

# The impact of office design on business performance

cabe



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# Foreword

In a 2003 survey by *Management Today* magazine, virtually all (97 per cent) of those responding said that they regarded their place of work as a symbol of whether or not they were valued by their employer. Yet only 37 per cent thought that their offices had been designed 'with people in mind', and no less a third said that they were too ashamed of their offices to bring back colleagues or clients. This is the kind of gap which should worry management – and which, were it to occur in any other discipline in business, would almost certainly get urgent attention in the boardroom. So why do so many companies continue to dress themselves in rags in a country which must, in the face of growing international competition, earn its living by its wits?

The answer may be that a company's most natural response to that same force of competition is to seek to drive down its costs – and premises represent a cost that is both readily identified and readily comprehended. As in so many facets of life, however, a preoccupation with cost may actually destroy value: but the ways in which office accommodation can create value for a business, not just through economy but also through improving the effectiveness of its people and broadcasting positive messages about its values, are inadequately understood.

This study into the connection between office design and business performance is therefore both important and timely. It provides a positive route map for those facing the challenges and opportunities of addressing their business's accommodation needs; and it does this by:

- summarising what we actually know, so that we can embed this learning in good practice and avoid re-exploring the same issues
- summarising what more could be known, pointing to the need for further research
- proposing a framework for the analysis and application of accommodation factors which affect business performance
- suggesting a standardisation of the language and protocols by which this subject is pursued, so that we can accumulate a growing body of knowledge on this matter of national importance.

None of this will throw up easy answers, and one by-product of this study should be the abandonment of the very idea that there might be a single answer to any user's question – a holy grail of office design. The report does, however, point the way by which individual users might find their answer, and demonstrates that the effort is worthwhile.

For those who get this wrong, the best they can hope for is a missed opportunity; and the worst is nothing less than the loss of their key people as a consequence of growing dissatisfaction with their working environment.

For those who get it right, the reward, if not the holy grail, can be something almost as magical.

**Paul Morrell, BCO President  
and CAGE Commissioner**

# Introduction: Why office design matters

When Frank Lloyd Wright designed a new office building for the Larkin Company in Buffalo, New York, exactly 100 years ago, he wasn't working on his own. His clients were pioneers in the rapidly expanding mail order business; and they wanted a new office building to enhance their chances of commercial success. They chose Wright as the best architect available to help them reinvent the workplace to take advantage of the latest ideas in technology and management. Wright, despite his notorious ego, played a deftly handled part within a carefully directed and completely self-conscious managerial programme. His wonderful building, with its noble atrium, innovative environmental systems, all-round visibility, interconnectedness and inclusiveness, and its powerful, if by today's standards somewhat paternalist, imagery, was at least as much the Larkin Company's achievement as his. Each detail in the architecture of this extraordinary building had a business purpose: to support a commercial strategy, to accommodate innovative work processes, and to broadcast a particular set of business values.

Why aren't all office buildings today as purposeful as Larkin? How did we get from this shining example of using architecture as the infrastructure of business achievement to where we are today – in the land of Scott Adams' melancholy comic strip, Dilbert, based on his own experience of working in the offices of Pacific Bell, where cubes and labyrinthine interiors had become metaphors of bureaucratic frustration?

This question is the background to this study commissioned by CABE and the BCO to review the academic and scientific literature that has, over the last century, attempted to assess the relationship between the design of the workplace and business performance.

Those who commissioned this report and its authors share a strong desire to apply past research to lay the foundations of a rich and effective programme of study in an area of endeavour that is by any standards, a continuing challenge to social scientists, designers and, most importantly, clients.

This is an ambitious endeavour in a complex and little understood field, and it is hardly an exaggeration to say that the collective failure to understand the relationship between the working environment and business purpose puts us in the position of early 19th century physicians, with their limited and erroneous notions about the transmission of disease before the science of epidemiology had been firmly established.

Research on the relationship between office design and business productivity has generally started from design variables and then has sought to establish some organisational or business consequence. We have come to believe that one of the reasons for the relatively small amount of progress that has been made by such endeavours in this field is that this may well be the wrong starting point. An alternative perspective, tantalising but fugitive, has been expressed occasionally by business writers such as Tom Peters, who have looked at office design through the



Courtesy The Frank Lloyd Wright Foundation, Taliesin West, Scottsdale, AZ

business end of the same telescope. They are far less curious about the consequences of design variables on business, and much more interested in the office design implications of business drivers and priorities.

Consequently, we have conducted this study using two different but highly compatible analytical frameworks. The first framework is DEGW's 'three e's', a means of measuring the potential of the office environment to help businesses become more efficient, more effective and more expressive. The second is the widely respected 'Balanced Score Card', which we have found to be a useful means of communicating to management that the office environment is more than a financial matter but is relevant to business purpose in at least three other ways, in terms of human capital, customer relations, and business process. These frameworks have helped us to discriminate between the various insights that we strongly believe business people and designers should be demanding from research on the physical working environment namely: 'What evidence exists – or should exist – of ways in which office design can be used to help clients achieve their business goals?'

Looking coolly at the data we have surveyed, there is certainly a disappointing lack of relevance in most office workplace research to business performance, and we believe that a different approach will cumulatively lead to much more useful results. The recommendations to developers, designers and researchers with which we introduce this report are based on what we see as the crucially important benefits of a research programme that links office design to business performance through maintaining a sense of business purpose within a systemic framework.

No single perspective can provide a complete set of answers to such a wide range of inherently interdisciplinary questions. An integrated research approach is essential because research in this complex and changing field cannot be conventionally academic. The experience and judgement of all of the key constituencies involved are vitally important to the success of any research programme. As one illustration of this, the economic dimension of the results of design initiatives is obviously critical. Developers need to make investment decisions that are more likely to lead to greater profit and are less susceptible to risk; and corporate real estate managers need to demonstrate to senior management the contribution that workspace can make to stimulating and supporting business success.

At the same time, because of all these complexities, a robust medium is necessary to communicate measures of the performance of office space in relation to business goals. For example, the Harvard Business School case study approach provides an interesting precedent in communicating complex data involving many interests in a coherent and rigorous way. There are many similarities between the kind of data that are useful in the context of a business school, and the richness and complexity of the data that are necessary to explain the context, the objectives, the interplay of disciplines and interests, the timeline, the co-ordination, and the consequences that attend attempts to make the design of offices actually work for business purposes.

**Francis Duffy, DEGW**

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# 1 Setting the context: how the world of work is changing

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# 1 Setting the context: how the world of work is changing

## 1.1 Introduction

Over the last four decades of the twentieth century, the design of office buildings in Europe evolved alongside changing trends in business management. In the 1960s, the office was seen as a communications system, with the floorplan opening up to facilitate the free flow of information across the open plan. In the 1970s, increasing labour power in Europe and the consequent articulation of users' interests saw the development of the office as a place of social engagement. Issues of privacy, acoustic control, individual office rooms, and healthy and personally responsive environments became increasingly important. In Europe, therefore, floorplates became increasingly narrow and complex, whilst in North America the reverse happened, as office buildings became deeper and simpler, more generic, with less individual control of the environment.

The workplace was revolutionised in the 1980s as the computer moved from the basement to the desktop. At the same time, new network technologies facilitated the increasing globalisation of particular industries, especially financial and professional services, with a corresponding demand for consistent worldwide guidelines to regularise patterns of space use. European and Asia Pacific financial centres in particular imported North American design practices. The distributed intelligence of the ubiquitous desktop personal computer required improved facilities management, and led to the emergence of the so-called 'intelligent building'. This can be defined as a building with integrated management and information communication

technologies systems providing a robust infrastructure for information technology – and therefore more responsive to changing user demands.

## 1.2 Studies into the new ways of working

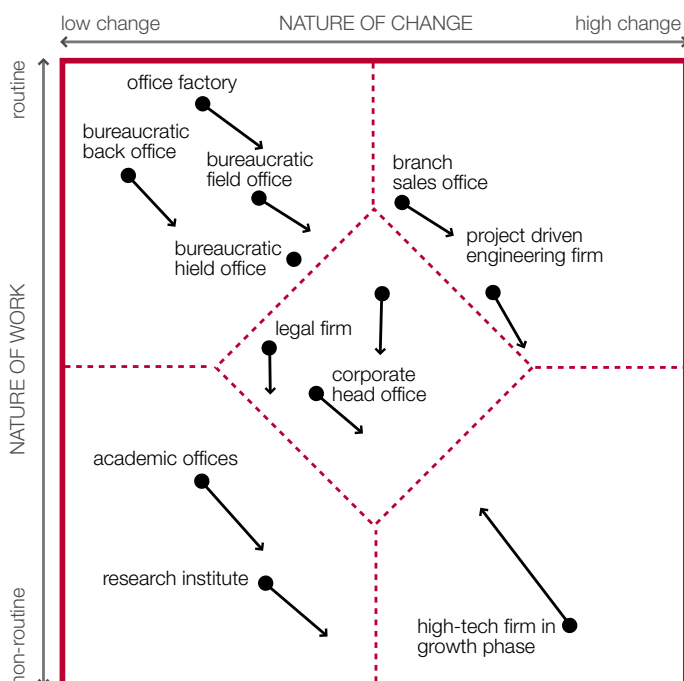
Between 1983 and 1985, DEGW and others carried out the ORBIT studies (Organisations, Buildings and Information Technology). This multi-national client-sponsored research programme established new parameters for office buildings able to cope with IT and the changing nature of the corporate organisation in Europe and the US.<sup>1</sup>

The studies identified the impact of cabling requirements, heating and cooling, and pressures on space; and the indirect effects of changing organisational structures, staff profiles and patterns of work affected by the new technologies were investigated. The trend whereby the interior design of offices had become disassociated from the characteristics of the base building shell was overturned by the impact of IT, which demanded a radical re-thinking of the use, servicing and base design for the office.

The second ORBIT study plotted organisations against two dimensions: the nature of change and the nature of work.

Change may be caused by internal re-organisation, and measured by the frequency of relocation within the building; or it may be caused by change in staff complement, measured by differences in headcount.

Figure 1: Orbit organisation classification model



<sup>1</sup> Duffy, F & Chandor, M (1983); Harbinger Group (1985)



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The nature of work is defined here by the extent to which an organisation's tasks are routine and predictable, or varied and unpredictable. The more non-routine the work, the more likely the firm is to need the integration of different forms of expertise, increased networking, and more personal meetings. On the other hand, companies with more routine work tend to use conventional hierarchies to maintain control, and are more likely to rely on centralised computing and information systems than on dispersed computing and distributed information systems.

The second ORBIT study concluded that there would be a tendency towards convergence in the future. So, small start-up companies characterised by high change non-routine work will tend to become more hierarchical, more differentiated, with more routine work and less change. Very stable, mature companies will typically find that they also have to innovate to remain competitive.

The definition of office building types according to functional value by the Intelligent Buildings studies carried out in the 1990s highlighted the difference between the continental European approach, and that in the UK (influenced by trends in North America). On the Continent, buildings were developed primarily for their use value, with high levels of amenity and space provision; whereas in the UK and America buildings were developed for exchange in the marketplace, with deeper floorplates and a lower level of user control.

The studies further defined intelligent building types according to their location and capacity for technological provision, giving four potential building types:

- **Obsolete:** poorly located, inaccessible and with a low level of technological provision.
- **Underachieving:** well located and accessible, but with low level of technological provision or adaptability.
- **Misplaced:** adaptable building with high levels of technological provision, but poorly located and inaccessible.
- **Business value:** accessible and well-located, flexible and with high levels of technological provision.

The features used in determining a building's intelligence included its sectional height and floor depth, floor size and configuration, planning and partition grids, communications infrastructure and building skin. As a business value building, the intelligent building is seen to combine the other functional values with the additional ability to support ICT, so that it is user driven, yet highly adaptable and of a high quality. The high specification atrium building, with 18 metre deep floorplates (glass to glass) emerged as the primary typology, especially in the UK.

The recession of the late 1980s and early 1990s led to a reappraisal of the call by Northern European organisations for expensive, custom designed buildings for their exclusive use; whilst Anglo-American developers have been forced to link up more closely with end users through joint ventures or pre-lets. A double shift has therefore occurred in the expectations of what buildings should offer end users: on the one hand the developers are paying more respect to the complex, varied and changing needs of end users; on the other hand, the end users are demanding buildings and office environments that can add value to their business by minimising occupancy costs.

In the 1990s a second workplace revolution introduced 'new ways of working', a response to the realisation that information technology was transforming cultural, social, technological and construction processes. The virtual world and digital tools reduced the need for synchronous communication and co-location of office workers for the purposes of carrying out defined tasks. This, the parallel realisation that office space is highly under-utilised, and the growth of serviced office providers as office functions were outsourced, saw a shift in perception of the office, so that it is now seen increasingly as a space for social and interactive engagement. The implications of this last trend for building typologies are still being absorbed.

**Figure 2: Development of office philosophies and office concepts in Europe<sup>2</sup>**

Period	Office concept	Office philosophy	Number of people
1950s	Cellular office	Representative arrangement	1-2 persons (up to 4-6 persons)
Mid 60s	Open plan office	Organisational flexibility	> 20 work stations
Late 60s	Group office/ office landscape	Ergonomic work environment	6-20 work stations
1980s	Combi-office	Communicative space structure	1 person cellular office + multi-functional zones

<sup>2</sup> Gottschalk, O (1994)

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## 1.3 The intangible economy

Since the mid-twentieth century, many innovations in interior office design have been pioneered in Europe, influenced by different *office philosophies*<sup>3</sup> and innovative office concepts which initiated new phases of development. None of these philosophies or office concepts completely replaced the other. Rather, they are all still in use, representing different basic options for office design, particularly in the grouping of people.

In their paper for the National Bureau of Economic Research, Lev and Radhakrishnan made the claim that investments in organisational capital account for 71% of sales growth<sup>4</sup>. The work of Erik Brynjolfsson at MIT takes this further, and posits that certain work practices, coupled with technology investments, yield the greatest gains. He describes these practices as:

- *team-working*;
- *decentralizing of work that requires local knowledge and interpersonal skills like product design, sales and on-the-fly adjustments on the factory floor*; and
- *centralisation and computerisation of quantifiable work such as accounts payable*<sup>5</sup>.

Organisational culture and workplace design therefore become increasingly powerful tools, impacting on the rate of turnover within companies and the extent to which knowledge workers are able to communicate their information in and out of the company. Spatial configurations make a difference in knowing or not knowing what is going on "on the shop floor." Space communicates, as well as providing a space for individuals to communicate with one another. Recognising this is critical to modern management capability in the workplace.

## 1.4 Shifting areas of expense in the new economy

One of the defining characteristics of the New Economy is the shift in resource allocation from tangible to intangible assets. In member economies of the Organisation for Economic Co-operation and Development (OECD), intangible investments make up 50–100% of outlays on physical assets; and in 2000 the US invested \$1 trillion in intangibles<sup>6</sup> – the same as the amount spent on property, plant and equipment.

Tangible assets that can be counted using traditional measures now only account for up to 25% of the market value of some of firms. The rest is comprised of intangible factors that need more creative measurement applications. Some (such as copyrights and licenses) have a tradeable value, but the majority (like

reputation, brand and networks) are latent capabilities<sup>7</sup>. For example BskyB, Britain's largest supplier of satellite television, owns almost none of the physical assets needed for satellite broadcasting. Profits are based primarily on a network of alliances.

Increasingly, the knowledge of an organisation is tacit, its nature hard to codify. But this firm-specific tacit knowledge is increasingly the source of competitive advantage, the way in which knowledge adds value. Companies are consequently increasingly vulnerable to the loss of key knowledge workers.

Staff turnover is costly. Replacing mid-level managers costs an estimated 50% of salary<sup>8</sup>; but is this just an unavoidable cost of doing business, or is there a business benefit in investing to retain staff? Becker et al suggest there is. Their cost benefit calculations show that the net present value of reducing staff turnover from 30% to 15% would be in the region of \$60,000 per employee, as figure 3 demonstrates.

**Figure 3: Cost of replacing high potential managers<sup>9</sup>**

Separation costs	\$500
Recruiting costs	\$7,500
Selection costs	\$7,500
Training and cultural induction costs	\$5,000
Lower productivity – cultural induction	\$10,000
Lower productivity – long run	\$25,000
<b>Total</b>	<b>\$55,000</b>

Becker also notes that *high performers have 40–80% greater impact on firm performance than do average employees*<sup>10</sup>, so satisfaction measures for these staff are vital for organisational success.

<sup>3</sup> Van Meel, J (2000)

<sup>4</sup> Lev, B & Radhakrishnan, S (2003)

<sup>5</sup> Lohr, S (2004)

<sup>6</sup> PRISM: 2003, p22

<sup>7</sup> "There are three kinds of intangible assets:

• Intangible goods, which include both artistic and scientific "originals" (eg original formula of a drug, design of a machine or software code) and legally protected exploitation rights (such as annuity contracts, trademarks, licences, and franchises). These can be bought, sold, stocked, licensed and otherwise traded in the same manner as physical goods, and in certain circumstances may also be used as security.

• Intangible competences – distinctive competences (key factors of differentiation that are difficult or costly to replicate); core competences (competitive necessities that you must have to compete); routine competences (routine activities you must do or outsource in order to "stay in the game").

Latent capabilities, which include leadership, networks, innovation, R&D process". PRISM: 2003, p15

<sup>8</sup> Becker, B et al (2001), p99

<sup>9</sup> Becker, B et al (2001), p99

<sup>10</sup> Becker, B et al (2001), p90

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## 1.5 Speed of organisational change

Since the 1990s, the number of very large businesses with over 500 employees has shrunk in most countries<sup>11</sup>. This is because organisations reflect the costs of managing and exchanging information, so a dramatic decline in the cost of processing some kinds of information is likely to have implications for their optimal structure and size.

The New (or Knowledge) Economy is characterised by a shift from value residing in tangible assets (bricks and mortar) to intangible assets such as intellectual property and knowledge. Approximately 60% of the GDP of North America is currently attributed to knowledge work.

This significant transformation has been clearly expressed by Jeremy Rifkin, who argues that the ownership of physical capital, once the mainstay of capitalism, has now become a liability in the new network economy<sup>12</sup>. Fixed physical assets cannot be reconfigured to meet changing business needs as quickly as organisational processes and structures. They may act more as a brake than as a springboard for change, given the significant shift between past and future patterns of accommodation need.

Investing in adaptability is a means of offsetting risk, an insurance policy against the vicissitudes of the business cycle; and like any insurance, this demands a premium in the form of first costs. However, degrees of uncertainty about the future are driving the demand for greater flexibility ever higher, as shown by ever shorter lease periods and the rise of the serviced office.

**Figure 4: Fixed infrastructure in a changing world**



### PAST

- Location specific
- Owning space or long-term lease
- Highly territorial space
- Strong physical branding
- Formal structured interaction
- Physical space and mobile technology

Meeting this demand is a challenge where building stock, characterised by inertia and longevity (only 1% of UK building stock is renewed each year), is concerned. Lease lengths reflect this: *over 80% of respondents to a 1999 survey were unable to forecast any aspect of their business that would affect space on a timescale of over three years, yet typical lease terms, even if shrinking, still averaged nine years*<sup>13</sup>.

## 1.6 People performance is more important than ever

The importance of human capital and staff satisfaction to organisations is recognised by Chief Financial Officers (CFO's), as the following table shows:

**Figure 5: Impact of human capital on business outcomes**<sup>14</sup>

Customer satisfaction	92%
Profitability	82%
Innovation/ product development	72%
Success in integrating acquisitions	71%
Revenue per employee	68%
Speed to market	66%
Growth	64%



### FUTURE

- Network of locations
- Short-term lease, pay-as-you-go
- Alliance/shared/hired space
- Varied internal and temporary brand expression
- Flexibility, connections, implementation speed
- Operating across virtual and physical space

<sup>11</sup> Coyle, D (1999)

<sup>12</sup> Rifkin, J (2001)

<sup>13</sup> Haynes, B et al (2000) p.8

<sup>14</sup> Bates, S (2003) p48

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As knowledge workers play an ever-greater role in generating and sustaining profits, understanding and increasing their effectiveness and productivity has risen in importance.

Human capital does not stay on a company's books when people leave, and in the Knowledge Economy attraction and motivation of appropriate staff is a critical success factor.

## 1.7 Multi-task work: arguments for club environments and demands for better alignment of workplaces with more complex business processes

The argument is that different kinds of layout can be justified by different organisational structures. Work processes are enabled by office environments that support corporate objectives, business cultures and business direction.<sup>15</sup>

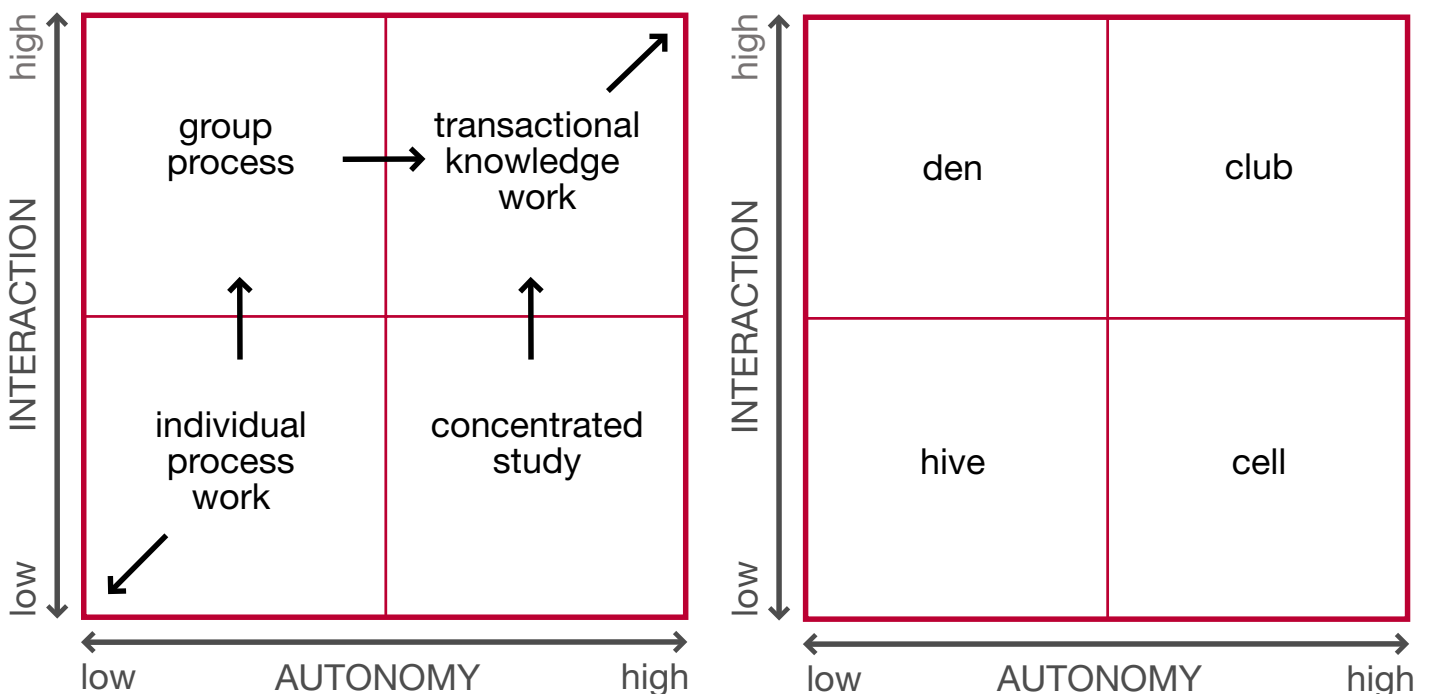
**Interaction** (the amount and intensity of face-to-face communication that is necessary to carry out work processes) and **autonomy** (the degree of individual choice regarding when, where and how work processes are undertaken) are two dimensions of organisational structure that may help businesses to establish where they are today and how they may change in the future.

