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What Is A Building For?

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Building Use Studies

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I Handy C., What is a Company For?, Michael Shanks Memorial Lecture, Royal Society of Arts Journal, March 1991 231-241.

INTRODUCTION

This is material prepared by Adrian Leaman for the Building Pathology '91 Conference, at Trinity College, Oxford, on 18-20 September, 1991.

The idea for the title comes from Charles Handy's lecture, "What is a company for?". Handy debunks myths about modern companies; one such is that companies exist to make profits. On the contrary, says Handy: "The principal purpose of a company is not to make a profit - full stop. It is to make a profit in order to continue to do things or make things, and to do it even better and more abundantly." "To say that profit is a means to other ends and is not an end in itself is not a semantic quibble, it is a serious moral point."³ Handy's message is that, increasingly, companies will need to think about their social and environmental performance and how their products or services benefit a wider social good.

WHAT IS A BUILDING FOR?

Handy's point can be extended to buildings. Buildings create environmental conditions indoors which are more stable and predictable than those outdoors. In so doing, they enable activities to take place that otherwise would not. A building, just like a company, should help us to do more things and to make things more abundantly and better.

The evidence, though, says otherwise. Many buildings appear not to create better conditions: they make things worse. Buildings often overheat, or are too noisy; they frequently stop things happening rather than helping them to happen. They inhibit rather than enable. They constrain, affecting not only physical tasks and functions, but also the willingness of people to use them and perform well in them.

Why do so many buildings appear to be expensive ways of stopping things happening? Part of the answer is to do with the pace of change of modern organizations (organizations are often changing faster than their own capacities to understand and manage the change); part of it to do with the design process (which suffers from designers' pathological reluctance to exchange knowledge across professional boundaries); and part to do with building management (which, in many instances, cannot cope with the technical and spatial complexity of modern buildings).

The first of these is a cultural problem concerned with maintaining social stability - hence the latterday emphasis (some might say obsession) with creating and managing company cultures. The other two - the design and management processes - are frequently

"downwind" of the first, reacting to and coping with its consequences. Consideration of these three - company culture, design and management - come together creates a different way of thinking about buildings and what they are for. Each of them is a potential source of constraint on the others and this helps to explain why so many buildings do not work well.

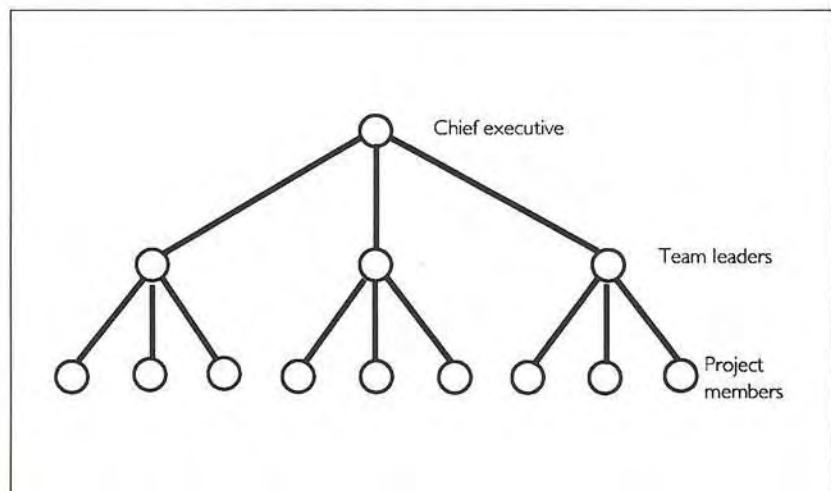
CULTURAL CHANGE

Interest in culture is a function of social change: the greater the pace of change, the greater the need to understand where social order comes from, hence the focus on culture. Many organizations are now undergoing forms of change, some of them solely because others are; others are changing for good reason. The best reasons are usually improvements in quality, performance, value for money, appropriateness, efficiency and economy. Hierarchical forms of organization, which seemed best suited to production-based systems, are in part giving way to flatter, lateral structures, seemingly better suited to service-led systems. A metaphor for this form of organization is a project team of peers working in open-plan offices. This is increasingly replacing the corridor-and-office layout of more status-driven and hierarchical organizations, and serves as an image for modernity.

