Ergonomic approaches to office layout and space planning

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Abstract
The consideration of ergonomic principles can be invaluable when planning an office layout or other internal space. Once the obvious physical requirements and constraints are known, several techniques can be used to produce a specification for the new layout. Stakeholder analysis reveals the requirements of the users of the new space, and also serves to gain involvement and commitment from staff. Link analysis represents connections between elements in the office design, and can show the importance of these connections. This article outlines some of the issues involved in office layouts and space planning and demonstrates how ergonomics can be used to make such work a success. It explains how to use stakeholder and link analyses and describes an example of office planning in practice. To conclude, an ergonomic checklist is given which summarises some of the issues to consider when planning a new or revised layout.

Many people are familiar, particularly since the introduction of the Display Screen Equipment Regulations (1992), with the application of ergonomics in offices (see, for instance, Stewart, 1994). However, this is far from being the only application of ergonomics techniques which can bring benefits to the office environment.

Ergonomics is a discipline concerned with all aspects of designing for people. There are as many definitions for it as there are ergonomists – a good one is:

the practice of learning about human characteristics and then using that understanding to improve people’s interaction with the things they use and with the environments in which they do so (Wilson, 1995).

In the industrial field, ergonomic design can be relevant to tools, equipment or jobs and in the military field, it might deal with the design of a fighter aircraft cockpit. In product design, the application of ergonomics is becoming increasingly indispensable with more and more companies selling their products on the basis of their ergonomic design. In offices, ergonomics has relevance not just to furniture choice (chairs and desks) and to the Display Screen Equipment Regulations, but also to communications within the workplace, teamworking, hot desk policies, layout, lighting, noise control and many other aspects of the working environment.

Any major organisational change, such as an office reorganisation or move, needs to be considered from both the physical angle, and with the users in mind. This twofold approach is used by System Concepts. It is relatively easy to plan for the “hardware” aspects of a move, but without a human-centred approach, the co-operation of staff may be lost, along with the potential opportunities of the move. Ergonomists try to consider the social and physical aspects of change simultaneously, recognising the importance of each to a successful outcome.

This article concentrates on the application of ergonomics to the design of office layouts, focusing in particular on the techniques of stakeholder analysis and link analysis. It concludes with a suggested “ergonomic” checklist for the facilities manager contemplating an office move, reorganisation or other layout-related change.

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Planning the new layout

So, where to start? Clearly, in any space reorganisation, there will be some constraints known from the beginning. These would include the number of people to be accommodated, the amount of space available, and existing building features such as the position of windows, pillars windows etc. Recording these constraints at the beginning of the work has two advantages – it ensures that they are not forgotten, and it allows them to be challenged early on (which often reveals that they are not as inflexible as they seem). However, faced with the task of redesigning a layout, understanding some of the less “obvious” requirements for the office can be a real help.

Stakeholder analysis

Stakeholder analysis is a technique which is used to gather the requirements, views and feelings of all the people who will eventually be affected by the change in the office. These may include managers, office staff, unions, and maintenance/cleaning personnel. In addition to the obvious benefit in terms of getting the new design right, the advantage of gaining a good understanding of these stakeholders’ views is that they will subsequently feel involved in the process of change. This leads, generally, to a greater sense of ownership and commitment to the change, which in turn should facilitate a smoother move from one layout to another and greater tolerance of any small problems which occur as a result. The two most obvious ways to gather this information are via interviews or through paper or electronically-circulated questionnaires. Interviews have the benefit of being personal, and individually tailored to the circumstances of the interviewee, but are clearly time-consuming in comparison to questionnaire analysis. See Figure 1 for an example interview proforma. There are two main areas which should be covered in the analysis, space requirements and communications requirements.

Space requirements

These range from the amount of space each individual staff member needs to do their job, to storage space, meeting rooms, communal areas and equipment space. It may be relevant to ask stakeholders for their “wish lists” – all the things they would have in their ideal office of the future. This is not to say that they will get them, but it helps to understand what the needs of each individual/department are. Sometimes people are “doing without” because there simply is not the space or resource to retrofit facilities. Also, some of the staff’s needs may be easy and cheap to meet (compared to the expense of retrofitting), given the opportunity afforded by the office reorganisation. It is also helpful to ask people to prioritise their lists, so that some split can be made between real needs and “nice to haves”.

It is, needless to say, important that the participants in this stage do not feel misled about the resources available to provide new facilities. Having said this, there is more to asking people what they want than finding yourself with an impossible-to-implement list. Understanding what people’s needs are can make a real difference to the subsequent efficiency of the new office, and to the productivity of the staff. An unpopular reorganisation, it need hardly be said, reduces morale, increases hostility and can have disastrous effects on work output.