The conventional 'Office Factory' of the nineteenth century and early twentieth century was based on the assumption of little face-to-face interaction and even less autonomy. Individuals were co-located and directed to undertake specific prescribed tasks, all necessarily working synchronously, with rigid managerial and supervisory regimes.

The promise of *The New Office*,<sup>16</sup> on the other hand, is that many organisations will more and more rely on highly motivated individuals who will be enabled by technology to enjoy a high degree of autonomy and who will need face-to-face interaction because of the increasing richness of their business transactions. Such workplaces will have to be designed to support knowledge transfer and connectivity, rather than linear business processes. Workstyles are changing because information sharing and the increasing complexity of tasks are making them change.

Increasingly, democratic organisations will assume autonomy at both individual and project levels. The obvious physical parallel is that appropriate levels of individual and group environmental control should be included in the fabric of the working environment.

Figure 6: Patterns of work – four major types



<sup>15</sup> Duffy, F & Tanis, J (1993) p427

<sup>16</sup> Duffy, F & Powell, K (1997)

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Others also argue that work environments designed for hierarchical organisational structures are becoming less and less appropriate. Such environments are likely to be inefficient, inflexible and costly. Flatter organisational structures will need work spaces that enable knowledge transfer, connect communities and support autonomous workers.

This point is stressed by Simon Hayward in his paper *The Agile Workplace*, a study carried out for Gartner/MIT in 2001<sup>17</sup>. He argues that work is becoming increasingly knowledge-based because the speed and volume of work required cannot reasonably be accommodated in traditional, sequentially managed work applications. Instead, there is more reliance on people knowing what to do. Knowledge workers are provided with more sophisticated tools to use in the performance of tasks. In other words, there is a major shift from "command and control" structures to the empowerment of front line knowledge workers.

Gartner/MIT predict that by 2006, about 30% of the Global 2000 Companies<sup>18</sup> will adopt a highly mobile work style model, where 35% of the knowledge workforce will be empowered to work outside the boundaries of the formal workplace. Virtual work will require both appropriate space and the reassurance provided by direct access and connections to peers and partner workers.

Organisations will have to create a new balance between collective and individual spaces. Technology is becoming the cheapest component of work and people the most expensive. Teleworking and home working were originally intended to be tools of convenience and autonomy; instead they have been found to be potentially isolating. Human beings are social, needing contacts to provide a sense of purpose and worth. Multi-task and club spaces may allow us to communicate directly with individuals in shared spaces, whilst simultaneously interacting virtually with others in remote locations.

### 1.8 Expression

Much of the trend in the approach towards workspace that follows these changes in the business environment is from the **efficiency** of expenditure towards the **effectiveness** of the way people can work. A third increasingly important factor is another intangible: the internal and external communication of messages about what the business stands for – or **expression**, which is central to the development of both static and mobile cultures.

Expression is critical to staff in fixed locations because of the amount of time they spend there, and it is relatively easy for businesses to use buildings to broadcast messages to static occupants.

Expression is even more critical to remote workers because of the necessity to express shared values to hold people together in teams and groups, even though individuals may rarely share the same places.

At the same time, as large organisations have become even larger, they have become more dispersed. The unprecedented mergers and acquisitions boom of the 1980s and 1990s has encouraged businesses to capitalise on the returns generated by an increasingly global economy.

The Gartner/MIT Study estimates that by 2006, 80% of knowledge work in the Global 2000 will be conducted in the context of virtual teams, in which team members, separated by time and space will collaborate – although the study also notes that the majority (65%) will continue to collaborate from conventional work settings.<sup>19</sup>

In a globally networked world, technology makes millions of potential co-workers distributed around the world accessible to each other. Constraints of time and money prevent many of these potential co-workers from meeting face-to-face on a regular basis. To increase productivity it is necessary to improve collaboration; and although conventionally collaboration is best achieved face-to-face, digitisation frees work from previous locational constraints. At the same time, demographic factors, work-life balance issues and cost pressures are increasing the demand for distributing work, even at the local level. Building organisational knowledge at a distance will require trust, new skills and new conventions.

### 1.9 Brand and the increased value of marketing in the New Economy

Over the last thirty years, technology has not only slashed the costs of the production of goods, but also expanded the scope for innovation, leading to an explosion in the choices open to consumers. Most of the product differentiation in new goods takes the form of intangible attributes or services, so value increasingly lies not in the product itself but in innovation, design, marketing, responsiveness and after-sales support.

Building brands used to be relatively straightforward: a logo was a guarantee of quality and consistency. Today, due to the effects of globalisation and improvements in manufacturing, it has become harder for firms to differentiate their offerings on these terms alone. Organisations which have not previously considered themselves as having to depend on their brand for their success – such as industrial corporations, insurance companies and others involved in the business-to-business sectors – realise that they now must have a corporate brand<sup>20</sup>. How companies and

<sup>17</sup> Hayward, S in Joroff & Bell (2001)

<sup>18</sup> List generated by Forbes of 2000 of the world's biggest companies (including 776 in the USA, 331 in Japan and 132 in the UK), as measured by a composite ranking of sales, profits, assets and market value.

<http://www.forbes.com/2003/07/02/internationaland.html>

<sup>19</sup> Bell, M (2001) in Joroff & Bell (2001), p52

<sup>20</sup> Sampson, J (no date)

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their products are perceived by customers and clients is increasingly important.

When a large proportion of the value of a company depends on branding, it becomes necessary to take every opportunity to communicate messages about values. In this context the capacity of office design to communicate messages has become critically important.

Work processes in the Knowledge Economy are being shaped by the growing relevance of communication and interaction. Becker and Sims (2001) have suggested an alternative way of approaching office design: *“Rather than thinking of the office as a place primarily for solitary activity, from which one occasionally breaks out in time and space to settings intended for social activity, the office is designed primarily as a social setting, from which one occasionally seeks out more private places for contemplation, concentration and confidentiality.”*<sup>21</sup>

### 1.10 Where can buildings have the most impact on business performance?

The design and business literature and case studies surveyed in this study suggest that office design can have an impact on business performance. Factors of business performance that office design has been argued to influence include:

- productivity of staff;
- motivation and retention of staff;
- knowledge and skills of staff;
- innovation and creativity in the workplace;
- responsiveness to business or technological change;
- catalysing culture shifts;
- customer attraction and retention;
- optimisation of total occupancy cost.

According to Low and Siesfield,<sup>22</sup> 35% of analysts' investment decisions are determined by non-financial information. In order to test this proposition, ten non-financial key success factors put forward by financial analysts were ranked in order of their impact on the success of the business. These factors range from the execution of the corporate strategy (the most important key success factor) to the quality of major business processes. In the figure below, Low and Stansfield's key success factors have been paired with the Business Performance Factors identified in this literature review.

The significance of Low and Siesfield's argument, when applied to office design, is that contemporary corporate real estate and facilities management are often cut off from the wider and more important strategic business considerations that they describe; and they are rewarded primarily, and sometimes exclusively, for cost cutting.

It is consequently very important to set the contributions that office design can make to business performance in the context of broader frameworks such as the Balanced Score Card, to counter disproportionate management focus on measures of financial performance and give equivalent attention to business performance in two other areas: the use of human capital (**people**), and a business's relations with its **customers**.

The benefit of such frameworks, which are developed in this report, is that they are reminders of the complex nature of business and office design. The literature review that follows has been categorised, analysed and evaluated in a similarly layered framework, designed to be a constant reminder of the different ways in which office design can contribute to business performance.

One important distinction should be noted between efficiency, effectiveness and expression: greater efficiency brings direct rewards to business, with every square foot of space saved bringing cost savings directly into the corporate pocket. The contributions of greater effectiveness and more powerful expression are indirect. No return is guaranteed. Instead potential has been created for management to exploit.

<sup>21</sup> Becker, F & Sims, W (2001), p52

<sup>22</sup> DEGW (2004); Low & Siesfield (1998)

## 1 Setting the context: how the world of work is changing

**Figure 7: Business performance factors related to key business success factors, ranked in importance<sup>23</sup>**

Business Performance Factor	Suggested key success factor influenced
Productivity of staff	execution of corporate strategy (1) quality of major business processes (10)
Motivation and retention of staff	ability to attract and retain talented people (5)
Knowledge and skills of staff	execution of corporate strategy (1) innovation (4) research leadership (9) quality of major business processes (10)
Innovation and creativity in the workplace	execution of corporate strategy (1) innovation (4) research leadership (9) quality of major business processes (10)
Responsiveness to business or technological change	management credibility (2)
Catalysing culture shifts	execution of corporate strategy (1) management credibility (2) quality of corporate strategy (3)
Customer attraction and retention	market share (6)
Attraction of key staff	management credibility (2) quality of corporate strategy (3) ability to attract/ retain talented people (5) management expertise (7)

# 2 The challenge of measurement

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## 2 The challenge of measurement

### 2.1 Complexity of context

This project is about identifying connections between design variables and measured business performance. The challenge of characterising, and if possible proving, any of the connection points within the proposed model is therefore at the core of this investigation. However, assessments of cause and effect, of the impacts and interactions between organisations and buildings, can only be tentative.

In a recent article in the *Financial Times*, author and professor of management Peter Drucker made a call to arms for intangible measures matching “*the hard, systematic, analytical and synthesising work which Taylor developed to deal with shovelling sand, lifting pig iron, running paper machines or laying brick.*”<sup>24</sup> It is a problem for contemporary organisations that the impact of management and design decisions is as difficult to measure as intellectual performance. This difficulty is caused by a series of practical realities about the business and property environments, including:

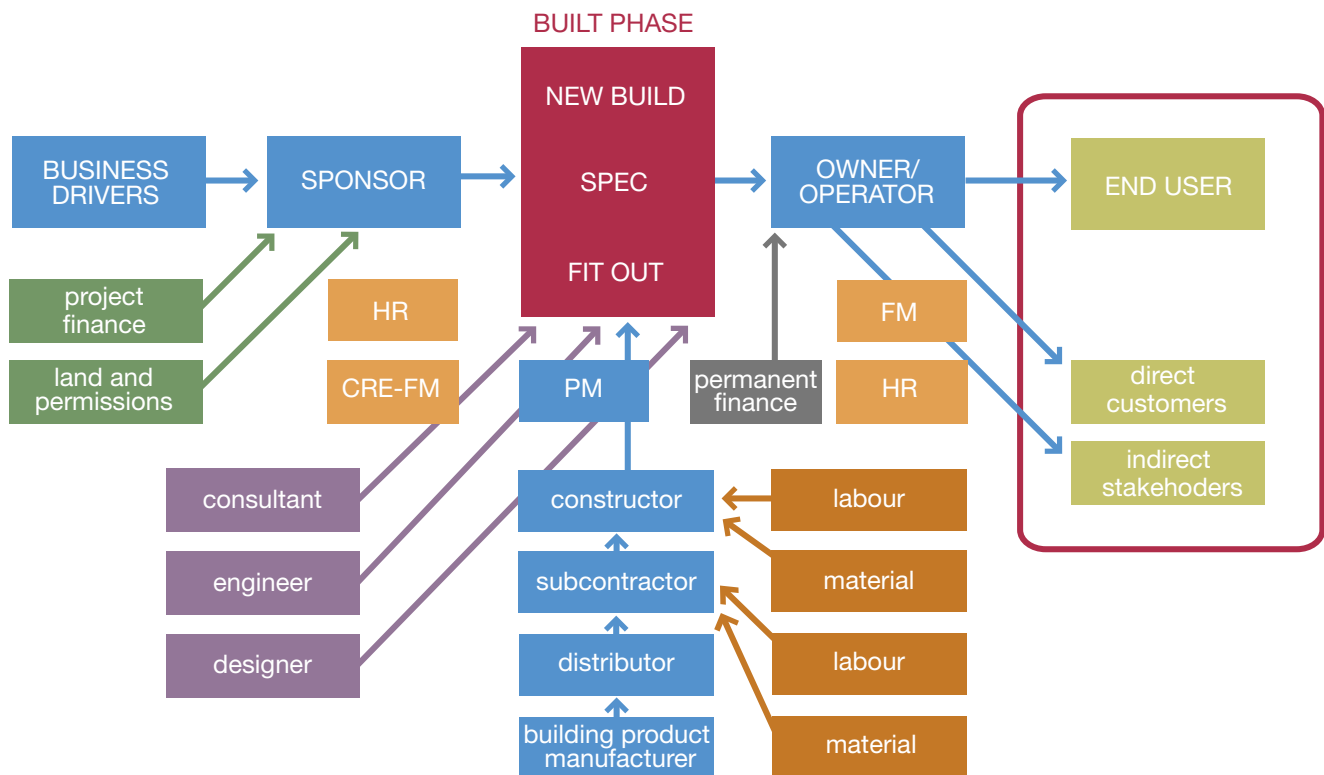
- The volatile commercial and economic context within which businesses operate, so that they have to plan and re-plan continually to make best use of the working environment.
- The complex nature of the relationship between the working environment and business processes, organisational structures, and corporate cultures.
- The large scale, multi-layered nature of the physical working environment itself – ranging from design at the urban scale to the tiny ergonomic details of individual workplaces.

- The rapid rate at which office organisations and office technology are changing and developing, compared with the inevitably slower pace at which office buildings are planned, procured, erected and refitted.
- The plural and highly political nature not only of businesses, which by definition are directed and purposeful, but also of office buildings and interiors, which are used by various constituencies as a medium to express what they value.
- The necessity for businesses to develop and change, and the potential for managers to use the workplace environment and its development to accelerate business and cultural change.
- The fragmented ways in which the supply chain for office buildings is managed, from strategic and long-term investment decisions by financial institutions to the tactical, short-term changes continually being made by end users to their immediate working environment – often without formal provisions for gathering feedback.

The traditional supply chain for office buildings poses a particular difficulty, with offices routinely developed, owned and occupied by different people, without a direct connection between the briefing process and the longer term needs of the occupier. Even when the relationships are more direct, they remain disparate and complex.

## 2 The challenge of measurement

Figure 8: A complex supply driven system



Office buildings and organisations are also both extremely complex systems; and even within a single building or organisation it is difficult to assess the impact of one variable on the entire system. The prospect of determining the precise impact of a particular design (with an infinite number of components) on the performance of an organisation (with an equally infinite number of influencing characteristics) appears impossible.

The difficulty lies in separating out the impacts of the workplace environment alone on any measured gains.<sup>25</sup> With all components operating together, there is no way to test variables independently, so who is to say whether any improvement or innovation is due to a change in management structure, increased serendipitous meetings, or better acoustic privacy? This is especially so where serendipitous meetings might be achieved through the combined efforts of design and management initiatives, and the acoustic privacy might be short-circuited by inappropriate behaviour. Benefits measured at the organisational level are affected by so many factors that workspace can neither be completely credited nor totally blamed for any such perceived effects.

### 2.2 Responses to complexity

To reduce this complexity to manageable levels, studies are frequently undertaken in laboratory conditions, but in order to test any hypothesis about a particular component of the relationship between business and design the laboratory tests must operate in extremely limited conditions. This experimental condition severely limits their utilisation in the world of practical applications. Double blind laboratory tests that isolate particular variables lose their explanatory power when subsumed in the 'noise' of a real environment. In this report, several varieties of data have been compiled and are therefore working together to substitute for the general inapplicability of laboratory-tested data.

More socially or anthropologically based analysis of the impact of design has also been undertaken. For example, work has been done on the outputs of knowledge workers, such as accumulation of intellectual capital, and business specific measures of output such as product development time, innovation rate, caseload rate, or service levels.<sup>26</sup>

<sup>25</sup> Leaman, A & Bordass, B in Clements-Croome (2000) p168

<sup>26</sup> Bontis, N (1998)

## 2 The challenge of measurement

Spectres of The Hawthorne Studies<sup>27</sup> by George Elton Mayo also persist. In these it became apparent that the change and attention shown to employees, rather than any particular aspect of the new environment, was to be credited with improved performance. There is the suspicion that the very act of changing the environment may be the over-riding factor in increased production, inseparable from any particular design improvement.

Furthermore, formal estimation procedures for the impacts of human resource (HR) measures are relatively scarce, even in large corporations. Based on research involving 968 senior HR managers, Becker, Huselid and Ulrich have shown that many key HR variables are measured by fewer than 10% of firms.

In some cases other methods may be nearly as valid. Self-assessed productivity has been used extensively by Bordass and Leaman, and they have developed a standard productivity scale. In his assessment of the validity of such approaches, Clements-Croome states that while subjective measures “*may not have the empirical or quantitative appeal of physiological or objective*

*measures, it is often argued that subjective measures are more appropriate and realistic since individuals are likely to work in accordance with their feelings, regardless of what physiological or behavioural performance measures suggest.*”<sup>29</sup> This is supported by Bradley, who suggests that indications of performance (monitored over a relevant time period) are likely to be more useful than absolute metrics in judging the success of workplace innovation.<sup>30</sup>

However, without formal measurement we are able only to speculate on the precise impacts of design on business with inevitably variable results. For example, Oseland reports on Sullivan’s post-occupancy study of an insurance company, in which productivity had apparently increased by 67%. But the move was carried out simultaneously with organisational restructuring, and management estimated the workplace changes to account for approximately 15% of the productivity gain, whereas the staff estimated around 34%.<sup>31</sup>

**Figure 9: HR metrics measured by organisation** <sup>28</sup>

	Formal estimation procedure	Subjective estimate or intuition	No estimation procedure
<b>Attraction and retention</b>			
Turnover costs	13.1%	43.1%	43.7%
Employee replacement costs	13.0%	48.8%	38.2%
Economic benefits of additional recruiting	7.3%	35.4%	57.3%
<b>Performance measures</b>			
Economic value of employees to organisation	6.0%	26.6%	67.4%
Cost of employee behaviours (absenteeism, etc)	13.5%	38.2%	48.3%
Economic benefits of various training levels	6.3%	46.5%	47.2%
Benefits of increasing job satisfaction or similar job attitudes	2.8%	42.3%	54.9%
Economic benefits of high and low performance on a particular job	6.1%	39.7%	54.2%

<sup>27</sup> Mayo, E (1933), Ch3; Roethlisberger, FJ & Dickson, WJ (1939)

<sup>28</sup> Becker, B et al (2001) p94

<sup>29</sup> Clements-Croome, D (2003), p9

<sup>30</sup> Bradley, S (2002), pp 150-159.

<sup>31</sup> Oseland, N (2001)

## 2 The challenge of measurement

### 2.3 Exploring the links between strategy and performance, using design variables as a business lever

Haynes et al <sup>32</sup> noted the disconnection between necessarily reductive studies on individual performance and the conversion of these findings into meaningful changes in the actual performance of a company. For example, Oseland reports that optimising the work environment can lead to increases in individual productivity of 5% to 15%, but organisations themselves have only a hazy idea of what this might mean for the bottom line.<sup>33</sup>

Most analyses rely, to a greater or lesser extent, on indirect or proxy measures. These include:

- absence from work or workstation;
- health costs, including sick leave, accidents and injuries;
- interruptions to work;
- controlled independent judgements of work quality;
- self-assessments of productivity;
- speed and accuracy of work;
- output from pre-existing work groups;
- costs for the product or service;
- exchanging output in response to graded reward;
- volunteer overtime;
- cycle time from initiation to completion of process;
- multiple measures at all organisational levels;
- visual measures of performance; and
- health and well-being at work.<sup>34</sup>

### 2.4 Quality harder to measure than quantity

Output benefits are generally measurable only in 'industrial age' knowledge work such as call centre operations. There is little consensus on how to assess 'information age' benefits of technology or environment - the higher-quality decision-making that goes on when managers are better informed, or the faster response rates that come when groups of workers can collaborate more effectively.

This is part of a bigger picture in which traditional external business measures are increasingly irrelevant. The very idea of productivity growth is a feature of industrial, not post-industrial, society. In the service sector, there has been no improvement in efficiency recorded in the last quarter century. This goes against common sense. It is the very idea of the quantity of a service output that is increasingly less relevant. When it comes to output in the knowledge economy, it is better quality that matters, not greater quantity.

Productivity (performance) itself is an ever more elusive concept. The idea of productivity, presupposing as it does an increase in 'quantity' of output, is a holdover from Taylorism. It is narrowly useful in the reductive measurement of certain processing tasks, such as the handling of insurance claims, but this entirely misses the broader point that market value is now often created by such things as creativity, networks of alliances, and quality of service.

### 2.5 The need for a framework

Given these measurement challenges, and the multiplicity of factors in play, one need and objective of this study has been to propose a framework for analysis of the existing literature, to organise the findings, and for occupiers and their advisers to consider how office design can be aligned with their business strategy.

<sup>32</sup> Haynes, B et al (2000)

<sup>33</sup> Oseland reported in Haynes, B et al (2000)

<sup>34</sup> Haynes, B et al (2000) per ASHRAE (1992)

# **3 A framework for analysis, organisation and application**

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# 3 A framework for analysis, organisation and application

## 3.1 Over-arching framework

This study is an exploration of the relationships between design variables, business performance factors and measured performance. Given that businesses exist to return measurable value to stakeholders, feedback must be established between the strategic aims of the organisation (the 'Business Strategy') and the results that the strategy delivers (the 'Business Performance Measures'). The diagram below illustrates this relationship between business strategy and business performance and shows the intermediary role that variables in the design of offices play, and it provides the over-arching framework by which these design variables can be considered as an aid to strategy and performance.

Business strategies and priorities determine the best way to pursue business levers, including office designs, to influence Business Performance Factors, which must be measured in terms of the degree to which the goals of the original strategy are achieved. Office design is just one business lever available to businesses to affect change – albeit one of the most powerful ones.

The research question may therefore be expressed as: what is the nature of the links that exist between office design and business performance? To what extent do universally applicable rules govern the relation between office design and business performance? How much do particular business contexts and specific business strategies determine how best to use office design?

Each of the terms used in these questions, and in the over-arching framework merits definition.