Such changes, from cellular to open-plan, sometimes carry with

Hierarchical corporate structures

Malone T.W. and Rockart J.F.,
Computers, Networks and
the Corporation, *Scientific
American*, September 1991,
page 97

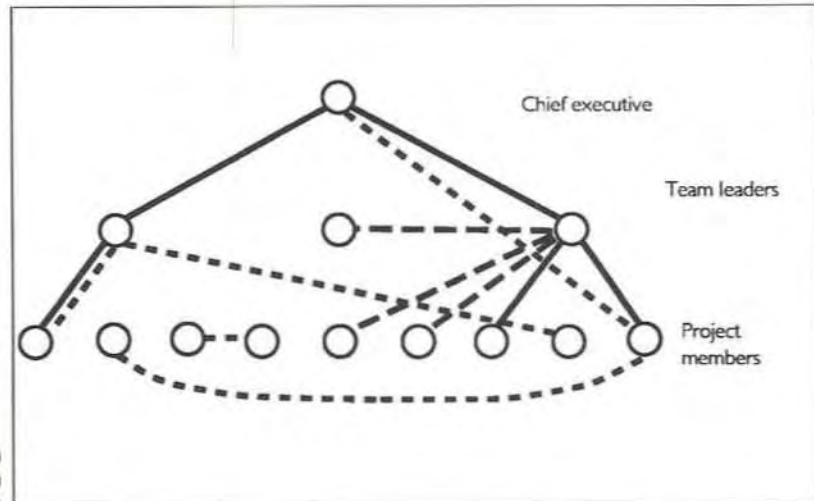


them high organizational costs. Open plan is often deliberately, and sometimes cynically, used as the prime mover of cultural change: people are forced to accept it, whether it is appropriate or not and whether they like it or not. As a result, people dread having this

Ad hoc corporate structure

The newer or "third wave" form of corporate structure, called an "adhocracy" by Alvin Toffler in *Future Shock*.

Malone T.W. and Rockart J.F., *Computers, Networks and the Corporation*, Scientific American, September 1991, page 97



Second wave (hierarchical) and third wave (ad hoc) forms of organization below

Scully J and Byrne J.A., *Odyssey: Pepsi to Apple*, Collins, 1987, page 95.

Scully's theme is that modern organizations are changing from "second wave" types, like his former company, PepsiCo, to "third wave" types, like his present company, Apple Computer.

change forced upon and them, and sometimes actively resist it.

Cultural change in organizations will, invariably, bring with it implications for the building stock. More people are moved about, buildings are disposed of more quickly, emphasis is given to efficiency and consolidation. However, it is a rare to find an organization which will try to mark out the culture it is trying to achieve, and plot the design and management route required to achieve it. One of the most remarkable features of this is that organizations usually

Characteristic	Second Wave	Third Wave
Organization	Hierarchy	Network
Output	Market share	Market creation
Focus	Institution	Individual
Style	Structure	Flexible
Source of strength	Stability	Change
Structure	Self-sufficiency	Interdependencies
Culture	Tradition	Genetic code
Mission	Goals and strategic plans	Identity, direction and values
Leadership	Dogmatic	Inspirational
Quality	Affordable best	No compromise
Expectations	Security	Personal growth
Status	Title and rank	Making a difference
Resource	Cash	Information
Advantage	Better sameness	Meaningful differences
Motivation	To complete	To build

do not know how they carry out their day-to-day work and what people do (How many people are in a typical working group? What are the occupancy levels? How much absenteeism is a result of conditions in the building?). In some cases, organizations will "go

A famous example of culture change has been carried out in the late 1980s at Glaxo Pharmaceuticals, UK.

"I found an old-fashioned linear type of management which was hierarchical with many layers. It had made Glaxo a powerful company in the 1980s but wasn't going to work in the 1990s."

Sean Lance Managing Director

"The offices were luxurious: some £35m had been spent on fitting them out. Even the plants had their own lighting and heating systems. But the review group said that the offices bore all the old trappings of status and did not reflect the new team spirit. They turned the seating plan upside down, and proposed that a business-based layout replace the former hierarchical plan. It means tearing down partitions and putting together people doing similar work from different departments. The executive dining room has disappeared and cafeterias will now cater for all staff".

