrity of the corporate identity can be maintained while individual choice is being cultivated. From the project manager's perspective, the infrastructure can assist in developing informal networks that can improve the quality of the environment while maintaining formal work-related activities. From the user's perspective, new opportunities can be developed across a range of individual and collective activities, from improving communication exchanges between other users to providing the ability to design more effective work environments. And by

reducing the layers of management, the design community can bring new energy and creative collaboration to the office that can lead to a more fluid design environment minimizing provider/user barriers.

The key design criteria that have been presented in this paper support the integration of building data, visualization and communication to assist design decisions. An important challenge in this collaborative approach is the need to develop a set of digital tools that can accommodate for uncertainties and complexities. In addition, long-term collaborative design projects require maintenance and the willingness on the part of the users to commit to using the system. The various social boundaries that exist in the multi-party collaboration need to be continuously renegotiated. This area is the focus of research activity in information systems and remote collaboration; it needs to be considered a critical issue within the architectural design community with significant potential benefit for the profession.

Does this mean that spatial planning of physical layouts is no longer relevant in the new workplace? Planning will be required for establishing guidelines and managing the larger relationships between the organization and the individual users. What is needed is a spatial planning model that augments the present one, which is based on dominantly functional connections. An infrastructure is required that makes use of the individual within the collective and is also capable of facilitating cultural as well as functional negotiations. In addition, it must be reiterated that this is not a deterministic approach that automatically determines decisions, but instead suggests a method to immediately communicate with the users and the management so that design professionals can collaborate with their clients and design timely and responsive furniture and work environments.

The idea of a more distributed spatial planning approach is closely related to the concept of the networked community of the organization. The new culture of work is ideally the culture of meaningful interactive communication between knowledge and place. While an explicit structure is still required, the design approach needs to transform from a rigid to a more flexible strategy, and to a negotiable set of tools utilizing various components that provide a blueprint for the various work group constituents throughout the work organization. The role of the architect in this networked design process is to become a facilitator directing the ongoing evolution of the office space.

This ongoing research investigation follows the notion of empowering the user in the design of offices. The overall strategy of this design framework is that the design process does not end after the initial implementation of the office layout but rather integrates design interventions

that occur throughout the life of the organization. Design in this case is considered a constantly changing entity that could better satisfy the many complex factors of the office when it is considered as a cooperative, interactive and iterative development. The research aims to recognize the importance of an individual within the organization and provide facilities for him or her to actively collaborate with the designer in shaping the workplace environment.

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