## 3.2 Business Strategy

Business strategy includes Corporate Strategy (eg opening up new markets), Market Strategy (eg ways of improving market share by expansion or consolidation) and Functional Strategy (eg outsourcing, partnering, TQM etc). The three together establish the over-riding vision and direction for any business.

## 3.3 Business priorities – general

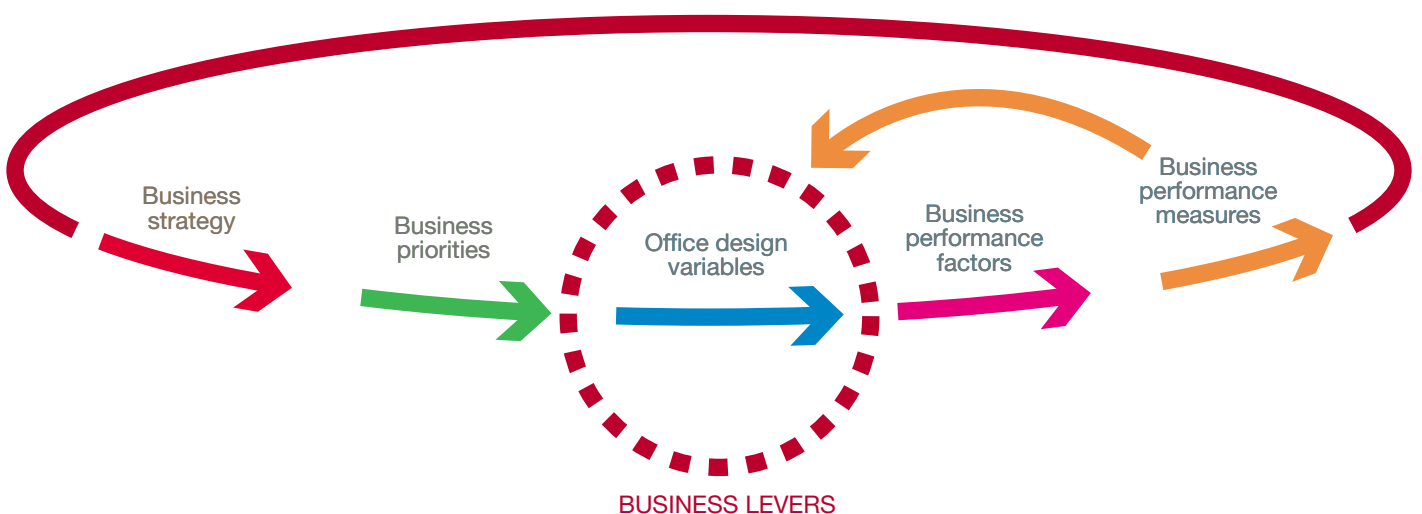
Shaped by strategy, business priorities determine the targets which are used to measure whether the strategy has been achieved. Examples can be taken from primary business objectives – eg increasing the number of products on offer, adapting services so they can be applied in new markets etc; or they may relate to the three E's framework already referred to and expanded here.

## 3.4 Business priorities – the three E's framework: efficiency, effectiveness and expression

This framework, developed largely within DEGW over the last 10 years, represents a categorisation of measures of the performance of the working environment in terms of the three kinds of business objectives (or priorities) to which they contribute:-

- Efficiency: cutting occupancy costs and other business costs – getting the most from the money. This involves making economic use of real estate and driving down occupancy costs
- the costs necessary to accommodate the business, including

Figure 10: The links between office design and business performance



### 3 A framework for analysis, organisation and application

rent, property taxes, heating, cooling and lighting, the amortised costs of fitting-out and the annual costs of managing office space and keeping it secure.<sup>35</sup>

- Effectiveness: value added by design to business performance – getting the most from the people. This means using space in ways that improve the output and/or quality of the work being done there. Duffy notes that sometimes efficiency can be the enemy of effectiveness – for example, when zealous, over thrifty cutting down on circulation area produces what on paper may be a commendably high proportion of rentable space, but at the cost to the user of the clarity, spaciousness, and generosity that can make an office floor or building a more interactive, hospitable and stimulating place to work.<sup>36</sup>
- Expression: success in broadcasting business values externally and internally – getting the most from the brand. This is concerned with communicating messages to both the inhabitants of the building and those who visit and interact with it in any way. The way a building looks inside and out has a profound effect on what people think about the organisation it houses and how they relate to it. Organisations therefore have to think about what sort of image they wish to create and the values they wish to express physically in buildings and workplaces.<sup>37</sup>

It will be obvious that such measures also provide the basis for setting targets for business performance, with both targets and measures expressed in the same terms.

Efficiency measures are straightforward and direct: they are used to evaluate the ways in which office design can save businesses money. Effectiveness and Expression measures are indirect: they provide businesses with a potential gain, rather than a guarantee of cost cutting. Our experience leads us to believe that the potential impact on business performance of measuring Effectiveness and Expression, and acting upon the conclusions, is far greater than any cost savings. Above all, though, what is important is that the purpose of measures and targets at all three levels is to calibrate the contribution, actual or potential, of office design to the achievement of business objectives. None of these measures has any abstract value. None is independent of business purpose.

#### 3.5 Business levers – general

Business levers are the resources that a business can manipulate to achieve targets. These include both physical resources (eg office design, IT services, infrastructure) and non-physical



<sup>35</sup> Duffy, F (1997), p47

<sup>36</sup> Duffy, F (1997), p47

<sup>37</sup> Allen, T et al (2004), p13

### 3 A framework for analysis, organisation and application

business disciplines (eg Human Resource policies and practices, marketing initiatives, etc). Of these, office design represents the physical means by which businesses not only accommodate their activities but can also use to enhance their chances of success.

#### 3.6 Business levers – office design variables

Office design variables embrace both buildings and their environment, and there is a need to organise these choices in a way that permits structured consideration.

A suggested way of doing this is to categorise them as a series of seven layers defined by Building Life Cycles, each of which has a different longevity.

1. **Site (infinite time impact):** the building's context – location, landscaping, site density.

2. **Shell (50–70 years):** the structure, defining shape, size and built form (for example, floor-to-floor height).
3. **Skin (25 years):** the building's cladding.
4. **Services (15–20 years):** heating, ventilation, lighting and cable distribution and the like.
5. **Scenery (7–10 years):** the fitting out of the internal elements such as ceiling, partitions and finishes.
6. **Systems(+/- 3 years):** systems of accommodation and of Information and Communication Technology.
7. **Settings (day to day):** management of the furniture and equipment.

Some of the broader characteristics of these layers are discussed in Figure 11.

**Figure 11: Design variables over life cycle**

Site	Shell	Skin	Services	Scenery	Systems	Settings
Telecoms infrastructure; Local amenities; Access; Car parking; Site Security; Aspect	Thermal strategy, Structural grid, Planning grid, Floor size, Space efficiency, Tenant efficiency, imposed floor loading, Floor depth and sectional height, Atrium provision, Communications infrastructure, Good access, Exterior/internal maintainability	Natural ventilation, Solar control, natural lighting, views, energy efficiency	Lighting, temperature, environmental control, ventilation, HVAC, BMS, small power	Choice and quality of materials, Provision of meeting facilities, Restaurant/dining facilities, Provision of vending/break areas, Internal landscaping/ planting, support facilities	Network access, Floor mounted power, data connections (Wireless)	Furniture, group size



### 3 A framework for analysis, organisation and application

Office design also includes the operation and management of the premises: to achieve business goals, intelligent Facilities Management is also essential.

#### 3.7 Business Performance Factors

Business Performance Factors are measures that evaluate the business consequences of the application of office design and other levers. These factors include the attraction and retention of staff, the rate of innovation in the organisation, and the ability to respond to business or technological change.

Bradley (2001) has suggested the following list of measures of business performance that can be linked to real estate and workplace performance:

- stakeholder perception (eg customer satisfaction and loyalty, community sentiment);
- financial health (eg economic or market value added);
- organisation development (eg innovation quality and quantity, cultural factors, team formation and new process introduction rate);
- productivity (eg space utilisation, process speed and quality, waste levels);
- environmental responsibility, and cost efficiency (eg total occupancy cost related to revenue generation).<sup>38</sup>

Business Performance Factors operate in four main areas. These are:

- efficiency
- adaptability

- staff performance
- external expression

and these four areas can provide a summary framework for examining office design and its impact on business performance. This framework also provides the major themes within which the research literature findings are analysed in the chapters that follow. Whilst the priorities of the Business Performance Factors may change over time, the four areas of focus are sufficiently robust to comprehend the way in which most current business issues relate to the design of the workplace. Other business performance models, such as the Balanced Scorecard<sup>39</sup> are compatible with this framework and may be used to supplement it.

In detail, the categories are as follows:

**(1) Efficiency in accommodation:** the efficient provision of accommodation and its operation over time.

Property and operational costs are typically the second largest expense for office based organisations, after staff costs. While they may be relatively low compared to staff costs, they represent a potentially fixed overhead with a direct and immediate impact on the financial performance of the business, and are thus often under close scrutiny by both internal management and external shareholders and analysts.

**(2) Adaptability and flexibility:** achieving appropriate level of extendibility and flexibility of infrastructure (building structure, services and systems).

The ability to respond rapidly to change is one of the key success factors in modern corporate life. The workplace can act either as a significant catalyst or as a hindrance to the ability to respond to

Figure 12: Business Performance Factor areas



<sup>38</sup> Bradley (2001)

<sup>39</sup> Kaplan, R & Nolan, D (1992)

### 3 A framework for analysis, organisation and application

change. Building design can impact on change processes in a wide variety of ways, including such factors as the ability to subdivide the space within buildings; the ease of adding partitions to make various sorts of enclosure; the ease of re-planning and re-defining the uses of space; and the ability to make changes to IT and other services infrastructures.

**(3) Staff performance:** defined as any combination of factors that improve the ability of people to enhance their output through increases in the quantity and/or quality of the product or service they deliver.

In analysing the features of workplaces that influence 'performance' under this definition, Maslow's hierarchy of needs<sup>40</sup> (Figure 12) has been followed.

This model, developed in the 1950s, proposes successive levels of human need, each of which must be met in turn to fulfil human motivation. Maslow's levels proceeded from physiological needs (hunger, bodily comfort, health etc) through to "self-actualisation" (or fulfilment). Using this as a base, this study has organised the relationship between staff and their workplace into three comparable levels:

- health and comfort: providing for the health and comfort of occupants;

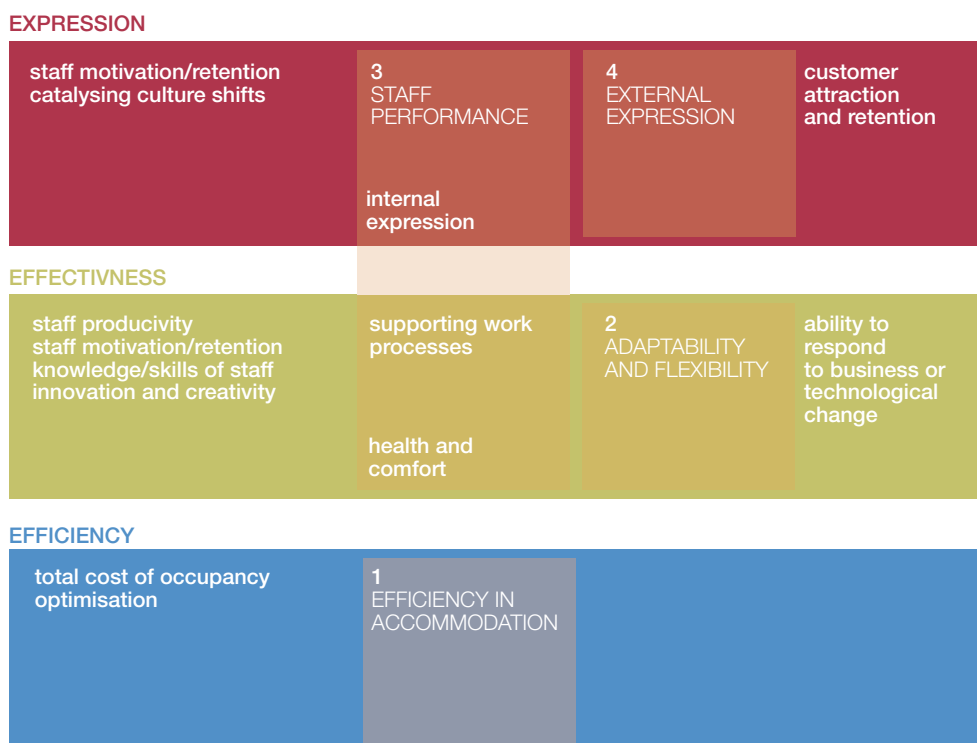
- alignment with process: effective alignment of workplace with work/management practice and process;
- internal expression: communication of messages to staff about corporate values.

A combination of efforts aimed at all three levels may be the most powerful approach to achieving staff performance through workplace design. However, in the research literature the relationship between cause and effect has been investigated most thoroughly in the first category (health and comfort), less so in the second (alignment with process) and only minimally in the third (internal expression).

**(4) External expression:** the management and communication of external messages

The space that an organisation occupies conveys messages to a wide range of external parties, regardless of whether this message is recognised and managed by the organisation. The importance that organisations place on using their buildings to communicate their brand and corporate values is likely to increase as the general public becomes increasingly aware of the built environment and of design and sustainability issues.

**Figure 13: Business Performance Factor areas**



<sup>40</sup> Maslow, A (1987)

### 3 A framework for analysis, organisation and application

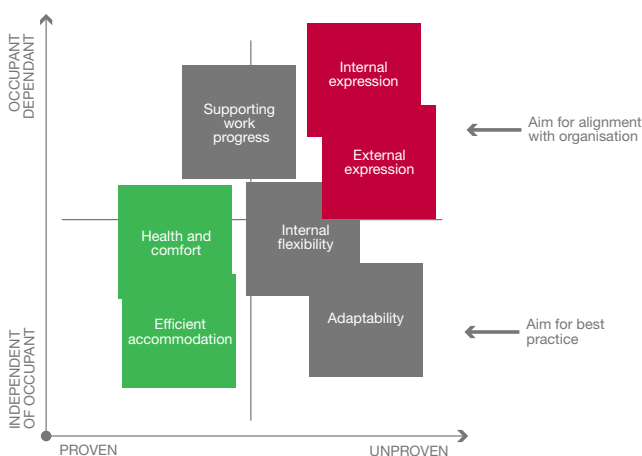
It should be noted that these Business Performance Factors are not all applicable or relevant to every organisation or business. Broadly speaking, reading the categories of the business framework (see Figure 13 above) from bottom to top, broadly following Maslow's hierarchy, there is a move from areas of universal applicability ('everyone must do this'), through to moderate needs for alignment of the design to the organisation, and finally to a point at which the correct office design solution is absolutely dependent on the characteristics of an organisation.

For example, in the category of health and comfort, regardless of whether an organisation operates in the financial services arena or in the fast moving consumer goods market, or is a company of 10 people or 10,000 people, there are some general best practice endeavours regarding the health and comfort of their staff that should be adhered to. The provision of appropriate temperature, lighting, and ergonomic environments can generally be assumed to be both universally applicable and universally beneficial.

In contrast, within the category of external expression, the notion of how to use office design to transmit a message is absolutely occupant dependent, and thus requires the highest level of alignment.

This scale of the degree of occupant dependency, set against another scale of the quality and rigour of data that underpins our knowledge about these Business Performance Factors, provides another useful framework for looking at this area of research.

**Figure 14: evidence and occupant dependency**



Each quadrant of this points the way ahead in terms of research, setting of standards, degrees of profit and occupancy dependency and the briefing and design process.

- The bottom left-hand quadrant, where data is generally objective, plentiful and rigorous, and where the Business Performance Factors will affect all users, represents the area of best practice – conditions that building users should be able to take for granted. This is the raw material of the BCO Guide.<sup>41</sup>
- The bottom right-hand quadrant, which again relates to matters of general application, but where data is plentiful or rigorous or where a factor is less capable of proof, points to a need for more research, but also to the need to discuss choices with users.
- The top left-hand quadrant, again where data exists but where solutions will be dependant upon the occupants, represents an area about which the choices are fairly well supported by data but with the selection from those choices being a matter for discussion between users and their advisers.
- Finally, the top right-hand quadrant represents the greatest combination of subjectivity and occupant dependency, and is an area in which progress can be made only in discussion between users and their advisers, considering possibilities and the contributions that these might make to a business's overall strategy, particularly in matters of culture and branding.

#### 3.8 Balanced Score Card

The second framework is even more explicitly related to business goals. It is derived from the 'Balanced Score Card'<sup>42</sup> widely used to encourage management to think more strategically and systemically about a range of targets and measures of business performance that go beyond the achievement of purely financial goals. The four quadrants of this framework are:

- Finance: achieving desired levels of financial performance
- Process: the design and conduct of business processes
- Customers: maintaining good relations with customers
- People: maintaining good human relations within the business

Within each of the quadrants appropriate targets and measures can be organised.

In developing measures of how well the physical office environment supports the achievement of business goals, the Balanced Score Card framework gives additional depth and meaning to the range of targets and measures within the three E's. In this study the two frameworks together provide the organising principle for the major task of reviewing the contributions of the empirical literature to various aspects of business performance.

<sup>41</sup> BCO (2005)

<sup>42</sup> Kaplan, R & Nolan, D (1992)

### 3 A framework for analysis, organisation and application

Figure 15: Development of appropriate measures<sup>43</sup>



It is important to note that the objective of the Balanced Score Card is not to insist on any preordained hierarchy of attainment in any of the four quadrants of the model. Nor do the three E's in themselves set targets. Instead the objective of both frameworks is to help each particular business establish and maintain its own systemic balance between targets and performance measures. All businesses must work out their own priorities for achieving success within their own unique environments and circumstances. The chief value of the Balanced Score Card is to ensure that none of the four quadrants either totally dominates or is entirely omitted from management's agenda.

#### 3.9 Business Performance Measures

Business performance can be measured from an external perspective using financial data on market performance, as well as internally using company-set targets.

External measures of business performance are generalisable and include market capitalisation, return on investment (ROI), share price, and price/earnings ratio (P/E ratio).

Internal measures of business performance are particular to each organisation, and include such variables as speed to market in product development; innovation rate; HR performance, including absence (absenteeism, lateness, sickness, turnover and productive days as a percentage of total available days); and the speed and accuracy with which processes are carried out.

Internal measures of business performance mark the progress a business makes towards external targets. As noted in Chapter 2 of this report, the hardest areas to measure involve intangible assets such as the skills of workers, intellectual property, business infrastructure, and brand value.

The links between office design and Business Performance Factors are complex. It is notoriously difficult to attribute the business consequences of any particular decision on business performance. This is because both businesses and buildings are complex entities and their relationship is not simple but complex. Nor is the relationship automatic: it depends upon vision, sustained leadership, as well as detailed management

<sup>43</sup> DEGW (2004)

### 3 A framework for analysis, organisation and application

#### 3.10 Business Performance – Summary

Key variables and issues which are critical to achieving business benefit are dealt with in the following sections of the report, but the table below provides an overview of the areas addressed, aligning Business Performance Factors with the associated Building Performance Measures.

**Figure16: Business Performance Factors and associated measures**

Categories of Business Factors	Business Performance Factors	Associated Building Performance Measures
Efficient provision of accommodation	<ul style="list-style-type: none"> <li>• optimise cost of occupancy</li> </ul>	<ul style="list-style-type: none"> <li>• total cost of occupancy;</li> <li>• capital costs;</li> <li>• operational expenses;</li> <li>• ratio of property costs to business operations costs</li> </ul>
Adaptability (external)	<ul style="list-style-type: none"> <li>• responsiveness to external business or technological change</li> </ul>	<ul style="list-style-type: none"> <li>• subdivisibility;</li> <li>• subletting potential</li> </ul>
Flexibility (internal)	<ul style="list-style-type: none"> <li>• responsiveness to internal business or technological change</li> </ul>	<ul style="list-style-type: none"> <li>• flexibility of layouts and infrastructure;</li> <li>• ability to accommodate relocation</li> </ul>
Health and comfort	<ul style="list-style-type: none"> <li>• support staff productivity</li> <li>• motivate and retain staff</li> <li>• develop staff knowledge and skills</li> <li>• stimulate innovation and creativity</li> </ul>	<ul style="list-style-type: none"> <li>• access to daylight;</li> <li>• air quality and quantity;</li> <li>• temperature control;</li> <li>• ambient and task lighting quality;</li> <li>• ergonomic factors</li> </ul>
Alignment of workplace with work processes		<ul style="list-style-type: none"> <li>• access to business information to facilitate decision making; communication between and within workgroups;</li> <li>• network communication effects;</li> <li>• ad-hoc interaction;</li> <li>• distraction-free solo and group work;</li> <li>• places for breaks;</li> <li>• provision of acoustic control;</li> <li>• effectiveness of information sharing with and between departments;</li> <li>• extent of cross-functional teamwork;</li> <li>• extent of organisational learning</li> </ul>
Internal expression	<ul style="list-style-type: none"> <li>• support cultural change</li> <li>• motivate and retain staff</li> </ul>	<ul style="list-style-type: none"> <li>• extent to which information is communicated effectively to employees;</li> <li>• degree to which shared values are subscribed to by employees;</li> <li>• adherence by the workforce to core values;</li> <li>• extent to which employees are informed about business goals and objectives</li> </ul>
External expression	<ul style="list-style-type: none"> <li>• attract and retain customers</li> </ul>	<ul style="list-style-type: none"> <li>• extent to which customers are clear about the firm's goals and objectives</li> <li>• consistency between different divisions, departments and locations</li> </ul>

### 3 A framework for analysis, organisation and application

All of these factors can, however, be related to the over-arching framework suggested above, to provide a rigorous and comprehensive approach towards the consideration of design variables as a response to strategy, and their measured impact upon business performance.