Independent on Sunday
13 January 1991

open" and achieve exactly the opposite effect they intended. Open plan can take away identity from individuals and groups, making them feel more isolated and vulnerable. Attempts to create fewer levels of hierarchy often mistake decision-making hierarchies (which can be convoluted and in need of reform) for the hierarchies embedded in the human ecology of the organization (which are often simpler, more enduring and independent of the formal organization chart). These include working groups, not all of which will be recognized formally.

Hierarchy in organizations is not necessarily to be deplored, nor eliminated, without understanding its usefulness and purpose. One such purpose is to provide sufficient order and constraint in the organizations' structure to enable decisions to be clearly made and carried out. The art is to provide enough structure to enable things to happen, but not too much constraint to stop them. The classic problem with top-heavy, overly-hierarchical organizations is that they prevent things happening; too little hierarchy, and the opposite effect can be created.

DESIGN

In many ways, buildings are the same as organizations. They have an implied hierarchical order which systematically utilizes the properties of constraints (see box on the next page). Decisions at any level affect the levels beneath and act as constraints on what is possible functionally. Too much constraint at any level will make the building functionally useless; too little, and constraints will have to be added in order to make the building work to best effect.

One of the reasons why so many recent buildings do not work well is that too much constraint is inadvertently or deliberately designed into the higher levels in the hierarchy - the building fabric and the services, for instance. This often leaves the occupants at the lower levels with a greatly reduced ability to utilize the spaces where they work to full effect because negative constraints on their activities are "inherited" or "emerge from" from the levels above.

Whatever the reasons for creating buildings like this, occupants often resent it. Office workers, for instance, report a relationship between high control over their ambient environment and improved productivity (more control means higher productivity). These relationships are most pronounced in more complex modern buildings - those with deep-plan space, air-conditioning and a high technical and services content. Here, components which in naturally-ventilated buildings were highly controllable, such as windows may now serve only vestigial functions. Similarly, direct,

Hierarchical control in a building system

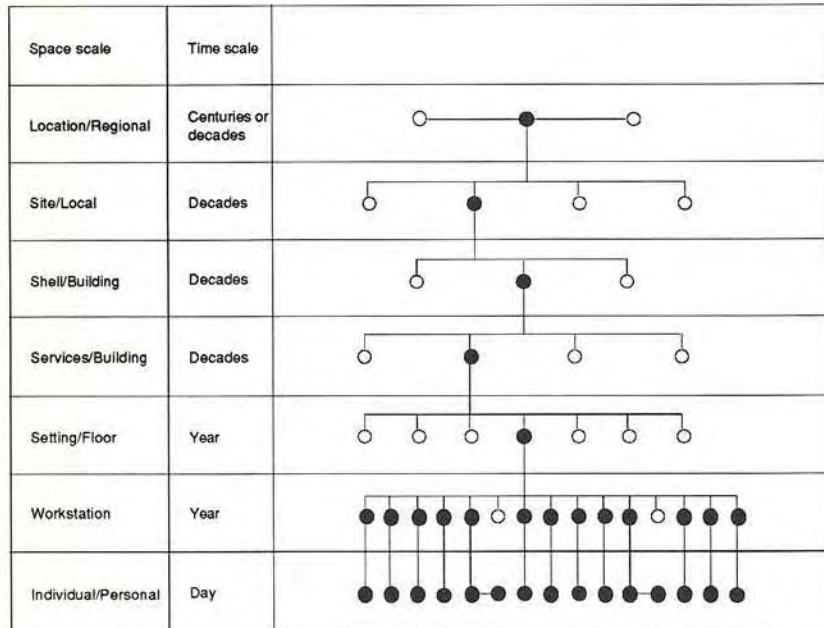
The diagram (right) shows how decisions affecting buildings work within the limitations of hierarchical of control.

Location is at the top level of the hierarchy; choice of location between alternatives sets the basic constraints within which a building has to operate throughout its life. At the next level is the site which is constrained by topography and microclimate. These set the pre-conditions for the next level, the building shell. The shell, in turn, has a set of constraints associated with it which are passed on down to the next level.

Many of the problems with buildings are created because the relationships between levels does not work very well.