Communications requirements

Understanding the communications network and requirements of the office can be the key to getting the layout and internal structure right. Formal channels of communication (meetings, reporting structures, clear links between departments) may be quite well understood, but experience shows that it is the more nebulous, informal communications network within an organisation which makes the difference between success and failure. It is therefore essential to understand these informal links – who needs regular access to who, how “things get done”, which departments need to be sited close to one another (and which separated)! Representational techniques such as link analysis are particularly useful for documenting communications channels, both intangible routes such as verbal communications, and tangible ones such as the movement of paper, post and people...
Figure 1 An example interview proforma for stakeholder analysis

<table>
<thead>
<tr>
<th>Name:</th>
<th>Location:</th>
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<tbody>
<tr>
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</tbody>
</table>

Job title: Desk number:  

Job description: Date:  

Workstation problems:  

Resources used in office (files, other screens, equipment):  

Comments on heat, cold, lighting, ventilation:  

Main contacts in office:  

Communications links (who do they need to be near?):  

Filing and space requirements:  

Wishlist for new office:  

Other thoughts:  

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Ann Brooks

Job description: Date:  

Job title: Desk number:  

Name: Location:  

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75
through a building. Link analysis is discussed in further detail below.

**Link analysis**

Link analysis is a technique used by ergonomists and others to represent relationships between elements in a design. The links are connections between elements, such as the frequency of people’s movement between two locations, the communications between people or areas, or the importance of the relationship between two areas. Usually the links are drawn in such a way as to show the relative frequency of the movement or communication (or whatever), often by using thicker lines, several parallel lines, or number labels on the links. In a drawing of the existing office, for instance, the links might represent the relative frequency of movement between the photocopier and the administrative staff’s desks, or they could represent the movement of internal mail. Representing relationships in this way can help to expose inefficiencies in an existing design, and can prompt redesigns that would be more efficient and require less movement. See Figure 2 for an example of this. In the case of communications, rearranging the layout to bring frequent communicators together could mean that they can more easily converse in person, rather than use the telephone. This brings quicker and better decision making, which can lead to better customer service or improved productivity. Avoiding unnecessary physical movements around the office can free up congested areas and reduce annoyance for people sitting near walkways. In addition, a link analysis can show the potential problems with a new design by highlighting areas of inefficiency. This, needless to say, can save considerable disruption and embarrassment for all concerned, if the proposed design has serious layout flaws. But there is more to link analysis than efficiency – a design based on this technique is also more likely to be useful to the people in the space, because it reflects what they are actually doing, and more “usable” in that it should help to make the main communication routes and walkways obvious.

The links on the drawing may be determined by several means. Clearly the stakeholder analysis will show up where likely links occur, but may not give an accurate view of their frequency. More direct measurements, such as observation of movements, or diary keeping can be used to establish the actual numbers. Obviously, the amount of effort put into this should reflect the importance of a successful outcome. Getting it right, may for instance, be more important when the efficiency of the office is linked directly to the speed of response to customers.

**An example**

System Concepts has recently been involved with a client in journalism which was concerned about the limited amount of space in the office and the effects of moving additional people into an already cramped space. The current office layout had (like so many) evolved into its current format. Such evolution often produces both positive and
negative effects. On the one hand, it had resulted in people sitting near their teams. On the other, it had resulted in a somewhat haphazard layout, with some clear inefficiencies, both in terms of use of space and usefulness to the occupants. Since tight deadlines were the rule and speed of writing/editing was very important, inefficiency could have a significant impact on production.

Our approach was to conduct a stakeholder analysis by interviewing all the staff and the managers in the area (25-30 people). We also spoke to the facilities manager, who was able to advise on the constraints of the building, and of resources. An important lesson to be learnt from such discussions was, in this instance, that the history of other office moves, and the reasons for their relative success/failure were important inputs for the new design. The results from the stakeholder analysis were clear enough, without the need for a full link analysis to be performed. This was assisted by the fact that it was a relatively small office, without many complicated links. In the case of many, or conflicting, requirements, link analysis can be useful for graphically representing far more relationships than can easily be memorised.

The results of our work were several alternative layouts, which were passed to the staff to gather their opinions. It was also demonstrated that, as the company predicted, there was, indeed, no extra room for more occupants. In addition to the layout requirements, the comments from staff also revealed some serious concerns about the physical environment (in particular temperature and ventilation) in the office, and so we were able to make recommendations to address some of these (including the installation of a portable humidifier, and the overhaul of the ventilation system).

**Ergonomic space-planning checklist**

To conclude, the ergonomic checklist, in Figure 3, lists some of the areas which a facilities manager may wish to consider when planning a new office layout. Whether you choose to consider all these options will depend on the extent of the change, and on the time and resources available for it.

Remember that this has been drawn up from an ergonomics perspective, and may not include every aspect that needs to be included in the considerations.

As a last proviso, any change to an office is a change to peoples’ working lives. Some of these changes may be major, such as a change...
to hot-desking, and some minor, but all have the potential to cause disruption, anxiety and ill-will. The psychological and morale issues surrounding the office changes should not be underestimated – the more participation and agreement that can be gained in advance, the better the chances of a successful outcome, and a smooth implementation. As any ergonomist will tell you, look after the people, and the rest will look after itself.

References


This article has been cited by:

1. Setia Hermawati, Glyn Lawson, Mirabelle D’Cruz, Frank Arlt, Judith Apold, Lina Andersson, Maria Gink Lövgren, Lennart Malmsköld. 2015. Understanding the complex needs of automotive training at final assembly lines. *Applied Ergonomics* 46, 144-157. [CrossRef]