#### 3.11 Case studies: towards a purpose driven, integrated approach

No one discipline can provide complete or definitive answers to such a wide range of inherently interdisciplinary questions. An integrated research approach is essential. Research in this complex and changing field cannot be contained within conventional, discipline based, academic boundaries. Understanding context and responding imaginatively to business purpose are vitally important. The involvement, experience and judgement of key constituencies are crucial to maintaining the relevance of any research programme intended to explore the

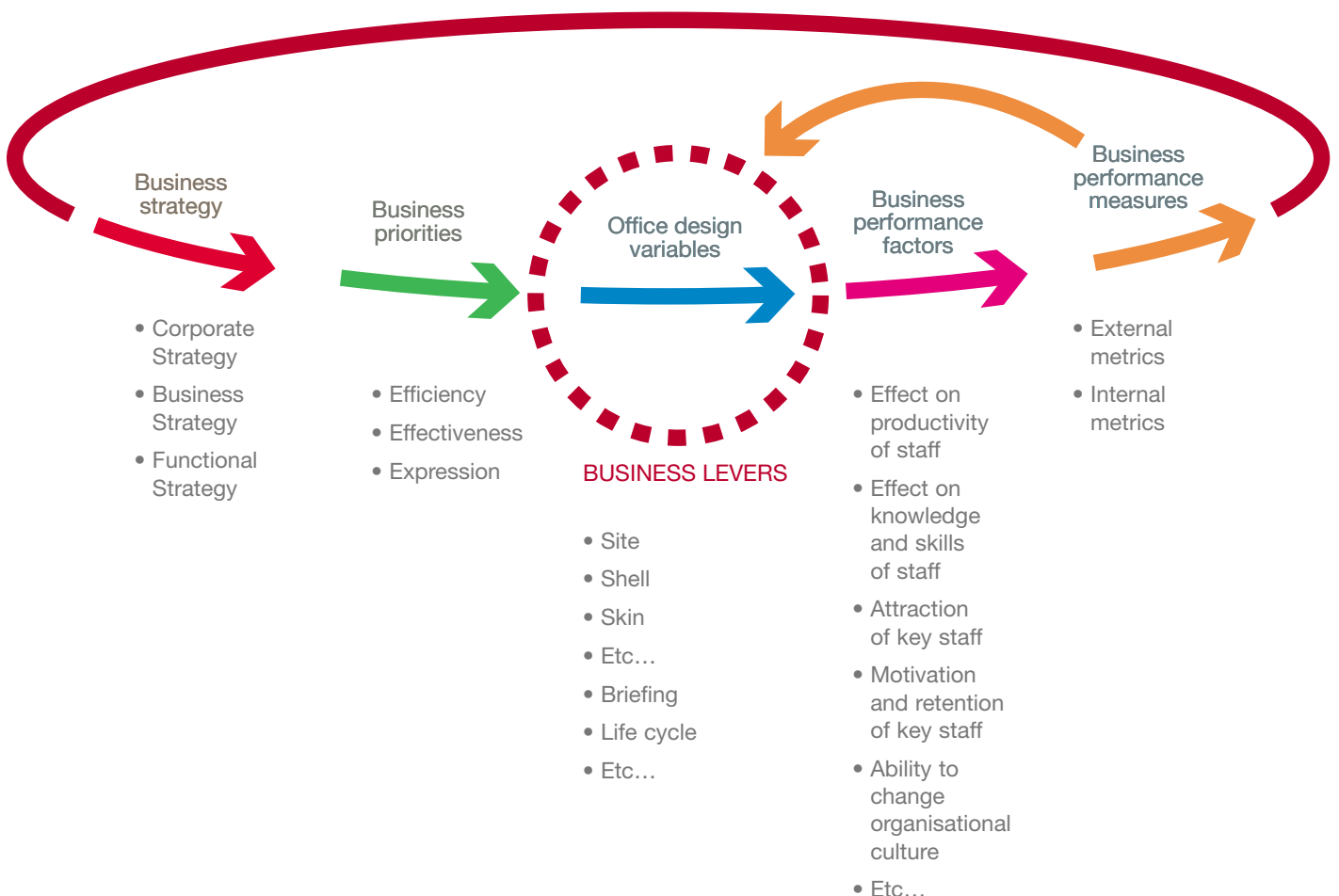
relationship between office design and business performance; and involving both the supply and demand sides is critically important.

The economic dimension of design and development should bind both sides of this equation together. Developers need to understand how to make more profitable and less risk prone investment decisions; corporate real estate managers need to learn how to demonstrate to their senior management the contribution that workspace can make to stimulating and supporting business success. If we are to measure how office space facilitates the achievement of business goals, it is obvious that a far more robust way of presenting research data will be necessary than most of the research studies reviewed in this study.

What precedents exist for such data rich, action orientated research?

We believe that adapting the Harvard Business School Case Study approach<sup>44</sup> is potentially the most attractive and effective

Figure 17: The over-arching framework developed



44 <http://www.hbs.edu/mba/experience/learn/thelearningmodel/howthecasemethodworks.html>

### 3 A framework for analysis, organisation and application

way of studying and communicating the longitudinal and systemic data necessary to identify critical trends and understand how business can take most advantage of the resource of office space. There are many similarities between the turbulent and risky context of business which stimulated the development of the case study method of teaching and research, and the interplay of disciplines and interests, the timelines, the co-ordination that are necessary to make office design work for business purposes.

The final element of the framework proposed in this report is therefore a call for case studies prepared in accordance with a consistent protocol, which again fits into the over-arching framework developed above.

These studies may come from existing project materials and summaries of the work of the project team and others, as well as existing studies written for HBS Press and CRE. It is proposed

that many existing studies are actually extremely close to being useful for this work, and that by asking a few more questions of each of them, much more information could be brought to bear on our understanding of the relationships between design and business performance. Furthermore, an explicit comparison of the case studies from several fields could be useful in making future investigations more fruitful.

A set of case studies could be compared and cross-referenced in order to develop a protocol for the development of increasingly valuable studies in the future. The components of each of these cases would be identified to show the full set of possible case components and to draft a list of essential inclusions. This exploration could then include descriptions and recommendations for data types, reporting styles and Post Occupancy Evaluation mechanism.

**Figure 18: The over-arching framework developed and applied to a sample case study**



### 3 A framework for analysis, organisation and application

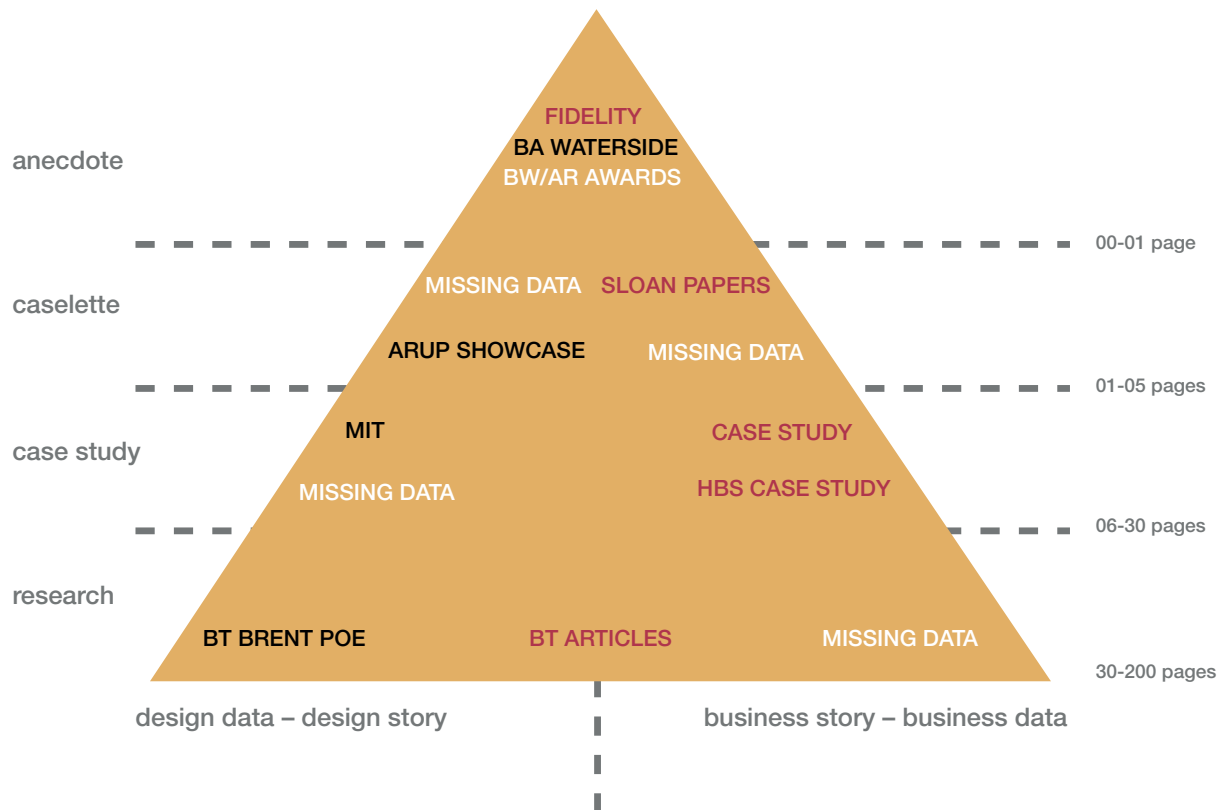
Business case studies typically describe a business challenge in context, providing a mechanism for exploring real-life situations in detail and identifying the ways in which problems can be addressed. There are many existing case studies relating to design and construction projects, but these tend to have been developed by individual firms for a specific purpose (for example applying for awards, archiving key projects, or promoting exceptional work). As a result they are often incomplete in terms of making explicit the relationship between workplace design and business strategy.

Nonetheless, existing case studies can provide a useful overview of the challenges faced by organisations attempting to use design to achieve their business goals. They can illustrate the

demands of a strategic approach to workplace design, pinpoint the critical decisions, and highlight the successes and failures of design projects in relation to the original goals.

We have proposed in this report that case studies should be used to supplement the available empirical data. As discussed previously, universally applicable recommendations and guidelines are almost exclusively limited to those aimed at addressing single variable effects, such as health and comfort. Very few empirical studies identify how the design and management of the office environment contributes to business performance in terms of the areas of competition facing post-industrial firms; and this level of experience would more effectively be explored through case studies conducted in accordance with a consistent protocol.

**Figure19: case study approaches covering design and business issues**





# 4 Research methodology and character

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# 4 Research methodology and character

## 4.1 The research process

The project team reviewed primary and secondary sources on the impact of design on business performance. The purpose of this review was two-fold. Firstly to understand what is known: the fundamental facts regarding the link between the design of workspace and business performance, the design aspects that are repeatedly addressed by the literature, and the way that businesses would most likely be affected by design. Secondly, to identify and locate gaps in the literature, indicating areas that remain unexamined, and hence potentially under-exploited as business tools.

To pursue these questions the following key tasks were undertaken:

- The literature was searched, with the results sorted and mapped.
- Initial themes were identified among these findings.
- An expert seminar was held, to help set the literature findings within the context of professionally held knowledge of this topic.
- Case studies were explored as a way of filling the gaps in the literature findings.
- The results from the literature survey were combined with professional knowledge in order to develop a framework for reporting on recommendations. A database of findings was organised as a resource which may continue as a source of reference for the industry.
- Based on this data, general recommendations have been posited for developers, tenants/occupiers and researchers.
- Through this approach, categorised references have been recorded, which will be added to in the future as our knowledge continues to grow.

**An expert session hosted by CABE was also used as an opportunity to ensure that relevant articles were included in the study, and to solicit views about a wide range of building and business issues.**

## 4.2 Literature search

The trawl for research material that would help to reveal the relationship between office design and business performance was initially focused on buildings. We searched the building databases for references to business performance, rather than searching management and business literature for discussions of building and design. We looked at articles that clearly purported to contain information on the relationship between space and business performance, so articles that mentioned space and design as a sideline to the main article topic were not included.

To ensure the most relevant articles were included in our analysis, academic (referenced) papers were given priority, in order to increase the amount of empirical data in the findings.

The team began by examining two major databases:-

1. *Building Investment Decision Support (BIDS)*: a database providing information for occupiers of buildings. 130,000 excerpts have been read by the BIDS team, based in the School of Architecture at Carnegie Mellon University, in order to create 130 case studies.
2. *Occupier.org*: a UK database containing over 375 articles, as well as a review of the literature.

and four key literature reviews:

1. *Does Property Benefit Occupiers? An evaluation of the literature.*<sup>45</sup>
2. *To what extent does workplace design and management affect productivity.*<sup>46</sup>
3. *What's working: Briefing and Evaluating Workplace Performance.*<sup>47</sup>
4. *Creating the productive workplace.*<sup>48</sup>

In addition, a wide range of other primary information sources was examined in more detail. These were selected because of citations in the reviews mentioned above or because of recommendations from members of the Steering Group and other industry experts.

The project team's primary focus was the office building. In structuring the literature review, however, it was recognised that the performance of the office building is significantly affected by how it is operated – that is, by Facilities Management. Moreover, individual office buildings often exist as part of a larger group of buildings owned and operated by or on behalf of a particular company (Portfolio Management). These areas – individual buildings, facilities management and portfolio management – are therefore interconnected, with actions in one area potentially producing positive or negative impacts in another. The literature review consequently sought research findings in all three.

In addition, it quickly became obvious that there were substantial gaps in knowledge in particular areas, including the expressive capacity of office space (how the office space transmits messages about an organisation), as well as issues surrounding site, and ICT services. In order to ensure that these gaps are the result of an actual lack of knowledge, rather than narrowly focused research criteria, the team widened the literature net to include material from the disciplines of marketing, management, HR, and IT.

<sup>45</sup> Haynes, B et al (2000)

<sup>46</sup> Oseland, N (1999)

<sup>47</sup> Bradley, S (2000)

<sup>48</sup> Clements-Croome, D (2000)

## 4 Research methodology and character

### 4.3 Analysis of results

The literature was then classified according to the following characteristics:

1. research method (empirical, predictive model, case study, anecdotal, hypothetical/theoretical);
2. design variable (layer within the building life cycle model);
3. the three E's framework: efficiency, effectiveness and expression (an organisational framework developed by DEGW).

For research method, the category definitions used (in order of most to least rigorous) were:

- **Empirical:** rigorous experiments, quasi-experimental studies or field trials involving two or more examples, usually (but not necessarily) providing quantitative evidence. In empirical studies there will be an attempt to choose examples that are equivalent or comparable, allowing independent conclusions to be drawn about the factor of interest. This category includes observational studies and staff survey data collected in sufficient mass to account for variations, and to have statistical significance; and it includes a broad range of research methods from field studies to rigorous lab studies (as a result of which it may appear larger than otherwise).
- **Predictive modelling:** economic calculations (eg energy use calculations based on potential future scenarios, including cost and energy savings estimates).
- **Case studies:** effectively narratives, including quantitative as well as qualitative data which (in contrast to empirical studies) make no attempt to control conditions, and from which it is

difficult to draw firm conclusions about the causes of any outcomes. However, more rigorous case studies that compare otherwise equivalent designs against one or more particular variables could be classified as empirical research.

- **Anecdotal:** information gathered incidentally, without rigorous controls or systems. Examples include incidental observations or comments which are not collected from a formal sample. Such information may also form part of case studies.
- **Hypothetical/ theoretical:** ideas or theoretical propositions arising out of expert/ professional knowledge, presented without any direct supporting evidence.

For design variables, the Building Lifecycle Model was used; and the “three E’s” framework is as described in Section 3.4.

### 4.4 The character of the research

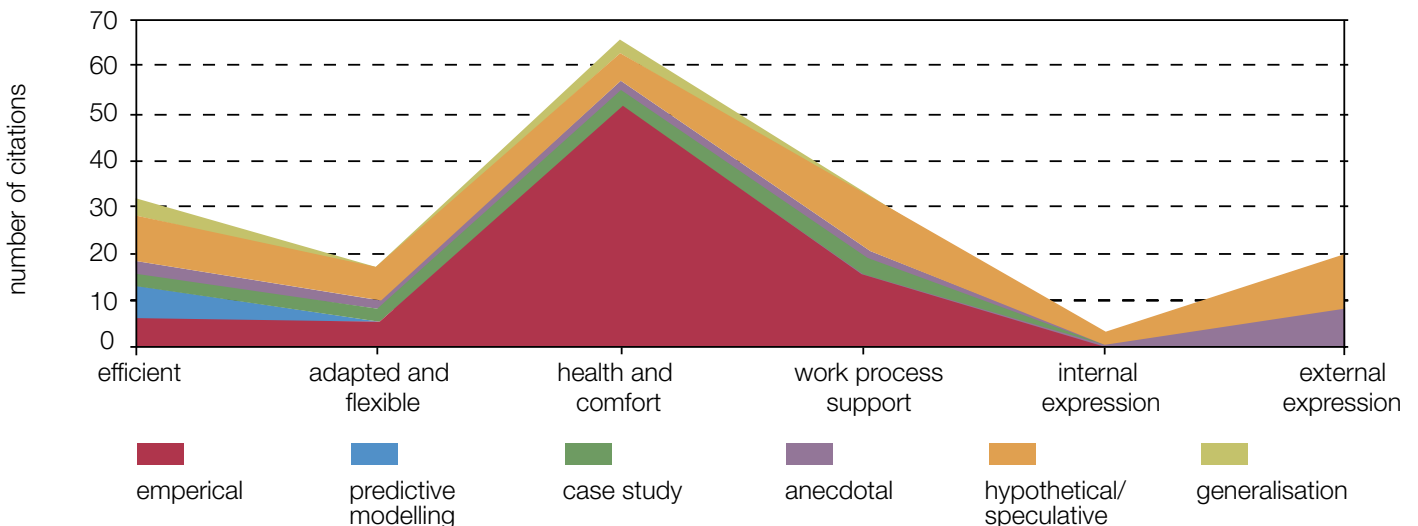
Plotting the literature against these categories it can be seen that most of the articles are empirical studies dealing primarily with health and comfort issues, with a smaller number of articles being concerned with work process support.

Looking at the same data sorted by reference to the Building Lifecycle Model, shows the same concentration on health and comfort, centred on the services systems of the buildings.

Hardly any research has explored the relationship between building design and internal expression; and whilst more articles have explored the impact of the building on external expression, these have generally been hypothetical or speculative.

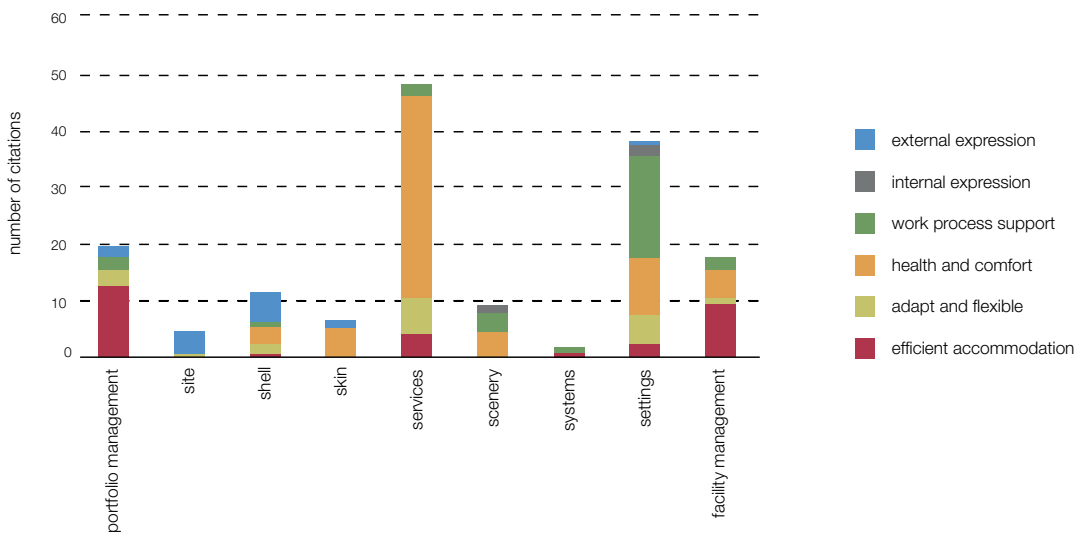
In summary, the analysis of the literature showed that:

Figure 20: Citations per area of investigation

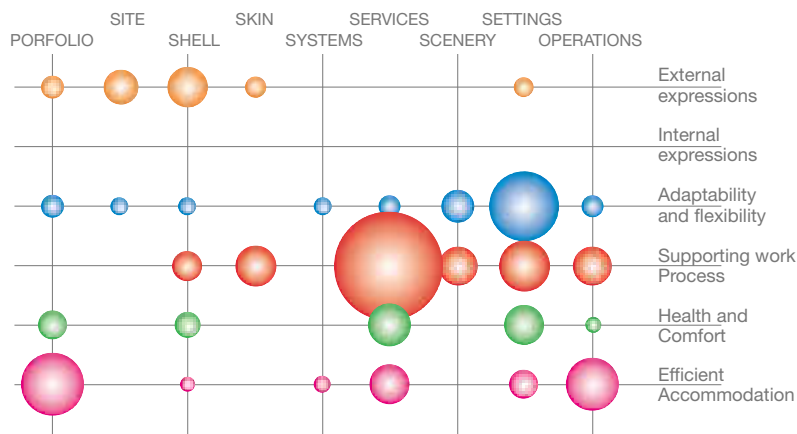


## 4 Research methodology and character

**Figure 21: Citations by area of investigation and building lifecycle stage**



**Figure 22: Focus and gaps in research literature**



- The larger part of the research literature is made up of empirical findings. The second largest category is case studies. Least common are studies involving predictive modelling.
- The strongest focus of the impact of buildings on business performance relates to building services (ie heating, lighting, ventilation) and settings (ie furniture and workstations). There was little discussion of site and systems.
- Measures of effectiveness are discussed most, and expression least.
- The literature focuses on the relationship between individual productivity and the design variables relating to building services and building skin (particularly ventilation, lighting, and temperature).
- Post-occupancy evaluations of the workplace are not common – and, when they are carried out at all, are conducted on a variety of bases.
- The realities of practical decision-making, and the realities of how space is acquired, designed and managed are not often discussed.

The literature also revealed other business performance categories, including sensitivity to cost, adaptable space and architecture, and provision for the comfort and satisfaction of employees.