User problems result because of an accumulation of constraints which are passed down the hierarchy so that the user at the workstation often has no choice, feedback or control.

Source: Leaman A. and Borden I., The Responsible Workplace: Users' Expectations, Building Use Studies, 1990



Types of constraints

Possible types of constraint occurring at different levels of an office building

	Types of constraint (examples)
Location	Geography, climate, local economy, natural resources, labour, social facilities
Site	Micro-climate, transport, natural resources, landscaping
Shell	Structural load, floor plate, floor to ceiling height, entrances
Services	Service load, IT integration, health standards, safety standards, comfort
Setting	Space, support equipment, interaction, communication, work functions
Workstation	Privacy, control, task performance, comfort, IT and support equipment

responsive control over heating and lighting may have been taken away from the occupants and replaced with automatic central plant controls.

The absence of vertical integration in the design process also contributes to this problem with constraints. The stratification of

Professional stratification

There is little vertical integration between different levels in the design process.

	Professional responsibility (examples)
Location	Planner, developer, organization executives
Site	Architect, landscape architect, surveyor
Shell	Architect, structural engineer
Services	Architect, mechanical engineer
Setting	Facilities manager, interior designer, space planner
Workstation	Facilities manager, departmental manager, individuals

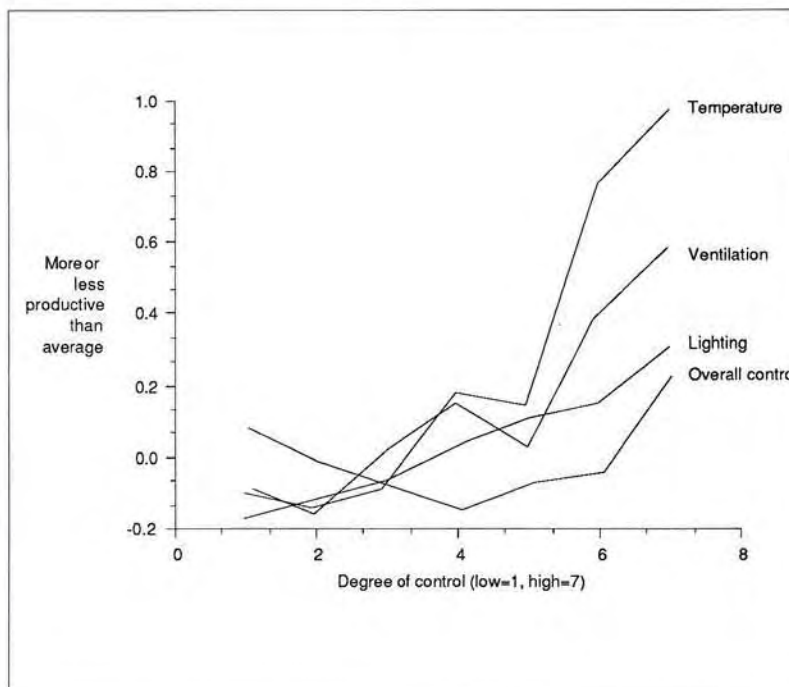
Control and productivity amongst office workers

One of the main findings of Building Use Studies, *Office Environment Survey, BUS, 1987*, was the importance of control. The less control people have over the heating, lighting and ventilation in their offices, the more likely they are to report losses of productivity and to complain of ill-health. This is shown in the graph (right). In the survey, respondents were asked in separate questions about their self-assessments of their productivity at work and the degree of control that they have over their immediate office environment. When the results are put together, they show that the more people report that they have control the more likely they are to think that they have higher productivity. The relationship is strongest for control over temperature with ventilation and lighting showing similar, but less strong, associations.

People were also asked about their overall control over their environment. This shows a different result. As control rises, productivity goes down at first, but then rises again.

These data show the importance of control to office workers. But control should not be provided indiscriminately because this will lead to further problems.

the professions at various building levels is shown in the diagram. It is possible that decisions (on shell design, for instance) have critical effects on performance at other building levels, without designers fully understanding how or why. This is most pronounced where shell and services interact: too many designers have unwarranted faith that services will rectify mistakes made at shell level.



Terry Trickett
*Towards a New Office Planning
Vocabulary*
Unpublished 1986

"For the (furniture) supplier, the main objective is to show how effectively a series of components can be fitted together. There is nothing wrong with this as long as the same components can, with equal facility, form other layouts which are more likely to be accurate reflections of real needs. But, in practice, systems often dictate layouts. Once installed changes can be made only within the context of the pre-determined layout pattern. It is this approach which leads to stereotyped and inflexible planning solutions - that is standard uses of an often inadequate office planning vocabulary."

"To state the obvious, we must realise that office life is much more complex than it first appears. Each and every person within an organization will be attempting to fulfil his or her idiosyncratic needs; each will need to be aware that his or her potential is capable of being realised and that his or her abilities are being used effectively"

Trickett quotes Likert (*New patterns of Management*, McGraw Hill, 1961)

"The most important source of satisfaction for this (sense of personal worth) is the response we get from the people we are close to, in whom we are interested, and whose approval and support we are eager to have. The face-to-face groups with whom we spend the bulk of our time are, consequently, the most important to us."

MANAGEMENT

From the perspective of building management, there is one overarching principle, concisely expressed by Terry Trickett: "At all costs ... we must learn to avoid self-imposed constraints". This was said about office furniture systems, a notorious source of nightmares for building management. The advice applies also to building management in building types other than offices.

The major constraint on building managers is usually the availability of space; there is never enough of it, or there is too much in the wrong places. The failure to plan strategically for changes in the demand for space (such as increased need for meeting and storage space in offices, or changing teaching group sizes in schools) often impose crippling inefficiencies on organizations. This is often the result of a short-sightedness caused by placing too much emphasis on the organization chart (keeping illogically structured departments together on the same floor, for instance), or too much on individual needs (where the provision of facilities at workstation or cellular office is the be-all and end-all). Invariably, as Trickett says, the working group, which is the functional heart of the organization, is ignored. Building managers usually have to cope with the consequences of this on a day-to-day basis. The commonest sources of complaint in office buildings are worries about temperature, ventilation and noise. Buildings are becoming hotter, stuffier and noisier. This is partly a physical problem in that insufficient care is given to shell and services performance and the capacity of buildings to respond to changing heating, cooling and ventilation requirements, but it also is due to a failure to relate how the environment of the building is controlled to the human communication requirements in a relevant way. In a building, there are two broad types of communication needs: those between people face-to-face, and those between people and media, usually in the form of machines such as telephones and VDUs. People working together have different requirements from those working with machines. Normally, working groups will be based on the day-to-day communication requirements of the former, while accommodating the latter in the same or adjacent spaces. Most working groups will need to be within earshot and line-of-sight vision of each other, but many will also be organized so that they take the personal preferences of individuals into account. These personal preferences will include individuals' varying comfort requirements, as well as needs related to tasks (some will need quiet, others will not, for instance). The more the communication requirements of the group are planned for, the better people will perform. It is vital, therefore, for the comfort con-

Zoning for working groups

The illustration here schematically shows how control and communication requirements should be combined into one discrete zone and planned primarily for the working group.

The working-group zone is sub-divided into three types of space. The people-only area is for meetings, concentrated work, quiet work and can be used for individual offices if needed.

This space is also capable of rapid changes of use.

The people and constantly-used equipment area is designed and serviced primarily for telephone and VDU use and will be the space in which people usually work. This space will comply with the requirements of the EC Directive on VDUs. Desks will be usually located here.

Arrangements should suit the requirements of the working group, and personal preferences of staff. For instance, desks may be shared if the staff think that this is the best way of organizing the space.

These spaces for people should have window seats and views out for at least 70 per cent of the staff working in them, especially those who are at their desks all day.