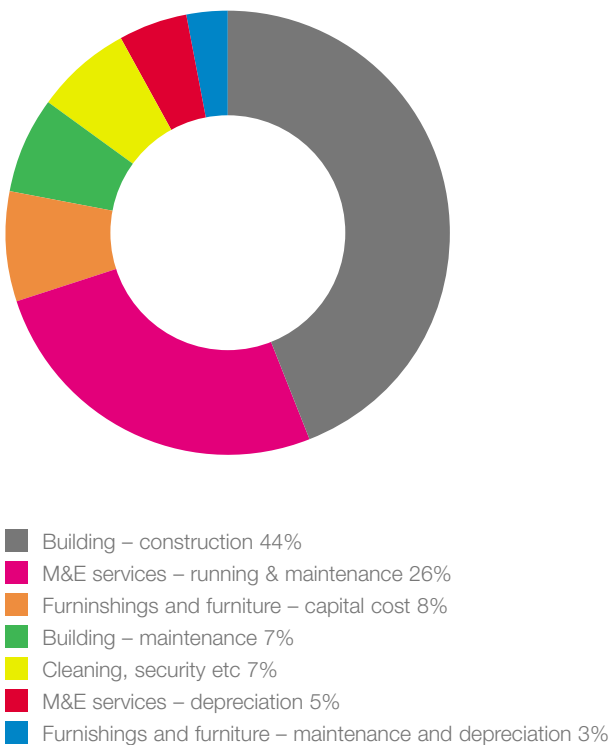
# 5 Research findings: efficiency

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## 5 Research findings: efficiency

“Cost is still the predominant focus of FM operations, but the industry is maturing and there is now a growing awareness of how facilities can actively support or actively disrupt the performance of people at work.”<sup>49</sup>

“Good design need not be expensive. Northcliffe has commissioned several buildings in recent years and an analysis of costs, updated for inflation and adjusted for site factors, indicated that good design of itself was not a prime determinant of building cost.”<sup>50</sup>

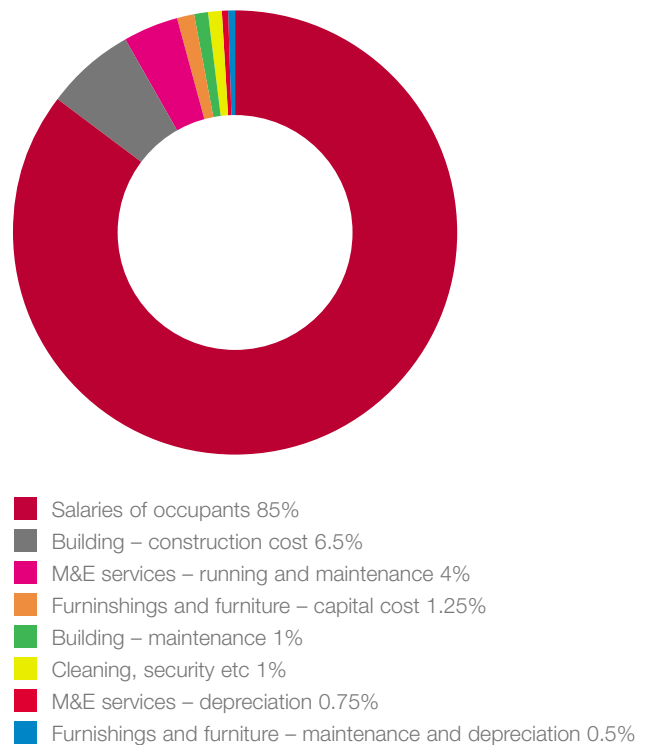


**Figure 23: 25-year expenditure profile of office occupiers – excluding salary costs**

Figure 23 shows the cost of developing, owning and operating a typical office building over the 25 years of an occupational lease, all reduced to present value at a discount rate of 6%. It shows that, excluding land, 44% of the total goes on the developer’s construction cost, and the balance of 56% goes on furnishing and operating the facility. This excludes the costs of the salaries of those who work in the building.

### 5.1 Relative costs – putting things into perspective

The cost of providing accommodation for office workers in terms of both capital (construction) costs and building running costs is dwarfed by the costs of their salaries and benefits.



**Figure 24: 25-year expenditure profile of office occupiers – including salary costs**

Figure 24 then repeats the calculation, but includes in the equation the present value of salaries that the occupier will pay to his staff. The effect is dramatic. Just 6.5% of the total cost now goes on construction, 8.5% goes on furnishing, maintaining and operating the facility, and 85% goes on salary costs.

<sup>49</sup> Carter, A (2002), p1

<sup>50</sup> Wigginton (1993)

## 5 Research findings: efficiency

These figures are based on the analysis of a real building and will vary depending upon the specification of the building, and its location, occupational density etc. However, as a generalisation, for a typical service business, construction costs, building running costs and business operations may be in the ratio of 1:1.5:15, where 1 represents the amortised cost of construction; 1.5 the cost of running the building (eg lifetime maintenance, costs of heating and lighting etc); and 15 is the staff salaries and other business operating costs.

In *Does Property Benefit Occupiers, an evaluation of the literature*, Price et al warn that information on true occupancy costs, and especially whole life costs, is frequently not available, and that life cycle costs cannot be considered without knowing the impact of the workplace on operational factors (eg staff turnover) and this data rarely exists.<sup>51</sup> Property costs and operational costs are the second largest expense for office based organisations,<sup>52</sup> but building ownership and maintenance is only a small percentage of the overall cost of the people, and whole-life maintenance and operational costs are considerably greater than construction costs.<sup>53</sup>

In another example of relative costs, Wyon<sup>54</sup> reports that a saving of 50% in energy costs through improving system design would be paid for by an improvement of between 0.25 and 0.5% in staff productivity.

This firmly puts the onus on occupiers to put efficiency measures into a wider business perspective, so that they can be related to their overall business performance.

There are four main areas in which efficiencies can be realised: capital construction costs; maintenance; operational costs; and spatial efficiencies.

### 5.2 Capital construction costs

Capital construction costs in Europe vary by a factor of two, and the range in the USA or Asia<sup>55</sup> is greater still. Estimates by Gardiner & Theobald show the following variation in construction costs in the UK, suggesting that the provision of air-conditioning systems has a greater impact on capital costs than other differences in overall building specification and design.

**Figure 25: UK construction costs for different office types<sup>56</sup>**

#### Construction costs (including raised floor, carpet, suspended ceilings, heating, lighting and power)

City centre (no A/C)		City centre (incl AC)		Business park	
• Low	• High	• Low	• High	• Low	• High
€1,413/m <sup>2</sup>	€1,664/m <sup>2</sup>	€2,041/m <sup>2</sup>	€3,038/m <sup>2</sup>	€1,523/m <sup>2</sup>	€1,978/m <sup>2</sup>

<sup>51</sup> Haynes, B et al (2000)

<sup>52</sup> Price, I (2002)

<sup>53</sup> Evans, R et al (2004), p43

<sup>54</sup> Wyon, D (1994)

Other major influences on capital cost are:

- Building height: In general, the higher the building, the greater the construction cost per square metre, with step increases between mid-rise towers (20–30 storeys), high-rise towers (more than 40 storeys) and very high rise (over 50 storeys). This is due to a combination of structural costs and vertical transport and services requirements (multiple plant rooms etc).
- Structural span: structural cost is a direct function of span, which should in turn relate to planning grid. Spans above 9m will attract a particular cost premium, which may well be compounded by increased building height required to accommodate the increased depth of structural members.
- Cladding plan form: is a major and variable cost in offices, so from a first cost point of view, the most efficient geometry for wall-to-floor ratio (the amount of cladding necessary to enclose a square metre of floor space) would be a square.

The key message is that, although initial capital costs is heavily outweighed by other costs over the life of the building, unnecessary cost should nonetheless be eliminated by a properly conceived and conducted value engineering process.

### 5.3 Maintenance costs

Maintenance costs vary widely, and are mainly influenced by building size, plan form, age and levels of servicing. In addition to energy costs, maintenance and repair (M&R) costs are also impacted by design decisions. For example, HVAC operations and maintenance costs are estimated to be roughly 2–5% of current plant value. However, because of incomplete records on causes of M&R costs, and what M&R savings (including manpower costs) would be offered by various design/engineering solutions, the level of potential savings is generally unknown.

At the same time, occupant density, length of work day, and the use of technology have dramatically increased in the workplace. As a result, system overload and failure costs are now accruing beyond the already significant costs of conventional churn.<sup>57</sup>

<sup>55</sup> Harrison, A et al (1997)

<sup>56</sup> Gardiner & Theobald (2003)

<sup>57</sup> Loftness, V et al (1999)

## 5 Research findings: efficiency

### 5.4 Operational costs

Operational costs are made up of energy, water/sewage, cleaning, security/caretaking, insurances and churn. Each of these maintains different characteristics relative to who benefits from cost minimization, the scale of financial impact, and the time period over which the value is estimated (other factors include lease terms and short-sightedness). What is known is that *“high property occupancy costs can have an adverse effect on shareholder value. The extent of fixed occupancy costs ... has a direct effect on the cost of equity and hence the share price. Fixed operating costs act in a similar way as fixed debt, the larger the proportion of fixed operating costs against variable operating costs the more likely it will be for returns to show volatility. Share prices generally increase when property assets are sold and go down when property is acquired. A reduction in occupancy costs of 2% can boost the profit margin by a corresponding 10% without any change in turnover. The same multiplier effect cannot be achieved through improvements in turnover alone, underlining the importance of the property manager’s role of limiting fixed operating costs.”*<sup>58</sup>

Energy is the most significant component of operational costs, and design can have a significant impact on this. Although the cost of constructing a low energy building may be 10% or more higher than the cost of constructing a standard air-conditioned building, many energy cost savings are considered to have a pay-back period (on cost of initial investment) of 3 to 5 years. However, this can vary. For example, The Mistral Building for British Gas in Reading, by Foster & Associates was designed to incur only 20% of the energy costs of a more conventionally designed building, with a pay-back period on the initial higher outlay on design of 12 to 15 years.<sup>59</sup>

### 5.5 Spatial efficiency

#### 5.5.1 Measures of spatial efficiency

Three scales are used to measure the spatial efficiency of office buildings.

- The first (Landlord efficiency) is the efficiency of the floor plan, measured as the percentage of lettable space remaining on an office floor after structure and core space have been subtracted. This measure is of particular interest to landlords, and it should be 80–83% for a building of more than 12 floors, 83–87% for 4–12 floors, or greater than 87% if less than 3 floors.
- The second scale (Tenant efficiency) measures the percentage of usable space that remains within the lettable area once secondary circulation has been subtracted. This leaves the space that is directly usable by tenants and is therefore of primary interest to them. Tenant efficiency should be at least 85% in all buildings.<sup>60</sup>

- The third scale is the density of occupation of the usable space (measured in square metres of usable space per person). This is usually in the direct control of tenants and users, and will vary by type of business, by form of tenure (the average tenant uses 12% less space per worker than the average owner occupier<sup>61</sup>), and by chosen working practices. One of the most significant changes in recent space planning practice is the introduction of space sharing techniques, which are particularly appropriate for offices and workers supported by advances in information technology. Much higher effective densities of occupation can be achieved in this way, and it represents a critical decision for each occupier.

#### 5.5.2 The impact of shell design on spatial efficiency

Building design can reduce efficient occupation through constraints imposed by shape. In general, simple geometric shapes (such as squares or rectangles) are considered most usable, whilst faceted, stepped, curved or angled facades often reduce spatial efficiency.

By the same token, building design can aid efficiencies in terms of the proportion of usable floor area. These benefits are normally captured in landlord efficiency measures (the proportion of a typical floor which is net lettable) and tenant efficiency (the proportion of the rented space that is actually usable), as defined above.

#### 5.5.3 The impact of settings design on spatial efficiency

Perhaps the greatest impact of efficiency measures is through rationalisation of space use. However, this cannot be achieved without considering organisational repercussions. A simple policy of densification is not generally effective, as there are often negative outcomes. Becker and Sims note that while higher densities can be associated with a sense of energy and ‘buzz’, density can reach a tipping point, beyond which it becomes dysfunctional. They cite their own investigations, in which the density tipping point appeared to be quite high at around 55 square feet (5 square metres) per person, albeit this should be treated with caution because of the small sample size.<sup>62</sup>

The HR literature takes up the point: *“Many employees are sceptical of open office arrangements and suspect that the primary benefit is the lower costs that come from packing more people into cubicles.”*<sup>63</sup> The British Council for Offices (BCO) has recommended densities no higher than 14–15 square metres per person (Net Internal Area)<sup>64</sup> on the basis of individual workplace occupancy – although this may well be a condition that is unlikely to be sustained. Actual densities of occupation for mobile workers may become varied as individuals have their own ways of working.

<sup>58</sup> RICS (no date)

<sup>59</sup> Worpole, K (2000), p48

<sup>60</sup> Duffy, F & Powell, K (1997), p231

<sup>61</sup> Economist (2003), p13

<sup>62</sup> Becker, F & Sims, W (2001)

<sup>63</sup> Institute of Management and Administration (2003), p8

<sup>64</sup> British Council for Offices (2000)



## 5 Research findings: efficiency

### 5.5.4 The impact of systems design on spatial efficiency

Some organisations reduce space reconfiguration costs through universal workstation layouts, especially in back offices. Other organisations invest in “reconfigurations to support plural, non-territorial offices, mobile workstations, micro workstations and teaming spaces.”<sup>65</sup>

And optimisation of space use can take other forms. Nolan and Doyle<sup>66</sup>, for example, state that the average office desk is occupied for only 45% of the office hours – the rest of the time the worker is likely to be in meetings, visiting clients, on holiday, training or sick. Desk sharing, hotelling and non-assigned desks can have a marked effect on density of occupation, the impact of which can be considerable in purely financial terms. For example, Duffy cites the example of Andersen Worldwide, whose investment in tailor-made design for their newly occupied buildings in Chicago achieved by ‘space-use intensification’ a reduction of 30% of the space that would have been used by conventional layout designs, with the overall savings on rent and occupancy costs paying for the initial capital outlay within four years.<sup>67</sup>

Clearly, these categories of potential cost saving cannot be considered in isolation and there will be trade-offs. In considering capital cost and space efficiency for example, though shallower plan forms tend to cost more and are less space efficient, shallower plan buildings may lend themselves to cheaper, more domestic envelope construction, cheaper services and consequently lower management costs.<sup>68</sup>

### 5.6 Whole life cost models

The critical point is therefore that cost issues must be considered holistically, to identify the effects on overall costs of substitution effects (for example IT investments can reduce the need for

physical facilities) and utilisation effects (the business benefits that certain workplace strategies might produce). Again, for such thinking to become systematic, there needs to be a consistency of languages and methodology.

Enterprise Total Cost of Occupancy (ETCO) is one method that measures the “total cost of convening the workforce – that is the cost to create and maintain both physical and electronic workplaces, whether workers are in a traditional office, working at home or travelling on the road.”<sup>69</sup> It embraces:

- property occupation: rent, property tax;
- adaptation: fit-out, furniture, equipment;
- building operation: insurance, energy, maintenance, security, cleaning;
- business support: telephones, reception etc;
- equipment: fixed and mobile telecoms, computers, lighting, office supplies ;
- connectivity: voice data, paging, mail, PBX, VPN, satellite;
- IT support services: maintenance and repair, helpdesk, software applications, copying, mailing and faxing etc.<sup>70</sup>

ETCO can show where cost reductions may be found through alternative space procurement. *The Agile Workplace*<sup>71</sup> quotes a case study carried out by Verizon in the US, in which the costs of accommodating 100 staff over a three year period using conventional lease-occupancy was compared with a managed accommodation service offered by Regus. Although the rent costs were 50% higher for the managed accommodation, overall costs per person were reduced by a third, due to the inclusion of installation for cabling and data connectivity, furnishings and services within the rental charges for the serviced space.

<sup>65</sup> Loftness, V (1999), pA-3

<sup>66</sup> Nathan, M & Doyle, J (2002)

<sup>67</sup> Duffy, F & Powell, K (1997)

<sup>68</sup> Leaman A, & Bordass, W (1999) p4-19

<sup>69</sup> Bell, M in Jorroff, M & Bell, M (2001) p85

<sup>70</sup> This list is a composite from the British Council for Offices BCO Guide 2000: Best Practice in the Specification for Offices, p14; and Bell, M (2001), pp86-87

<sup>71</sup> Bell, M in Jorroff, M & Bell, M (2001), pp88-89

# 6 Research findings: adaptability and flexibility

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## 6 Research findings: adaptability and flexibility

*“Buildings by their nature have long design lives, whilst the requirements placed on them are changing rapidly in time horizons which are short... This can lead to complex and competing requirements throughout the various stages of the life of the building.”<sup>72</sup>*

### 6.1 Long v short term flexibility

Flexibility means different things to different stakeholders, and can apply to different parts of the building fabric. Users and Facility Managers may be concerned with the longer term issues of a building's responsiveness to changing requirements, whilst corporate managers are concerned with shorter term matters - such as the utility of the building as a physical asset, and particularly how easily the asset can be disposed of once requirements change. The long-term value of a building is usually a function of its own mutability, or its ability to accept a variety of uses without changes being required of its infrastructure. Bordass & Leaman<sup>73</sup> refer to this when they make a distinction between flexibility (short-term, such as in-built redundancy of air-conditioning systems to handle shifting occupancies) and adaptability (long-term), and point out that these two requirements can sometimes be in conflict.

### 6.2 Building Lifecycle Model

The issue of timescales is crucial in determining the required flexibility of a building. The Building Lifecycle Model described previously points to a hierarchy of dependencies, and suggests priorities for assigning adaptability capabilities (both more expensive initially and more difficult to change later).

The implication of the analysis of office space in terms of the longevity of design decisions is that both architects and clients should avoid short-circuiting investments by failing to adopt a cohesive approach across scales of the building. Both the supply and demand sides should focus primarily on the most long-term and robust decisions relating to site, shell, skin and services decisions, whilst recognising that scenery, systems and settings are inherently more changeable. It makes little sense to plan for flexibility of use for a component when its use is dependent on a higher order of building flexibility that may be absent.<sup>74</sup> Decisions about the site, shell, skin and services of office buildings demand careful attention to the long-term changes that are likely to become significant as time goes on. Meanwhile, due attention to the design of services, scenery, systems and settings is the means of ensuring flexible environments for changing businesses.

### 6.3 Adaptability: a long term approach, providing for future users

#### 6.3.1 Strategic decisions

Before considering the attributes of a particular building, occupiers still have two critical strategic decisions:

- **To own or to lease.** The choice between owning and leasing property will have an impact on an organisation's ability to handle long-term changes. As Evans states: *“By outsourcing its property portfolio, the occupier can potentially save costs, increase flexibility, reduce risk, and more closely align its corporate real estate with business strategy.”<sup>75</sup>*
- **Site selection.** The accessibility of a site, local amenities, the aspect, and the provision of car parking all affect adaptability – as does the provision for multiple tenants in regard to access, arrival, visibility, security, subdivisibility and shared services.

#### 6.3.2 Shell: medium depth floor plates

More interactive and intermittent patterns of occupancy within offices mean that medium depth buildings with atria may become more suitable for many users. Deep central core and shallow depth configurations tend to be more tenant specific and generally less adaptable. As a result these buildings are comparatively more vulnerable to change.<sup>76</sup>

Plan depths in the UK converge on a range between 15 and 18m, because of their suitability for most mechanical and mixed mode air-handling systems.

Narrower floor plates struggle to accommodate mixed cellular and open plan working space, while floor plates deeper than 21m can have disadvantages in terms of comfort, aspect and environment, unless they are carefully and appropriately designed.

#### 6.3.3 Shell: ceiling heights

Ceiling height is related to the idea of 'loose fit', an antidote to the buildings of the 1960s and 70s which were over specified, then value engineered, and now have insufficient floor-to-ceiling heights to accommodate IT requirements.

Key facilities that contribute to adaptive servicing design include relatively generous floor-to-floor heights with risers sufficient to accommodate future servicing, as well as machine rooms designed to accommodate additional mechanical, electrical, voice and data services. The additional capital cost for such extra capacity should be of the order of 5%.

<sup>72</sup> Evans, R in Macmillian, S (ed) (2003), p42

<sup>73</sup> Leaman, A & Bordass, B in Macmillian, S (ed) (2003)

<sup>74</sup> Leaman, A & Bordass, B in Macmillian, S (ed) (2003), pp 151-152.

<sup>75</sup> Evans, M (2000)

<sup>76</sup> Duffy, F & Powell, K (1997), p95

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### 6.3.4 Shell: regular structural and planning grids

Structural grids should be based on a multiple of the planning grid. For planning grids, 1.5m is the most flexible for open plan and cellular spaces (although 1.35m co-ordinates with parking and brick dimensions), and 7.5 to 9m structural spans have become the industry norm. It is not always practical or economic to do away with internal columns altogether, but columns must be carefully aligned with primary circulation routes.

### 6.4 Flexibility: accommodating short term changes

#### 6.4.1 Manageability

Bordass & Leaman categorise buildings along two axes: technological complexity and management input. In their view the best performing buildings are those that have a consistent link between building technology and manageability. They give examples of buildings which have appropriate levels of maintenance and management to deal with relatively high levels of technological complexity (such as Tanfield House, 1995); or which are simple and self-managing (such as The Elizabeth Fry Building, 1998). However, they find that most buildings display the worst combination: technological complexity with inadequate management resources.<sup>77</sup>

#### 6.4.2 Services: redundancy and appropriate specification for change

Office development in the UK has a history of over-providing mechanical and electrical services as a way of buying immunity from future uncertainty. This was particularly true in the 1980s, when usable sectional heights were constrained by over-capacity of heating, cooling and ventilation plant in raised floors and suspended ceilings.<sup>78</sup> During an expert seminar held by CABE in February 2004, services were highlighted as being important, but likely to have a smaller impact on flexibility than building depth and ownership.

In *New Environments for Working*,<sup>79</sup> the concepts of hive, den, cell and club are introduced to characterise working patterns, and Laing et al set out recommendations for HVAC systems appropriate for each. For example, 'club' settings are best served by mixed mode and distributed HVAC systems. Medium depth atrium and medium depth slab buildings can most easily accommodate a shift to den and club working, and HVAC systems that are more responsive and controllable at a local level (mixed mode) are better suited to facilitating this shift.<sup>80</sup>

#### 6.4.3 Services: subdivisibility and subtenancy

An essential quality of all commercial office buildings is the capability to support a range of subtenancy options. This serves two agendas: it offers more letting options and unit sizes and therefore more flexibility to the market to meet changing needs over time; and it offers occupiers more flexibility to absorb organisational and workstyle change over time. It is essential that each subdivisible unit is entirely self-supporting with direct access to passenger and goods lifts, toilets, vertical services and independent means of escape.

#### 6.4.4 Churn: the high costs of internal movement and re configuration

The need to reduce the cost of internal relocations (or 'churn') is often cited as the most pressing reason for investing in flexible infrastructures. Becker and Sims cite total costs in a physical workstation move of \$2,000–\$4,000 compared with \$400–\$600 per move for a 'box move' (an individual changing location with only his or her own belongings).<sup>81</sup> With many businesses having an annual churn rate of 50% or more,<sup>82</sup> this represents a substantial business cost.

There is a strong body of evidence across organisation type and sector that raised access floors and modular wiring have had a significant effect on churn costs by comparison with cellular (fixed outlet) floors. In a 1993 study, York identified a 79% annual reduction in churn cost and a 40% reduction in Facilities Management staffing costs in a building with a raised access floor and modular wiring, as compared to a conventional North American office building with poke-through wiring distribution and wired systems furniture.<sup>83</sup>

Similarly, a 2003 study identified a 90% decrease in churn cost in a building with under-floor HVAC, power, telephone and data systems over a building with ceiling-based HVAC and a cellular floor,<sup>84</sup> although these benefits may diminish with the gradual introduction of wireless connectivity.