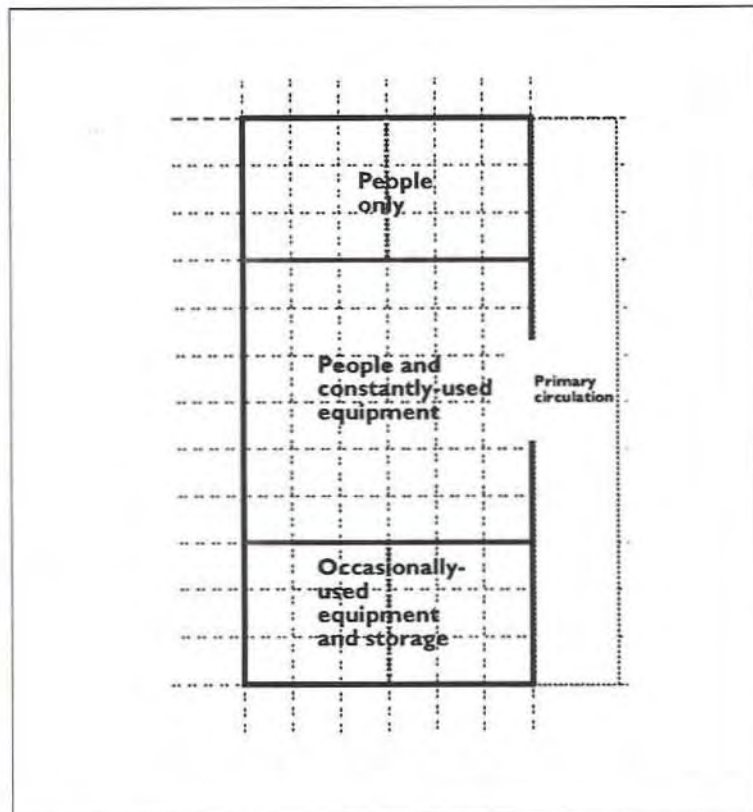
The occasionally-used equipment and storage space is specially serviced, ventilated and, if necessary, partitioned, for all technical equipment other than VDUs and telephones. This area also contains group storage. Activities in this area should be visible and audible (but not intrusive) from other parts of the zone.

The relationship between the zone and the primary circulation is defined by a single threshold.

The group area can be given identity at the threshold.

Different zones are defined primarily by the layout of lighting, heating and ventilation controls. They can be partitioned or left open, as required. As the overall logic depends on group size and function, any space standards should be based on groups rather than individuals.

trols and the communication requirements to work together in a coherent and mutually supportive way.



As performance is related to degree of control over the physical environment, it is imperative that the working group is able to control its physical conditions effectively. The area used by the working group should have environmental controls which are zoned to correspond with their requirements. Thus, lighting, heating, cooling and ventilation should all have a degree of direct control from within the space occupied by the working group. In many buildings, especially those where multi-functional space is provided, these control regimes are rarely found.

'On her first day in the job, the then leader (of Westminster City Council) showed her his office. "It consisted of one little window - in local government, status is all about windows. He had one desk in the corner, and piles of papers. I said: "Is that it?"'

Shirley Porter; *The Years of Living Dangerously*
Management Week, Vol 1, number 8,
page 87, September 1991

The relationship between control and communication is important but little understood. In many instances, open environments are intended to improve communications, but the consequences for control are not thought through. Everyone will have experienced offices where the light switches are located on the other side of the partitioning, or where there are perpetual arguments between staff about whether the windows should be open or not. The result will be that the lights are left switched on unnecessarily, or that windows remain shut when they should be providing ventilation or cooling. There are thus strong management reasons related to productivity, performance and minimizing waste for considering further the relationship between control and communication.

Working groups using multi-functional spaces are an example of the increasingly spatial and behavioural complexity of buildings. Buildings are increasingly used in intensive and complex ways. In addition, they are more complex technically. Many organizations are failing to appreciate that, if they demand more from their buildings, then they must put more management effort into dealing with the consequences of complexity. This is one of the reasons why the occupants of office buildings exhibit chronic symptoms of ill-health. In offices, complexity is a function of depth: as buildings become deeper, more services are required to run the deep spaces comfortably. Deep buildings are normally also open-plan buildings: so complexity, depth and open plan go together. Managers who naively think that open plan is an easy option which requires less, rather than more, management effort, will be on the right road to creating a sick building.