More significantly, churn costs will be minimised in businesses where group reconfiguration is rare, and where cultures of space ownership and working patterns allow the movement of people, not walls. This will in turn be facilitated by flexible furniture arrangements. As Becker reports: "*open plan bullpen environments with free-standing furniture offered greater flexibility and speed for dealing with organisational change, whilst reducing the cost of churn.*"<sup>85</sup>

<sup>77</sup> Leaman, A & Bordass, B in Macmillian, S (2003), p147

<sup>78</sup> Leaman, A & Bordass, B in Macmillian, S (2003), p150

<sup>79</sup> Laing, A et al (1998)

<sup>80</sup> Laing, A et al (1998), pp58-61

<sup>81</sup> Becker, F, & Sims, W (2001), p41

<sup>82</sup> Evans, R et al (2004), p47

<sup>83</sup> York, T (1993), p23

<sup>84</sup> US Department of Energy, (2003)

<sup>85</sup> Becker, F & Sims, W (2001), p46

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# 7 Research findings: staff performance

*“The productivity of 20% of the office workforce in the USA could be increased by improving office air quality.”<sup>86</sup>*

*“A 2 to 5% increase in staff performance can cover the total cost of providing their accommodation.”<sup>87</sup>*

*“If companies can enhance knowledge worker productivity in this century anywhere near as much as they did with manual labour over the course of the last one, the payoffs will be astronomical.”<sup>88</sup>*

## 7.1 Introduction

In research to date the relationship between design cause and business effect has been investigated most extensively in the area of comfort, somewhat less so in terms of staff performance, and least in the area of internal expression. However, the collective knowledge of research, case studies and professional experience demonstrates the benefit of combining efforts aimed at all three levels.

In assessing user satisfaction, organisational factors (hierarchy, culture, reward systems, leadership) have the largest influence, followed by individual factors (such as aspiration, rewards, loyalty, self-motivation, aptitude, experience and training).<sup>89</sup> The extent to

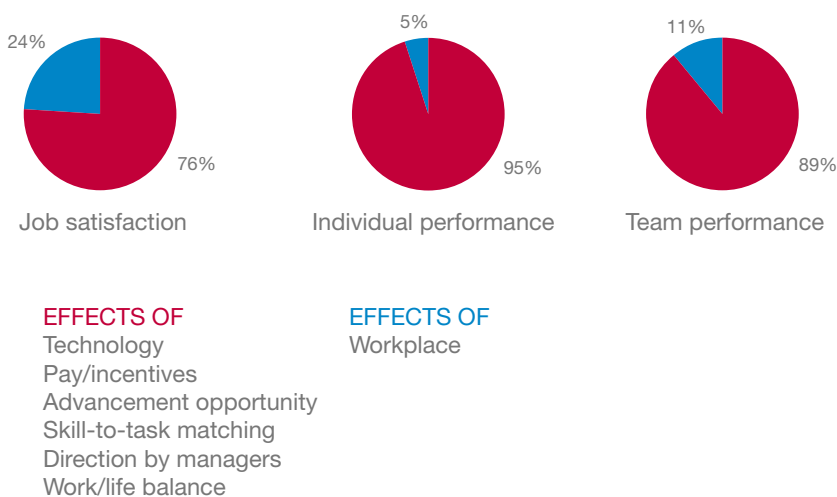
which the office infrastructure contributes to these factors has proved difficult to quantify. Nonetheless, claims have been made that the workplace is responsible for 24% of job satisfaction,<sup>91</sup> and that this can affect staff performance by 5% for individuals and (because of the benefits of improved interaction) by 11% for teams.

Companies that have tracked turnover levels and made an explicit link to changes in the workplace report benefits. At a financial services firm in Sydney, staff turnover was reported to be down from 25% to 11% following an office refurbishment,<sup>92</sup> although separating out the extent to which this was due to operational or design improvements requires validation.

Similarly, in a major UK company, staff turnover in a call centre operation reduced by 11% after a move to new premises (where the company estimated training costs at £13,000 per employee); whilst output more than doubled (from 35 calls per employee handled pre move to 74 calls post move) over the same period.

A similar exercise that considered absenteeism, showed a clear effect in reduced absence from work in a group that had moved to new premises, by comparison with staff continuing at five other company locations.

**Figure 26: Effects of workplace on job satisfaction and staff performance<sup>90</sup>**



<sup>86</sup> Leaman, A & Bordass, W in Clements-Croome, D (2000), p171. See also Lorsch and Abdou 1994a, 1994b, 1994c.

<sup>87</sup> Oseland, N (2001)

<sup>88</sup> Peter Drucker, quoted in Pay for Performance report, 2001, Institute of Management and Administration.

<sup>89</sup> See also CIBS Technical memoranda quoted in AWA Workplace and its impact on productivity.

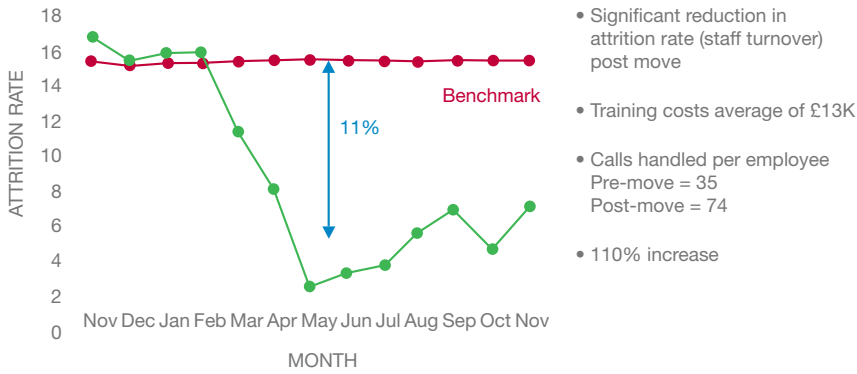
<sup>90</sup> ...

<sup>91</sup> Brill, M et al (2001), p18

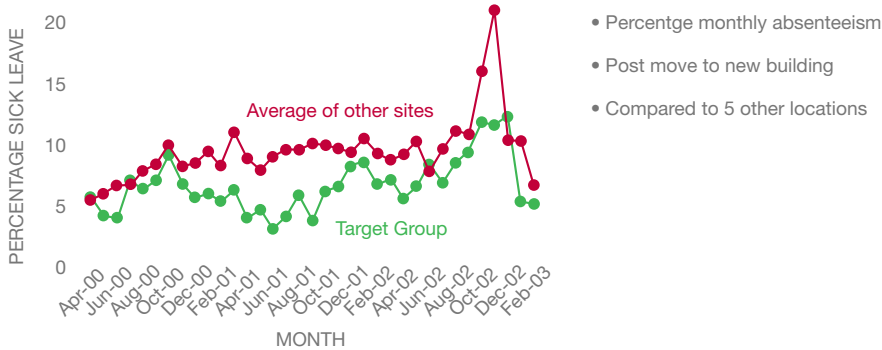
<sup>92</sup> Duffy, F & Powell, K (1997)

## 7 Research findings: staff performance

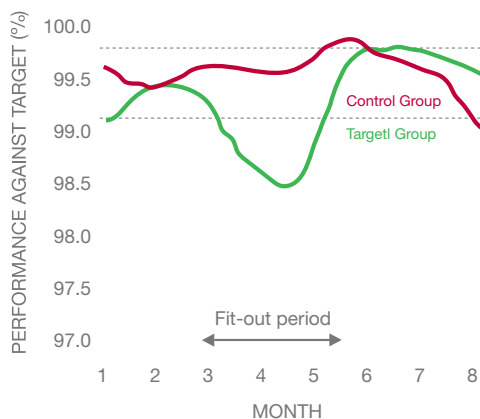
**Figure 27: Reduced staff turnover in group after move to new premises** <sup>93</sup>



**Figure 28: Reduced absenteeism in group after move to new premises** <sup>94</sup>



**Figure 29: Improved performance in group after refurbishment of premises** <sup>95</sup>



<sup>93</sup> add footnote

<sup>94</sup> ?

<sup>95</sup> Webber, BT (2000)

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Finally, in looking at the performance of part of a workforce after refurbishment of their premises by comparison with colleagues continuing in parts of the building still unrefurbished, a call centre operator recorded a small but positive effect.

In all of these cases there will be extraneous factors also at work, but they are notable because the data that is measured is objective, there is a control group – and the measured effect is consistently positive.

### 7.2 Health, safety and comfort

#### 7.2.1 Getting the basics right

Improving users well-being in buildings, through the so-called 'hygiene factors' relating to health and comfort, is the essential first step in improving business performance. These, with rare exceptions, should be incorporated into all workspaces. According to research by the healthcare consultancy IHC, 40 million days are lost each year in the UK through workplace absenteeism, at least 70% of which are related to health issues. For example, health issues account for up to 30% of benefits payments.<sup>96</sup> According to the Confederation of British Industry, £11.5bn was paid out during 2002 in wages to absent employees and on additional overtime and temporary staff cover.

Leaman suggests that the most important factors in comfort provision are: rapid response, manageable complexity, alleviation of discomfort, integration of systems, and minimisation of time in operation for users.<sup>97</sup>

And yet, post-occupancy feedback often establishes that these basic requirements of human comfort (and therefore performance) are not delivered – and, in a reflection of Maslow, basic physiological needs must be met before 'higher' aspirations can be served effectively.

#### 7.2.2 Baseline health and comfort

There is a strong relationship between perceived comfort and self reported productivity, with differences in productivity as high as 25% reported between comfortable and uncomfortable staff.<sup>98</sup> *"Productivity, health and satisfaction variables are almost always linked to comfort – the better the occupants think the indoor environment is, the more likely people are to say they are productive, healthy and happy."*<sup>99</sup> In his work on Building Use Studies, Leaman uses reported dissatisfaction levels for environmental factors, and links these to self-reported productivity levels. In the buildings tested, the importance of environmental comfort factors and self-reported productivity

losses were ranked and were found to be the most important factors are air quality, followed by temperature, overall comfort, noise, and finally lighting.<sup>100</sup>

These are based on average responses, though, and it should be noted that many individuals react differently to different stimuli and levels of comfort. For example, whilst some people are extremely sensitive to sound, others may be more sensitive to temperature.

#### 7.2.3 Air quality

Many air quality studies focus on the decrease in reported symptoms attributed to Sick Building Syndrome (SBS), as a result of the improved delivery of outside air. The decrease in SBS has in turn been suggested to have a proportional impact on productivity. Wargocki and Wyon indicate that for every 10% reduction in reported SBS symptoms, a 1.1% increase in productivity may follow. In a 1991 building study, Hall et al identified that 3% of workers surveyed left work early or stayed home, and 8% had reduced ability to work, due to symptoms attributed to insufficient air delivery systems in the workplace. This downtime could be reduced by an average of 20% by improving outdoor ventilation air delivery.<sup>101</sup>

Meanwhile, a multiple study of school children in classrooms with openable windows showed 7–8% higher test scores than those with fixed windows,<sup>102</sup> again indicating the effect of fresh air on performance.

It has been found that successful ventilation strategies often include the following characteristics: mixed-mode systems (ie air conditioning systems supplemented by natural ventilation); decoupling of heating/cooling and ventilation; provision of task air; increased outdoor air ventilation rate; and reduction of pollutants.<sup>103</sup>

#### 7.2.4 Temperature

Extremes of temperature have been found to have a negative impact on productivity. Decreases in productivity of the order of 30% have been found in factories experiencing extreme temperature conditions.<sup>104</sup> This assertion is supported by David Wyon's 1974 analysis of data from a 1914 controlled experiment by the New York State Commission on Ventilation, which reported a 46% reduction in typing speed and accuracy at temperatures warmer than 24°C.<sup>105</sup>

Although research has attempted to establish a precise temperature at which individuals are most comfortable or productive, individual variation is substantial. In 1999 field study research by de Dear et al, 23.5°C was reported as the preferred temperature.<sup>106</sup> However, this generalisation has to be qualified by reference to:

<sup>96</sup> US Department of Labor, Bureau of Labor Statistics (2003)

<sup>97</sup> Leaman, A & Bordass, B in Macmillian, S (ed) (2003)

<sup>98</sup> Leaman, A & Bordass, B in Macmillian, S (ed) (2003), p171

<sup>99</sup> Leaman, A (2003)

<sup>100</sup> These areas of importance are indicated by a series of questions asked on occupant survey forms designed and developed by Adrian Leaman. Such indicative questions include occupant ratings of their thermal comfort in winter and summer, noise, lighting, and overall comfort.

<sup>101</sup> Hall, H et al (1991), pp33-35

<sup>102</sup> Hescong, L et al (2002), pp21-25

<sup>103</sup> Loftness, V et al (1999)

<sup>104</sup> Oseland, N (2001)

<sup>105</sup> Wyon, D (1974), pp309-318

<sup>106</sup> Leaman, A & Bordass, W in Clements-Croome, D (2000), p168



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- the substantial number (30%) of individuals who prefer spaces warmer or cooler;<sup>107</sup>
- anecdotal reports indicating that individuals perceive air quality to be better when air temperature is cooler (with a further indication in regard to individual productivity, that tolerance may be greater when space is slightly cooler than when space is slightly warmer);
- and the New York State Commission on Ventilation findings, indicating that the comfortable temperature will vary depending on physical activity.

These findings as a whole point to the considerable benefit of providing the means of thermal and ventilation control to individuals (see para 7.2.8 below).

### 7.2.5 Overall comfort

Attention to ergonomics has been found to have substantial positive impacts on people's productivity, as well as on the reduction in the healthcare insurance payments for workplace related disorders. A 1990 study found a 23% increase in computer-based data entry and editing when sub-optimal workstations were replaced with improved workstations and ergonomic chairs.<sup>108</sup> Similarly, simple interventions such as the introduction of adjustable ergonomic chairs, wrist rests, and adjustable keyboard supports have been found to increase productivity by 10%, as well as reduce cumulative injuries.<sup>109</sup>

Additional studies show reductions of up to 60% in the risk of musculo-skeletal injuries with the introduction of height-adjustable titling keyboard trays;<sup>110</sup> whilst insurance costs for repetitive strain injuries decreased by 63% with the introduction of a comprehensive ergonomics programme.<sup>111</sup>

### 7.2.6 Noise

There are strong indications that point to the importance of ensuring appropriate noise levels in the workplace. Loewen and Suedfeld (1992) report improvements of 38% in the performance of simple tasks and 27% for complex tasks when working in an environment with white noise, as compared to tasks in unmasked noise conditions.<sup>112</sup> Ventilation noise in particular has been tested and found to affect work performance. Waye et al found the elimination of low frequency ventilation noise resulted in an 8% improvement in the perceived interference with performance.<sup>113</sup>

Acoustic conditions suited to work are, however, the subject of a balance between adequate quiet (to avoid discomfort and disturbance see para 8.3.4 below) and adequate masking sound (to protect confidentiality and create a "buzz"). A workplace can consequently be either too noisy or too quiet.

### 7.2.7 Lighting

In school environments, it was found that school children in well lit classrooms received test scores 15% higher on average than those in classrooms with little or no daylighting.<sup>114</sup> The increase in classroom test scores, representing a measure of individual performance, indicates the importance of daylight.

Daylighting design has also been linked to a 15% reduction in absenteeism in office environments and improvements in student attendance at school.<sup>115</sup> Increases in productivity of between 2.8% and 20% attributed to increased illuminance levels have also been found in other studies.<sup>116</sup>

There is also an operational issue here. In a case study of Lockheed Building 157 in Sunnyvale, California, Thayer identified 50% savings in lighting, cooling and ventilation energy as well as a 15% reduction in absenteeism, due to an integrated daylighting design that harmonised layout, orientation, window placement, type of glazing, light shelves and ceilings.<sup>117</sup>

### 7.2.8 Personal control

Providing personal control over the local environment has been found to have two main performance benefits.

Firstly, individuals are found to be more tolerant of fluctuations in interior comfort factors when they have control over them. If given control, occupants are likely to remain satisfied despite slightly lower building performance – although controlled laboratory conditions indicate a narrower tolerance of factors such as temperature variation than are reported in field studies. Context plays a substantial role in the evaluation of comfort. Occupants will usually forgive faults when obvious efforts have been made to resolve them, or when they have proved difficult to solve.<sup>118</sup>

Secondly, occupants have been found to value the sense of control which is provided by such responsive systems. Personal control over individual comfort has been identified as a significant variable in perceived productivity.<sup>119</sup> Leaman has shown that as perception of control rises, especially for noise and cooling, so does perceived productivity. Central to this is the important distinction highlighted by Leaman & Bordass between comfort provision and discomfort alleviation. The ability of users to rectify unforeseen discomforts (glare, draughts etc) through small changes that they can make themselves has a positive effect on reducing dissatisfaction levels. Although the relative importance of factors varies, individuals generally value control over heating, cooling, ventilation, noise and lighting.

Personal control has been found to increase productivity in the range of 3% when environmentally responsive workstations

<sup>107</sup> Leaman, A & Bordass, W in Clements-Croome, D (2000), p168

<sup>108</sup> Dainoff, M (1990), pp49-67

<sup>109</sup> US Department of Labor Bureau of Labor Statistics (1999)

<sup>110</sup> Hedge, A et al (1999), pp1333-1349

<sup>111</sup> Ignatius, E & Fryer, B (1994), pp 45-46

<sup>112</sup> Loewen, L & Suedfeld, P (1992) pp381-395

<sup>113</sup> Waye, K et al (1997), pp467-474

<sup>114</sup> Heschong, L et al (2002), pp21-25

<sup>115</sup> Thayer, B (1995), Romm, J & William, D (1994)

<sup>116</sup> Oseland, N (2001)

<sup>117</sup> Thayer, B (1995), pp 26-29

<sup>118</sup> Leaman, A & Bordass, W in Clements-Croome D (2000)

<sup>119</sup> Leaman, A & Bordass, W in Clements-Croome D (2000), pp172-173

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which provide occupant control of temperature, air supply, sound masking and lighting are introduced;<sup>120</sup> and the same perceived magnitude when individual temperature, air speed, and air direction control are introduced in place of conventional overhead distribution systems.<sup>121</sup> Personal control over the mechanisms of comfort factors may be a key way of both providing for exceptional quality comfort and delivering a message of autonomy and importance. However, it is often impractical to provide high levels of control at individual workstations. There must, therefore, be a balance between appropriate provision for control and responsive systems.

A control-rich, naturally ventilated environment should be the default, with complex systems adopted only in the minority of occasions when temperature and humidity conditions exceed tolerance thresholds. Designers should depend upon simple, robust control devices such as openable windows, radiator valves and window blinds; and where control of the environment is centralised, rapid response to uncomfortable conditions is essential. Particular attention should be paid to control mechanisms for noise and cooling.<sup>122</sup>

The best buildings are those that are briefed, designed, constructed, used and managed with a mandate to deal with technological complexity and manageability: either managed complexity, or delegated simplicity. As Bordass & Leaman have pointed out, though, the most common problem is unmanageable complexity.<sup>123</sup>

In summary, careful specification of building systems is critical when trying to enhance staff performance.

### 7.3 Supporting work processes

#### 7.3.1 Communication v concentration

The matter of communication versus concentration receives much attention in the literature on the design of workplace environments, and has been at the core of arguments over whether open plan is preferable to cellular offices. Discussions of optimal workgroup sizes, the moderation of acoustics (given the content and range of human speech), perceptions of privacy, and systems for allocating work space are also related to these arguments.

It would be felicitous if it were possible to show a direct causal relationship between increased open space and increased communication and improved productivity. However, the debate also involves complex issues of privacy, individual creativity and the encouragement of innovation and knowledge management within the organisation studied. The fact that a definitive causal relationship has not been found indicates the extent to which the answer is dependent upon the unique characteristics of individual organisations.

The development of theories of knowledge management in the 1990s, particularly with regards to tacit knowledge transfer, has led to the perception of communication as a panacea. Empirical findings illustrate a paradox of knowledge management: the best transfers are serendipitous, personal and private, yet the best insights need periods of intense and private reflection as well as periods of exposed communal activity.

The challenge is balancing the organisation's requirements for both communication and concentration, and devising spaces that can respond to and catalyse the highly complex process of social interaction at work.

#### 7.3.2 Communication

Tom Allen's work on the link between communication and the built environment<sup>124</sup> defines three types of technical communication: co-ordination, which suffers least from physical separation, then dissemination and creativity, both of which are more sensitive to physical distance.

In his work on horizontal separation, Allen showed that the probability of interaction between individuals declines significantly after the first 50m of separation, and that this result is largely independent of the industry measured. Allen discovered that a similar pattern of declining probability of interaction occurs with members of project teams and members of departments, although members of project teams will tend to communicate more due to the higher interdependence of project tasks.<sup>125</sup>

Allen cites Hauptman's work on telecommunications, which shows that the use of all media (not just face-to-face communications) declines with distance. He also underlines the point that telephone and electronic mail are limited by bandwidth, meaning that complex and abstract communication are difficult to achieve by this means. Even video-conferencing is not considered to be a suitable substitute for face-to-face interaction, particularly for more creative forms of technical communication.<sup>126</sup>

In a 1990 report, Kraut claims that more than 80% of the most valuable interactions can be classified as informal, including the type of short interactions that might occur while passing in a hallway or while stopped at a vending or coffee machine.<sup>127</sup> The point of informal interaction, particularly of the last type, seems to be in its aggregate effect in transferring knowledge specific to the organisation.

At the Decker Building of the Corning Glass Works, a multi-storey building for manufacturing engineers, provided with atrium, elevators, open stairways and ramps, Allen found that the probability of regular technical communication between engineers on separate floors was 14 times higher than in similar buildings without visual vertical contact and easy vertical movement.

<sup>120</sup> Kroner, W et al (1992)

<sup>121</sup> Bauman, F et al (1992)

<sup>122</sup> Leaman, A (2001) and Leaman, A & Bordass, W in Clements-Croome D (2000)

<sup>123</sup> Leaman, A & Bordass, W in Macmillian, S (2003)

<sup>124</sup> Allen, TJ (1997)

<sup>125</sup> Allen, TJ (2001)

<sup>126</sup> Allen, TJ (1997), pp14-15

<sup>127</sup> Ward, V & Holtham, C (2000), p7; see also Kraut, R et al (1990)

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However Allen himself caveats the results: “*There are many other differences between the organisations. We have no control over work relationships or any other form of relation which might exist between floors in the three organisations.... [but] the provision of visual contact and easy vertical movement certainly did no harm.*”<sup>128</sup>

### 7.3.3 Concentration

The focus on the importance of open, communicative and collaborative environments conflicts with studies explicitly demonstrating the value of quiet spaces for those engaged in tasks that require uninterrupted concentration. For example, Banbury and Berry showed that individuals working in quiet spaces achieved 16% higher performance scores in memory tests, and almost 40% higher in mental arithmetic tasks, as compared to open office environments with 65dB(A) background noise including speech.<sup>129</sup>

In a controlled laboratory experiment, Wolfgang and Hellbruck identified that irrelevant speech and music brought an 8% increase in total error rate in serial recall tasks when compared to the error rate in quiet conditions. The introduction of masking sound at the level of the disruptive speech (“pink noise”<sup>130</sup> at

65dB) was effective at eliminating these discrepancies.<sup>131</sup>

Such reports suggest that design is capable of delivering audio privacy in the workplace. However, the ability to do this is limited by the need to install barriers and other surfaces which may reduce apparent openness. A balance must be sought. Loewen and Suedfeld identified that performance scores on simple tasks under masked office noise conditions were 12% higher than those under quiet conditions and 20% higher than under unmasked conditions, due to arousal effect. Performance scores on complex tasks were 5% higher in quiet spaces than under masked noise conditions, and 14% higher than under unmasked noise.<sup>132</sup>

Brill ranks the ability to do distraction-free solo work as the workplace factor with the strongest effect on productivity.<sup>133</sup> There is also a wealth of laboratory data to back the assertion that quiet spaces are necessary for concentrated tasks. Mawson’s AWA paper<sup>134</sup> discusses the distracting effects of interrupting individual concentration, citing De Marco and Lister’s theory of flow, in which it is posited that, following a distraction, 15 minutes of immersion time is required to return to optimal levels of concentration. Mawson also quotes Harvard Business Review research which suggests that general conversational distraction

<sup>128</sup> Allen, TJ (1997), pp22-23

<sup>129</sup> Banbury, S & Berry D (1998), pp499-517

<sup>130</sup> Unlike white noise, pink noise bears a logarithmic characteristic representing a psycho-acoustic equivalent of white noise adjusted for human hearing. Pink noise is characterised by equal energy per octave, instead of equal energy per

frequency like white noise.

<sup>131</sup> Wolfgang, E & Hellbruck, J (1998)

<sup>132</sup> Loewen, L & Suedfeld, P (1992), pp381-395

<sup>133</sup> Brill, M (1986)

<sup>134</sup> Mawson, A (2002)

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causes 70 minutes of lost productivity in an 8 hour office day.

### 7.3.4 Appropriate density

Tornqvist (1983) concluded that creative milieux have shared characteristics, and that communication thrives between different areas of competence. He also argued that successful communication implies a certain 'density,' and thus a kind of overcrowding and chaos.<sup>135</sup>

Connectivity and density also are themes explored by Frank Becker.<sup>136</sup> As discussed previously in this report, Becker believes that a sense of energy is associated with an increase in density, up to a critical point which he puts at 5 square metres per person.<sup>137</sup> Although critical densities vary with sector and type of work, conventional design recommendations prescribe densities of not more than 14–15 square metres net internal area per person.<sup>138</sup> The discrepancy between these two figures suggests there is no density that is appropriate for all organisations.

Becker also compares various types of working environment in the US office market, from enclosed offices to bullpens (team spaces) to individual cubicles. An advocate for open working environments, he nonetheless demonstrates that the 'Dilbert' cubicles perform badly on every measure of team and individual effectiveness.

The observed frequency of interactions is higher in more open office types (eg "bull pens"), whilst the observed duration of interactions is shortest in those same office types.<sup>139</sup> Open small-scale team environments increase the "flow of information that employees view as fostering better quality work and faster decisions."<sup>140</sup>

In PROBE 15, Lehman & Bordass recommend that "well integrated work groups of four to five people is acceptable, but the risks of lower productivity in bigger work groups can increase proportionately."<sup>141</sup> This recommendation is based on observations that "perceptions of productivity are higher in smaller and more integrated work groups."<sup>142</sup>

### 7.3.5 Variety of work settings

Activity settings are a design approach intended to overcome the shortcomings of both cellular and open-plan environments. The concept is based on the premise that in the context of knowledge work a single, all-purpose workstation is no longer sufficient. The aim is to offer a variety of spaces to accommodate the range of specialist activities undertaken within an organisation. Given that the more functions and activities people have to cope with [at their workstation], "the less likely they are to say they are



<sup>135</sup> Ward, V & Holtham, C (2000)

<sup>136</sup> Becker, F & Sims, W (2001)

<sup>137</sup> Becker, F & Sims, W (2001), p46

<sup>138</sup> British Council for Offices (2000)

<sup>139</sup> Becker, F & Sims, W (2001), p27

<sup>140</sup> Becker, F & Sims, W (2001), p1

<sup>141</sup> Leaman, A & Bordass, W (1999), pE21

<sup>142</sup> Leaman A & Bordass, W (1999), pE20

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productive as well"<sup>143</sup>, providing a range of settings allows individuals to be suitably accommodated. Staff members are at liberty to choose the activity setting that best fits their task and move between alternative spaces for specific needs during the day.

### *Illustrative cases: BP Blue Chalk and Sun Microsystems*



*In a field study to test the BP Blue Chalk programme of office design, Rasmussen used questionnaire analysis to assess three different types of work space: enclosed (high ownership of cellular space), restack (open plan) and 'Blue Chalk' (BP's version of activity settings).*

*The questionnaire analysis revealed perceived improvement in communication, collaboration, creativity and performance in the third type of layout. Statistically significant benefits were achieved in all four areas: approximately 13% greater performance, 15% greater communication, 18% greater collaboration, and 10% increased creativity.<sup>144</sup>*

*Sun Microsystems' Director of Workplace Effectiveness reports that the introduction of a variety of settings designed to enhance the informal spread of ideas contributed to a perceived 10% gain in individual productivity and 7% in team productivity; and added that "even if the amounts are half that, it results in millions of dollars in productivity gains".<sup>145</sup>*

Flexible ways of working with different activity settings require rules for the use of shared workstations to ensure the establishment of a corresponding working culture. For example, a clear desk policy

may be needed to support availability of temporarily used workstations, occupied either on an ad-hoc basis ('hot desking') or by reservation through an automated central booking system ('hotelling'). Such systems allow advance booking of rooms with special equipment such as video-conferencing.

### 7.4 Internal expression

*"Environments have to be designed which enable staff to see that the company means what it says. You can't eat, drink or sit on vision and value statements."<sup>146</sup>*

#### 7.4.1 Values and brand

In addition to its impact on health and comfort, and the provision of physical support for work processes, the workplace may also be used as a means of communicating the beliefs and values of an organisation between employees and employers. Whether or not the message is being consciously managed, staff will interpret the physical clues around them to evaluate the organisation and their relationship to it. Even if basic physical health and comfort needs have been met, and operational performance has been optimised, a workplace can still fail dramatically if it conveys messages which contradict organisational values. Emotional, communal and personal needs of users are either satisfied or frustrated, with attendant impacts on job satisfaction, productivity and job retention.

When an organisation focuses on the design, use and management of its space in terms of the messages it communicates to staff, it embraces the notion of 'internal branding' – as described in Wolff Olins's assertion that a brand has two roles: that of persuading outsiders to buy and insiders to believe.<sup>147</sup>

As Gregory explains: *"Employees are a target audience, a channel of communications, and part of the company message itself. Employees can make or break the corporate brand."<sup>148</sup>* By using space to respond to employee needs, values may be communicated throughout an organisation; and the effect of such communication may be gauged through proxy measures such as staff satisfaction and turnover rate. Internal branding may impact on the performance of staff by allowing them to understand and embrace the 'brand promise', so that employees who believe in the brand work harder and better, and in doing so create brand differentiation.<sup>149</sup>

<sup>143</sup> Leaman, A (2003), p315

<sup>144</sup> Rasmussen, N see also BP (2002)

<sup>145</sup> Haynes, B et al (2000)

<sup>146</sup> Olins, W (2003), p8

<sup>147</sup> Olins, W (2003), p10

<sup>148</sup> Gregory, J & Wiechmann, J (1997)

<sup>149</sup> Webster, K (2002)

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### 7.4.2 Offices as brand experience

In a recent study examining what distinguishes successful companies from their less successful competitors, Colins and Porras described the key features of companies which preserved a leading market position over long periods of time – so called ‘visionary companies’. They suggested that “*visionary companies translate their ideologies into tangible mechanisms aligned to send a consistent set of reinforcing signals.*”<sup>150</sup> They emphasise that using office and facility layouts, designed to reinforce norms and ideals, is one of the principal measures adopted by leading companies to strengthen social cohesion.

Myerson and Ross (2003) describe a set of fourteen projects, each of which tells “*a story about a company and its brand through an experience or journey through interior space.*”<sup>151</sup> They state that “*the narrative office brings brand values alive, acts as a receptacle for corporate memory and gives employees constant visual stimuli in their environment to promote a service ethos.*”<sup>152</sup>

In some examples, companies feature branded iconography specific to the sector, and the messages are not only legible but literal: Ogilvy and Mather’s offices in Los Angeles, for example, uses billboards and screens on its walls.

Other messages are less explicit, but nonetheless powerful, such as the decision to make the toilets at the Cellular Operations call centre

in Swindon a technological experience (with electronic taps and fibre optics).

### 7.4.3 Artefacts and aesthetics

In his assessment of communities of practice, Wenger asserts that the interaction between participant and artefact is key to the existence of shared meaning in communities.<sup>153</sup> Thus the interactions of staff with space create a sense of community and identity within the organisation. Ward et al note that “*throughout history, images of creativity have emphasised the importance of access to objects, artefacts and symbols as direct stimuli to creativity.*”<sup>154</sup>

This theme is increasingly taken up in office spaces, such as the British Airways Waterside project where art and environment are introduced into the space to encourage reflection and creativity. Tuan suggested that; “*Pictorial art and rituals supplement language by depicting areas of experience that words fail to frame ... Art makes images of feeling so that feeling is accessible to contemplation and thought.*”<sup>155</sup>

The culture of an organisation is reinforced by the expression of core values and brand. It has been asserted that space also has a role to play in encouraging an organisational culture to change,<sup>156</sup> and that space can continue to support an existing organisational culture.<sup>157</sup> However, the method for achieving this is less clearly defined.

Case studies are perhaps the most informative method of demonstrating that successful internal expression requires more than a simple one-dimensional approach. The complex relationships between the elements at an organisation’s disposal must be carefully managed, as ‘branding’ is by its very nature about differentiation, and the communication of that differentiation.

#### **Illustrative case: J Walter Thompson**

*In 2002 J Walter Thompson, the advertising agency, moved from a site in Berkeley Square, which they had occupied for over 50 years, to new offices in 1 Knightsbridge Green. JWT already had a strong, well-established brand but used the move as an opportunity to renew the way their space embodied their brand.*

*The Knowledge Centre is based next to the reception area and forms the hub of the office. It is regularly used by employees, but clients are also welcome to drop in and use the resources. An open staircase links the reception area to the first floor and is intended to help staff and visitors feel the energy of the business. It leads into a bar, which is used throughout the day and evening for meals, meetings, and events; and it also provides a showcase for the brands of JWT clients. The bar leads onto a grassed roof terrace which is heavily used. Any time the weather is good, this area is added to the square footage of the office.*

*Each floor features an “inspiration zone” – a space for thinking, brainstorming, creating new ideas. The content of these zones is*

<sup>150</sup> Colins, J & Porras, J (2000)

<sup>151</sup> Myerson, J & Ross, P (2003), p17

<sup>152</sup> Myerson, J & Ross, P (2003), p17

<sup>153</sup> Wenger, E et al (2002)

<sup>154</sup> Ward, V & Holtham, C (2000), p8

<sup>155</sup> Cited in Ward, V & Holtham, C (2000), p8

<sup>156</sup> Peters, T (2003)

<sup>157</sup> Kerslake, P (2002), pp53–55

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managed by a cross-disciplinary team. For example, one features specially commissioned floor-to-ceiling photographs and a changing selection of the latest CDs, whilst another features floor-to-ceiling enlargements of iconic magazine covers.

JWT believe the new offices have changed the way employees work and behave. Staff now take pride in their workplace and it has proved to be a successful tool in recruiting clients and employees. The space has also maintained the flexibility to adapt constantly.

However, certain elements within the building life cycle should be considered, regardless of what the organisation decides to do with them. These are:-

- **Site:** The location of an organisation's building is believed to have a very significant impact on its internal expression of values. For example, by locating its building in a desirable, fashionable, amenable area, the organisation may be sending a message that it appreciates the non-work needs of its staff.
- **Systems and services:** Low quality and poorly maintained systems and services transmit a negative message about the value an organisation places on the well-being of its staff.
- **Scenery and settings:** These areas, with a shorter life span, can more easily be designed and redesigned to respond to an organisation's developing identity, and are therefore a powerful medium for conveying internal expression. Scenery and settings provide a constant visual reminder of organisational identity. They are also features of a building where users can be given a degree of autonomy in decision making without compromising other aspects of efficiency, effectiveness and external expression.

### Illustrative case: Muzak Corporation

Muzak's new headquarters has been used as an opportunity to tell a story about the firm to staff. They wanted their move "to take the new branding to the new office", and with their ultimate product being emotion rather than background music, they "wanted to use design to remind employees of that every day".<sup>158</sup> The shift to a new environment which is in alignment to the organisation has meant identical workstations, a central piazza, and a range of open areas.

In addition, a unifying symbol, a silver and black M in a circle, has been created and used throughout the space. Muzak's office has become part of its brand.<sup>159</sup>

As a result, Muzak "have a new way of talking about the company. The product has a face. It has meant everything in the world internally to our culture... Design has not only been great for Muzak's business, design has given Muzak its soul".<sup>160</sup> Now "each employee, equipped with a sense of confidence, has become vocal to outsiders about how we have changed".<sup>161</sup>

#### 7.4.4 Facility management: protocols, boundaries, codes and behaviours

The operation and use of space provides the greatest opportunity to use it to support organisational values. Poor maintenance devalues staff. The visual clues of worn carpets, marked walls, and uncollected coffee cups in kitchenettes, display a lack of pride in the organisation. In turn, apathy is broadcast about what is occurring in the office space, and by implication about the work being carried out.

The way space is used also communicates the values of the organisation. By encouraging certain behaviours in the space, and discouraging others, management can ensure alignment between space use and the goals of an organisation. For example, a firm that has a non-hierarchical work culture can express that through the non-hierarchical allocation of space. By having the CEO in an open plan work-area, the company demonstrates in a tangible way its commitment to openness and equality.



<sup>158</sup> [www.bizsites.com/2003/article.asp?di=346](http://www.bizsites.com/2003/article.asp?di=346)

<sup>159</sup> [www.bizsites.com/2003/article.asp?di=346](http://www.bizsites.com/2003/article.asp?di=346)

<sup>160</sup> Kenny Khan, Vice President of Marketing, Muzak, cited [www.bizsites.com/2003/article.asp?di=346](http://www.bizsites.com/2003/article.asp?di=346)

<sup>161</sup> [www.eciffo.jp/project/project101\\_e.html](http://www.eciffo.jp/project/project101_e.html)

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### **Illustrative case: Bloomberg**

*Bloomberg LP, is an information services, news and media company. Their London office is the European Headquarters and houses 1800 employees. The central premise of the London offices is a sense of transparency, revealing the working dynamic of the firm and encouraging visibility and accountability. Staff members are encouraged to move around and interact with colleagues – any employee who has a good idea should be able to communicate the idea to everyone within the firm.*

*Staff and visitors enter the offices via an escalator from the street-level entrance up to the first floor. This escalator is surrounded by plasma screens showing the Bloomberg News television channel, providing an instant immersion into the firm and its products. The pantry (providing free drinks and snacks for staff and visitors, day and night) is located directly off reception, and acts as the hub for the firm.*

*As well as encouraging public access into their building, Bloomberg also project their workplace into Finsbury Square. Through the summer they organise a number of events for staff and public in the space immediately in front of their building, dramatically increasing the visibility of their brand.*

*The space demonstrates corporate rather than individual expression with news displays, the artefacts of Bloomberg's production. The display extends beyond the physicality of the spaces to the messages conveyed by their management. For example, monthly rotations of curated art spaces and a dynamic lighting programme are intentionally managed as a message about constant change.*



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*"The influence of property on the feedback from customer perceptions to business income is poorly understood outside sectors such as retail."<sup>162</sup>*

### 8.1 Introduction

The space that an organisation occupies sends a message not only to staff, but also to external parties, regardless of whether this message is recognised and managed by the organisation. External expression embraces both communication and branding.

Romaniuk (2003) outlines how *"anything that is encountered with the brand may, if sufficiently processed, become linked to the brand name in memory and thus become part of that brand's image."*<sup>163</sup> Thus, an organisation's real estate can contribute to its overall image in the marketplace, by being visible and by the public consciously taking note.

The importance that organisations place on using space to communicate their brand will increase, as the general public appears to be increasingly aware of the built environment. The publication of illustrated architectural guides to cities is expanding and this is evidence of the growing public interest in the buildings, parks and landscapes of cities.<sup>164</sup>

Whether seen when driving down a street or on the cover of a magazine, the space a company occupies provides an opportunity to transmit a message. Real estate can help to keep an organisation, its products, and/or its services in the public mind, as well as communicating the 'right' messages about these products and services.

The difficulty is that in the commercial office sector little is known about the relationship between an organisation's real estate, the impact it has on external parties, and how that in turn impacts upon the business. Though the hypothesis that space has an impact on external stakeholders does have a degree of professional consensus (for example, Bradley's assertion that stakeholder perception – eg customer satisfaction and loyalty, community sentiment etc – can be linked to real estate<sup>165</sup>), details are sketchy.

#### **Illustrative case: Fidelity Investments – managing public perceptions**

*Fidelity Investments, an international provider of financial services and investment resources with a declared commitment to "continuous improvement, state-of-the-art technology and peerless customer services", was conscious of its real estate potentially having a negative impact on its corporate image. It took active measures to ensure the business was not linked in the public's mind to buildings that were not in alignment with th2*

*image Fidelity wished to project. It thus removed any conspicuous external signage from any office building it occupied which it considered to be sub-optimal. Rather than 'repairing' the buildings, or moving to a different location, the organisation managed the communication aspects of its real estate by trying to remove obvious traces of its ties to the building.*

An organisation's external stakeholders may consist of customers (who purchase the end product or service), potential customers, clients and shareholders; and in the case of government organisations it may broaden to include all taxpayers. So while the audience for the internal expression of a building is limited to those employed by the company (a small and specific audience) and those visiting the building, the audience for the organisation's message is potentially much larger and more general.

### 8.2 The value of good design

Hough and Kratz (1983) estimated the effect of "good" architecture on commercial rents in Chicago and found that tenants are willing to pay a premium to be in new architecturally significant office buildings (although they saw no equivalent benefits associated with old office buildings that expressed recognised aesthetic excellence).<sup>166</sup>

Good urban design *"allows projects to rise above the general market. It bestows trademark value and it heightens a developer's, owner's and tenant's market status. It positively shapes public perceptions and it helps anchor, safeguard and even increase property values through enhanced performance, amenity and image."*<sup>167</sup> This applies equally to urban design (the subject of this quote), to individual office buildings. However, external expression and branding is not just about adding value to the property: it is about adding value to the business. *"The most successful players in the residential and commercial property industry have come to realise that good urban and architectural design spell competitive advantage."*<sup>168</sup>

Measuring how to value the contribution that appropriate external expression makes to a business is difficult. *"Companies investing in quality architecture recognise that there are benefits to such investment, but do not make any serious attempts to incorporate these benefits within the decision-making process that determines the design and construction approach adopted."*<sup>169</sup>

The challenge of measuring the value of the design is that areas such as corporate identity and branding are intangible, and effects are therefore difficult to attribute directly to design. Furthermore, because of the frequently unique designs that result from these expressions of corporate identity and brand, it is difficult for strict market evaluations to account for the benefit that a particular company derives.<sup>170</sup>

<sup>162</sup> Haynes, B et al (2000), p1

<sup>163</sup> Winchester, M & Romaniuk, J (2003), p219

<sup>164</sup> Worpole, K (2000), p8

<sup>165</sup> Bradley, S (2001)

<sup>166</sup> Hough, D & Kratz, C (1983), pp40-54

<sup>167</sup> Droege, P (1999)

<sup>168</sup> Droege, P (1999)

<sup>169</sup> Rouse, J (2004)

<sup>170</sup> Rouse, J (2004)

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### Illustrative case: Darling Park, Sydney

The promoters of Darling Park believe it demonstrates how a commitment to urban design quality can be a profitable strategy to protect as well as add value to an asset while building a corporate trademark of excellence, stability and growth.

The establishment of three accessible and transparent office towers in a landscape of gardens and hotel-style foyers, and the public domain aspect to the development, has helped to “amplify their corporate identity” and to ensure a high occupancy rate with a better yield than Sydney Central Business District (CBD) averages. The office towers have become a desirable option for major tenants.<sup>171</sup>

[www.propertyoz.com.au/data/national/advoc/design%20divident.htm](http://www.propertyoz.com.au/data/national/advoc/design%20divident.htm)

### 8.3 What are the main choices regarding external expression?

There are a number of different alternatives as to how an organisation might choose to brand its space and communicate with the public. The expression can be supplied predominantly by the developer/owner (eg the Rockefeller Centre), or by the principal occupier (the Shell Building); or the occupier can choose to be in a landmark, heavily branded building (eg the Empire State Building), or lastly in a relatively anonymous, deliberately ‘non-branded’ building.

### 8.4 Expression by the developer or occupier: a supply and demand question

“Property developers, at least the more imaginative ones, are realizing that developing the property into a brand is going to give it a particular cachet.”<sup>172</sup> In a competitive market, developers are now ‘branding’ a development in order to gain an edge over the competition. In the US, for example, the Stealth/Ogilvy speculative offices in California demonstrate this approach. “By using a striking design instead of the usual canned low-rise building for speculative office space in a run-down area of Culver City, California, the owners hope to attract ad agencies, movie studios, and other media businesses. The architecture distinguishes the building in an otherwise drab office market.”<sup>173</sup>

Branding speculative office developments can be used as a sales mechanism to attract organisations whose own identities are in keeping with the development. Chiswick Park, a West London business park with the tag line of ‘Enjoy Work’, has taken the branded speculative development one stage further, organising a range of events, activities and services for people who work on site to create a sense of place and community.

<sup>171</sup> [www.propertyoz.com.au/data/national/advoc/design%20divident.htm](http://www.propertyoz.com.au/data/national/advoc/design%20divident.htm)

<sup>172</sup> Olins, W (2003), p10

<sup>173</sup> Nussbaum, B (2003)

<sup>174</sup> Loe, E (2000), p39

### 8.5 Choosing between landmark and heavily branded buildings or ‘non-branded branding’

“In the City of London the predominant form is the office building, where all too frequently the value is in the image. Good design is possibly achieved more successfully through ‘quiet architecture’ which offers itself as ‘a good neighbour’. A bad neighbour building will create a negative impact, not just for itself, but in the surrounding area.”<sup>174</sup>

Memorable buildings result not just from a good designer, but from the personality of the client being expressed in the building.<sup>175</sup> In addition, a clear focus is needed into the values the client holds, its attitude to its people and the community. Out of this will emerge good design,<sup>176</sup> though of course neither good design nor the “flagship” project can in themselves guarantee market success. This is no better illustrated at the present time in the UK than in Sheffield and Doncaster where two projects, the Rock Music Centre and the Earth Sciences Centre, are acknowledged as innovative designs but struggle as economic ventures.<sup>177</sup>

### Illustrative case: Northcliffe Newspapers, Plymouth

Northcliffe Newspapers wanted a building that was a reflection of their organisation. The reason for their building, as stated by the organisation, was that “good local newspapers are deeply rooted in the communities they serve. We saw an opportunity to raise the profile of our newspapers in the community by constructing a landmark building on the new site”.<sup>178</sup>



The question must be asked, to what extent should an organisation ‘brand’? A bespoke, highly customised solution may not be an intelligent long-term decision, as the business and /or its operating environment may change. “Asset specificity actually reduces the tangibility of the asset... It means it is going to be

<sup>175</sup> Loe, E (2000), p30

<sup>176</sup> Loe, E (2000), p30

<sup>177</sup> Loe, E (2000), p35

<sup>178</sup> Wigginton, M (1993)

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*more thinly traded because an organisation with a bespoke corporate identity is less likely to be taken on. There will be fewer purchasers, and so there will be a depression in its value."*

Furthermore, there are some questions about the benefit in the trend to burden office buildings with high degrees of messaging, and a question of whether the absence of messaging is a good thing or not, in terms of flexibility.