CONCLUSIONS

There are two obvious strategies for avoiding the consequences of complexity: the first is more management, the second is simpler buildings. Shallow-plan, peripherally-serviced buildings are usually simpler than planar-serviced¹, deep-plan buildings. Problems tend to arise when organizations grow out of these buildings. They move from offices crammed with too many people and a cheerful jumble of small rooms, with hopelessly inadequate meeting and storage facilities, into larger open spaces. With the move will usually go a commitment to an open culture and a flatter organizational hierarchy. The immediate problem will be under-estimating the effort required to lay out and plan the new office. After move in, the open space will often be too bland, or lacking in character and identity. Open plan tends to take away individuals' identities, making them feel threatened, and remove the individuality and charac-

¹ Planar-serviced buildings have floor and ceiling voids containing ducts, cabling and other services for deep-plan spaces.

ter of working groups. The initial furniture layout will inevitably be changed as soon as the gap between theoretical departmental structures and working reality is understood. The environment will be noisy and distracting, with people unable initially to discriminate between general background noise and those sounds which are which only relevant to them: they will often be frustrated with the distractions. Managers will introduce formal rules governing use and behaviour, raise cleaning and tidiness standards, and perhaps appoint a specialist facilities manager. At this point in its lifecycle, the organization will probably have understood the relationship between its culture, the building's environment and how it should be managed. If it has not come to terms with managing the complexity, then the results can be calamitous.

More experienced, sophisticated (and wealthier) organizations are now asking for the benefits of both shallow and deep plan in one building type. Occupants like shallow plan because it gives a larger proportion of people a window seat, with fresh air, views outside and a sense of well-being. Building managers like the benefits of deep plan, with its image of visibility and efficient density planning. So one possible response is "mixed-mode" office buildings, where the perimeter and planar spaces are serviced in different ways. The perimeter spaces next to the windows may be naturally ventilated, for instance, the deeper spaces comfort cooled. Properly executed, mixed-mode buildings may be the answer to several apparently conflicting needs - the relative efficiency of deeper spaces, increasing demands for window seats for most staff, higher levels of control for individuals, improved levels of energy efficiency, a solution to overheating, especially in the middle of deep spaces, and rational ways of dealing with spaces which are needed but not occupied by people all the time. Clients who ask for such buildings will be already aware of the importance of the relationship between culture, design and management. In fact, successfully bringing all three together will be a mark of organizational excellence. Those who achieve it will not, amongst other things, have sick buildings.

Management should plan to avoid constraints that will make things unworkable in space, and avoid bottlenecks which create queues, which indicate inefficient use of time. Predicting where the constraints and bottlenecks will occur, and taking action to avoid them, is the art and practice of building management. The worst thing that can happen is to create buildings crammed full of unmanageable physical and comfort constraints, which are also made worse by bottlenecks. In these situations, people can become

stressed, aggravated and frustrated. Patrick O'Sullivan said of condensation : "You are always going to get it, so it depends on where you put it." Many physical constraints in buildings are like this, they are unavoidable, so it depends on where you put them.

Manipulating constraints is the means of creating space and form. But there are thresholds of form, where a strength can turn into a weakness, where order becomes chaos, and where utility becomes disfunction. Understanding where these thresholds are is crucial to strategic design.

One such threshold is depth of space. Office buildings tend to be much simpler if they are less than 12 metres deep. Between 12 and 15 metres, when the limits of natural ventilation are reached, they are more complex. Over 15 metres they enter an order (or orders) of complexity greater. Not only do people behave differently over these thresholds, but the building services have to be designed and managed in a different way.

Depth is thus linked to complexity. The complexity threshold in buildings is rather like the economist's idea of marginal utility. Once the threshold is crossed, so that the building is more complex than the abilities of the building management to cope with it, then a vicious circle of decline is likely to be created. This can happen, on the one hand, because the quality of human management becomes lower (people leave, or not enough resources are devoted to building management), or, on the other hand, because the building is made more complex by adding further systems to it which are just beyond the comprehension of existing managers, or because managers are overwhelmed by the speed of change.

The complexity threshold is crossed, for instance, when an organization moves from a naturally-ventilated to an air-conditioned building without proportionately improving its building management skills. In such a case, there is a large marginal complexity because the next "unit" of management skill input will have to be relatively large in order to maintain and run the new building at the standards which the organization has established for itself in the past. Any improvement in performance will require an even greater management input.

A building is for control and communication, full-stop. We control the outside world so that we can create space indoors which enhances our abilities to communicate and be creative. Too many constraints in the wrong places stop this happening. To profit from buildings, we need, as Handy says of companies, to create them as means to further ends, rather than as ends in themselves.