Another negative view of the landmark building, and reinforcement for the view that even a good new building cannot do much for a business that lacks strategy or direction, comes from Simon Jenkins, a journalist for the Times, who proffered 'Jenkins' Law'. This asserts that, "*any outfit moving into a splendid new headquarters is heading for the rocks. There are no exceptions. The law is ironclad... New buildings tend to appear just when success is turning into decline. It is the moment when growth comes to a halt. If market share no longer surges, at least headquarters can. Anyone who has built or moved house knows what happens next, trauma and tantrum... Every decision wounds someone's pride. The networks and loyalties on which any organisation depends are bruised and broken.*"<sup>179</sup>

### 8.6 The need for flexibility

Flexibility is important on a number of levels when it comes to external messaging.

- To allow for multiple messages. Organisations may need to communicate multiple messages simultaneously to different types of external parties. They consequently need to ask themselves who are they selecting space for, who are they designing for, and essentially who is their audience?

It should be noted that there are additional challenges when multiple occupants occupy a single building and potentially compete for 'brand width' - one example being buildings suffering from 'brandalism'<sup>180</sup> where each of the tenant organisations have their corporate sign emblazoned on the outside of the building, competing for attention.

- To allow for changing internal circumstances. External expression needs to be flexible in order to be able to adjust to any changes an organisation makes. For example, an organisation may change its product/ service offering, the industry it operates in, or simply the message it wishes to convey. The cost implication of being able to adjust the external expression is an important factor.

Changing circumstances also mean that organisations should be aware of, and manage appropriately, lease length. It is important for organisations to recognise that 'site' is ultimately inflexible, so a business should avoid being locked into a site that may later not be in keeping with the external message it

wishes to communicate. There is currently a lack of awareness of this issue. New business practices, let alone external expression concerns, are not reflected in lease lengths: more than 83% of respondents in a 1997 survey reported that *their new business practices had not affected either the lease length or the location of their offices.*<sup>181</sup>

- To allow for changing external circumstances. The organisation must also be able to adapt to external changes which are beyond its control. For example, after the attacks on the World Trade Centre on September 11th 2001, organisations began to reassess the branding of their physical assets, and re-think how visible they wanted their buildings to be. A survey indicated that since the events of September 11th, a fifth of respondents had less preference for occupying high profile named buildings, or for having high profile public signage outside their building.<sup>182</sup>

### **Illustrative case: LVMH – a luxury office development for a luxury goods firm**

*The LVMH Group is a world leader in luxury goods, with a stable of approximately 50 brands in fashion and leather, wines and spirits, watches and jewellery, perfumes and cosmetics.*

*LVMH wished to consolidate its various New York offices into a flagship headquarters building, to act as a "cultural manifesto".<sup>183</sup> The 23 storey building occupies a high profile location, and its design ensures it is a high profile building.*

*The building is made up of a series of glass facades with multiple planes that are irregular, oblique and angled facets. Part of the glass facade is sandblasted to a pattern, creating an interesting effect both for people inside and outside the building, and interior and exterior lighting is used to create special effects during evening hours.*

*The ground floor consists of a Christian Dior retail store, while the top floor houses a penthouse and a 10m high, two-level venue for high-visibility parties.*

*Winner of a Business Week/Architectural Record Award, the building was described as one that "stops people in the street", and "raised expectations about what architecture can do".<sup>184</sup>*

### 8.7 The elements of external expression

Apart from the general considerations of who will take the lead in branding an office (developer or occupier), and the extent to which that building is branded, the range of opportunities to express messages can be examined by reference to the Building Lifecycle Model.

**(1) Site:** highly valued and laden with meaning (*location, location, location*)

<sup>179</sup> Jenkins, S (2004)

<sup>180</sup> Brandalism is defined as the defacement of public buildings and spaces by corporate ads, logos and other forms of branding. The term was recorded in 1999. Source: [www.wordspy.com](http://www.wordspy.com).

<sup>181</sup> Haynes, B et al (2000), p8

<sup>182</sup> DEGWI/ IDRC (2003)

<sup>183</sup> Khermouch, G (2001)

<sup>184</sup> [www.greatgridlock.net/NYC/nyc.html](http://www.greatgridlock.net/NYC/nyc.html)

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One of the elements that office real estate has in common with the more highly evolved retail and leisure industries is the importance of location. Site selection is critical. For a building that acts as a message to external stakeholders, its location serves four purposes:

- Visibility to passers by. A member of the public may walk by a particular organisation's building during their lunch hour, drive past it on their way to work, or do their banking in the building's foyer. Hence, the visibility of the organisation's real estate can allow it to transmit a message that will be received by the public.
- Proximity to competitors. For many companies, being located close to competitor or peer organisations is very important, and physical proximity can potentially transmit a powerful message. By choosing to be located near competitors, for example, an organisation may be saying that it too is a 'player', or a legitimate alternative choice to do business with.
- Proximity to clients or other stakeholders. Just as choosing to be located near to (or far from) competitors transmits a message, so too does choosing to be near to (or far from) its clients. If a customer has to travel large distances to reach the organisation, the organisation may inadvertently be saying that the customer is not its number one priority.
- Association with choice of urban, suburban or other locality. External stakeholders who are physically dispersed may receive 'messages' about an organisation, without ever having seen the building in real life. Choice of location can communicate something about the organisation, because areas and locales themselves have meanings. For example, in London, Harley Street is recognised for medical care and the Square Mile for finance, whilst in Paris the Left Bank is known for art. When an organisation chooses a site, the meanings and brand of the site become interwoven with the priorities and standing of the business.

### (2) Shell and skin: the importance of the building form and exterior

Just as the site an organisation chooses sends a particular message, so too do the buildings it occupies. By choosing a particular building form, the organisation transmits messages about its corporate identity and values. For example, the skyscraper traditionally represents progress, power and success; and an organisation choosing to locate in a skyscraper aligns itself with these characteristics. On the other hand, corporate campuses signify a more approachable, accessible building type, and these values are again reflected on the firm that chooses to occupy such a development.

The building skin also provides an opportunity to transmit a message. For example, a transparent building in which passers by can see the occupants of the building working transmits a very different message to an organisation that occupies a building with an opaque skin.

### (3) Services and systems: technical advance and sustainability

Information and Communications Technologies and heating, cooling and ventilation strategies are all opportunities for businesses to communicate with external stakeholders. Generally, services and systems can communicate how 'leading-edge' an organisation is in terms of technology, and how environmentally friendly it is.

#### **Illustrative case: expression through the skin – demonstrating environmental and social accountability**

*When construction was completed on the Co-operative Insurance Society (CIS) head office in 1962, the building was the tallest in Europe. Now only the tallest building in Manchester, this landmark consists of a glass curtain-walled office block of 25 storeys, with a projecting service core covered in mosaic. Early in the history of the building, the mosaic on the service core began to fall off, creating health and safety concerns – obviously not ideal for an insurance company. The list of options to rectify the problem included replacing the mosaics and underlying fixings, stripping back the mosaics and painting or rendering the surface, or over-cladding the tower.*

*CIS are now actively exploring the option of over-cladding in glazed photovoltaic panels, primarily because this solution acts as a tangible reinforcement of the organisation's environmental and social accountability policy, and thus expresses an important corporate message to the general public. CIS, which has an environmental management programme, seeks to improve its own energy consumption and waste production in order to be increasingly sustainable. It recognises "that its own management of social, ethical and environmental risks may be of material value and interest to its various stakeholders", and undertakes socially responsible investment, and produces social accountability reports. "Our stakeholders can see that our performance continues to reflect our principles, and that our responsible attitude towards the environment – and the communities in which we operate – is clear to all."*

*Despite no guarantee that the planned work will proceed, positive press has already been created. Manchesteronline.co.uk for example, has reported that the scheme would "transform [the building from] an outwardly crumbling monolith to a shimmering blue monument to clean energy".<sup>185</sup>*

### (4) Scenery and settings: ensuring internal spaces give the correct external expression

Narrative offices are those buildings that tell a story about a brand, that "have a commitment to making the office environment a substantive tool in the business of brand differentiation."<sup>186</sup>

<sup>185</sup> <http://www.c20society.demon.co.uk/docs/casework/cistower.html>

<sup>186</sup> Myerson, J & Turner, G (1998), p11

## 8 Research findings: external expression

Attention is often paid to messages communicated to external parties in the most public interior aspects of a building: the lobby and reception space and the public meeting rooms. Certainly the sense of entry and arrival is critical, as is the ability to navigate the space, but finishes, design (scenery and settings) and behaviours manifested in the space all send messages to visitors. In this respect, a quote that refers to the staff of an organisation is applicable to external stakeholders: *“through explicit and implicit training, through absorbing what has been taught, observing the behaviour of peers and bosses, and through experiencing the way the company or brand lives in its own environment, a true sense of what the brand genuinely stands for will emerge.”*<sup>187</sup>

The impact of external messages will also be felt by staff and thus will support (or contradict) internal messages. Lack of alignment between the internal and the external expression will potentially create negative impacts: staff may feel outsiders are getting better treatment, whilst they themselves suffer.

### **Illustrative case: RMIT University Melbourne.**

*RMIT used its space in order to reinvent itself. The government marked the university for dissolution, and the university had to fight to retain its inner city location. RMIT saw this threat as an opportunity to readdress its space requirements, whilst ensuring its buildings “expressed its academic mission to be at the cutting edge of technological innovation”. An urban and architectural design strategy was proposed, which resulted in its space helping to achieve the business success of the institution. The ability to attract “more first preferences than other local universities” has been assisted by “the strategy of applying extraordinary attention to urban and architectural design”.*

*This has been “central to the corporate campaign for survival and transformation”. In addition, the “branding effects of its construction program were very important, and the successes of the past are being reinforced by introducing a formal design framework”.*

*RMIT does not believe that good design costs more; but so much does RMIT value the role that real estate plays in its academic ‘business’, it is willing to consider paying up to 10% more on construction for those projects requiring a more innovative approach.*<sup>188</sup>

[www.propertyoz.com.au/data/national/advoc/design%20divident.htm](http://www.propertyoz.com.au/data/national/advoc/design%20divident.htm)

### **8.8 Learning from other sectors**

The influence of property on matters ranging from customer perceptions to business income is better understood in the retail, leisure and entertainment sectors.<sup>189</sup> Whilst the commercial office sector has been slow to take on board the value of using its space to communicate with external parties, the retail, entertainment and leisure industries are well versed in this area. For example, *“when Nike went into retail, it built exhibition centres and monuments to itself. Niketown is not a retail outlet; it’s a three-dimensional expression of Nikeness.”*<sup>190</sup>

Comparing the expression of the office sector to that of the retail, entertainment and leisure industries presents learning opportunities for the office sector. These industries typically use space as a direct mechanism for interaction with their customers. They are sophisticated in using space to transmit messages to their public. Their direct relationship with customers means that space is both considered and measured as a benefit to the business, by reference to the particular characteristics of the sector, viz:

- The extent to which the customer interacts with branded space. The level of interaction between a customer and a business is much more direct in retail, entertainment or leisure space, than in office space. Retail space exists for the benefit of the customer, whilst office space primarily exists to support office workers, who in turn support the customer. External parties will only interact with the space through invitation, or through seeing the outside of the building. *“In retail, where fashion is a constant driver of change, value to the client emerges in the “power of the design to draw customers into the store.”*<sup>191</sup>

There is no reason that a shop should be any more expressive than an office, and interaction with office space should not be missed as a way of managing and communicating messages.

- Space as the mechanism and location for profit, rather than expense. The retail sector uses space, and in particular the images the space projects, to generate sales and enhance income generation.

<sup>187</sup> Olins, W (2003), p10

<sup>188</sup> [www.propertyoz.com.au/data/national/advoc/design%20divident.htm](http://www.propertyoz.com.au/data/national/advoc/design%20divident.htm)

<sup>189</sup> Haynes, B et al (2000), p1

<sup>190</sup> Olins, W (2003), p10

<sup>191</sup> Loe, E (2000), p42

## 8 Research findings: external expression

This can be contrasted with the office sector which historically sees space as an expense, as a cost that needs to be driven down, rather than an opportunity to express their corporate image and values.

- Means of measurement. Retail and leisure environments rely on their physical assets to enable a direct interface between the customer and the business. With their real estate directly supporting the generation of income, the ease and means of measurement of their real estate on external parties is very different to the ease and means of measurement for office environments.

It is easier to measure the performance of a retail environment, as there is a direct relationship between financial results and customer visits. The number of people at the door, or the changes to what is rung up at the till following a change in the location of a piece of stock, are just two simple measures that tell a retail organisation how positively (or not) space is sending messages that contribute to the success of the business.

The challenge for the future is to create a set of metrics that will similarly allow office based businesses to look directly at the relationship between the spaces they occupy and the total performance of their business.

# 9 Conclusions and recommendations

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# 9 Conclusions and recommendations

## 9.1 The state of the research literature

The objective of the study has been to survey and categorise the existing research literature on the relation between workplace design and business performance.

We have surveyed an extensive but highly skewed literature that has largely been written by and for academics – and to a much lesser extent design practitioners – rather than for the “real” audience of business users. The literature is uneven. The largest area of existing research has been on environmental and ergonomic issues related to the comfort of individual office workers. Research on the efficiency with which office space is used comes second. Adaptability and flexibility has attracted some attention; as has research related to supporting work processes.

## 9.2 Universality and provability

The extent to which each of the major themes can be related back to empirical data varies greatly. There is also significant variation in the dependence of the factors on the strategy and management of the occupier.

- **Efficiency:** Achieving basic health and comfort factors in buildings is the first essential building block of improved business performance. Not achieving these will limit the potential impact of other interventions.
- **Effectiveness:** Current management theory points directly to the value of how people operate in space, and how provision for this contributes positively to business performance.
- **Expression:** Though little empirical evidence exists, there is a professional belief that this is an area worth focusing on. Post occupancy evaluations suggest that messages mediated through physical space have a powerful effect on staff motivation, satisfaction and retention levels.

More significant than what has been included are matters that have hardly been touched. Topics that are vitally important in contemporary management literature such as knowledge management, branding, and corporate culture have so far been addressed only rarely by environmental researchers. Much of the work has been focused on individual performance rather than how people work together in groups and teams. A disproportionate amount of research energy has been devoted to the performance of building services – rather than, for example, the accommodation of information technology, the design of office building shells, and the performance of office skins.

Implicit assumptions about what office buildings are for can be derived from the literature. There is little overt interest in business matters and little contextual information about office users. A stable business environment seems to be taken for granted – the very opposite of contemporary corporate reality. Business constraints of time and cost are largely ignored. And issues of the personal choices open to office workers have been given very

little attention – an oddity when distributed working is becoming so important. Measurement has concentrated on individual satisfaction, comfort, and performance rather than on what office organisations do, why they exist, how well they perform. Methodological limitations mean that complex contextual matters have been given little attention. Longitudinal observations that effect and changes over time are very rare.

In many ways the research literature reflects the introverted, supply side thinking about office buildings that is unfortunately characteristic of many designers and is endemic in the construction and property industries.

To fill the obvious gaps in the literature, and in part to assist in developing a greater understanding of interconnections between decision making, building design variables and business performance, a case study protocol was developed. Several cases were researched. For a case study to reveal a greater degree of information about the relationship between business and design, the two components must be discussed with equal specificity within the study. This is often a challenge, since the knowledge of various project components comes from diverse individuals.

## 9.3 Recommendations

Even at this stage, though, having completed this literature survey, and despite the huge gaps that exist today between the research literature and the requirements of office users, some preliminary recommendations can be made for three of the major parties whose success depends upon linking office design and business performance.

### 9.3.1 Recommendations for Tenants and Occupiers

- **Diminish risk:** reduce exposure to inflexible real estate commitments.
- **Think harder about efficiency.** Evaluate property decisions on the basis of total cost of occupancy rather than initial capital cost.
- **Consider intensifying the use of space over time,** taking into account increased internal and external mobility, to achieve greater efficiency.
- **Engage more people in the design process.**
- **Encourage user control of the working environment supported by more responsive facilities management.**
- **Take greater responsibility for relating office design to business strategy at all levels.**
- **Align workplace design with work processes but anticipate continuous change in all areas of knowledge work, working towards greater effectiveness.**
- **Shift from thinking primarily about the design of individual workplaces to creating the collective environments that are more appropriate for knowledge work.**

## 9 Conclusions and recommendations

- Use interior design to support and change organisational culture. Exploit the expressive potential of design.

### 9.3.2 Recommendations for Developers

- Learn from what we know already. There is no excuse for providing anything less than excellent performance in health, safety, and comfort.
- Develop the measures of health, safety, and comfort already used to assess environmental services to evaluate the performance of the shells and skins of office buildings.
- Anticipate greater tenant demand for choice, for a widening variety of uses, shared tenancies and mixed uses.
- Anticipate tenant demand for more flexible leasing terms to accommodate more rapid change and shorter management time horizons.
- Establish longer term relationships with tenants.
- Become more involved in helping tenants with fit-out and design services.
- Dare to go beyond efficiency. Adopt building forms that are designed to support tenant effectiveness, for example by promoting internal communication, by attracting and retaining staff, by stimulating creativity.
- Think more carefully about how buildings perform over time. Give separate attention to measuring the different potential contributions to adding value to tenants' businesses of building elements of different longevities – greater effectiveness.
- Anticipate growing tenant demands for help with expression, with internal and external identity and branding.

### 9.3.3 Recommendations for Researchers

- Beware of the limitations for business purposes of depending upon conventional research methods.
- Avoid conventional assumptions: work and technology are changing fast.
- Be prepared to do more interdisciplinary research.
- Think as systemically as clients, relating HR, IT and CRE issues.
- Pay much more attention to business priorities and especially to how they are changing.
- Focus on emerging business issues: image and expression, flexibility and adaptability, the relation between virtual and real spaces, the potential for distributed working.
- Involve developers and design professionals as well as occupiers and tenants in the research process.
- Understand the supply chain better.
- Adopt a longitudinal approach: study buildings in use over time.

- Study a wider and more ambitious range of design and use possibilities.
- Learn from business schools and their use of the case study method for both teaching and research.
- Wherever possible, use consistent language, methodologies and protocols, so that research findings can be pooled into a growing body of knowledge with the widest possible application.

### 9.4 Critical decisions

For occupiers, the research also points to a sense of critical decisions that each business must make within the context of its own objectives and priorities. These include:-

- (1) **Staff productivity and satisfaction v economic efficiency:** achieving appropriate levels of density, daylight, view etc, and balancing this with occupancy cost.
- (2) **New ways of working:** choosing the working pattern that is suited to the business, and recognising the affinities between working patterns, building types and environmental models.
- (3) **Organisational change:** workplace as a catalyst for change, with the capacity to demonstrate and foster values through internal and external messaging.
- (4) **Concentration v communication:** raising issues of acoustic and visual privacy, work group size, vertical and horizontal travel distance, building depth.
- (5) **Individual v central control:** raising issues of responsiveness of FM, the ability to control individual environment, simplicity/manageability and the efficient operation of the building and its systems.
- (6) **Infrastructural flexibility:** providing flexible infrastructures that ensure connectivity and environmental quality through multiple iterations of organizational change.
- (7) **Feedback:** Using feedback as both a design tool, and as a means of monitoring that the workplace is delivering its full potential in terms of efficiency, effectiveness and intended expression.

### 9.5 What remains to be done

More significant than what has been included in the literature are matters that have hardly been touched by current research. Topics that are vitally important in contemporary management such as knowledge management, branding, and corporate culture have rarely been addressed. Much of the work has also been focused on individual performance rather than how people work together in groups and teams. This is a critical oversight which should be addressed through a comprehensive research programme exploring aspects of business performance in “real world” conditions and in organisations that are having to work

## 9 Conclusions and recommendations

within a dynamic and often unpredictable global marketplace. This research programme should include practitioners from a wide range of disciplines including design, business, information technology, corporate real estate and human resources; and it should also be truly international so as to capture cultural and regional differences in priorities and approaches to measurement.

So that this additional work builds to a usable body of knowledge that has relevance to a broad audience, there is also a need for the use of settled language and protocols, including:

- an over-arching framework;
- a framework and language for the organisation of research, and the analysis of options;
- a set of HR metrics for measuring staff performance in general and productivity in particular;
- a consistent approach towards the calculation of total occupancy costs;
- a protocol for case studies.

The final element of the framework proposed in this report is therefore a call for case studies prepared on a basis consistent with the over-arching framework. Few empirical studies identify how the design and management of the office environment contributes to business performance in the face of competition bearing on post-industrial firms, and this level of experience would more effectively be explored through case studies conducted in accordance with a consistent protocol.

### 9.6 To conclude

In the introduction to this study, and in Chapter 2, we addressed some of the systemic problems which cloud the successful relationship between business operations and the environments in which they take place. We discussed such issues as the large-scale, many layered nature of physical working environments; the fragmented links between supply and demand, from initial investment decisions through to end users' ability to make short

term changes in their immediate working environment; and the lag between the rapid rate of change in organisations and the slow pace of development. We hope we have dealt with these issues and provided some suggestions for ways forward in this conclusion.

As the majority of work carried out in organisations moves towards knowledge transaction, we are witnessing a shift of focus from tangible assets to human capital and intangible assets such as R&D, marketing, HR, innovation management and branding. This has implications for the workplace. Work environments designed for linear transaction processes are less appropriate than those that support knowledge transfer and connect communities of people and autonomous workers. As work becomes more distributed, technology will play an even greater role, supporting mobility and virtual working, while the individual office building becomes just one part of an organisation's workscape.

The repercussions of this on the subject of 'workplace performance' are potentially profound. If what is currently perceived as the 'workplace' only provides accommodation for half of a person's working week, does this undermine research predicated on the idea of a 9 to 5 day sat at a fixed, owned workstation?

Such new directions emphasise the need for further investigation. In addition to more Post Occupancy Evaluations, it will become essential to engage with issues such as workplace connectivity and social network analysis. More understanding is also required of workplace culture indicators to compare different organisations' cultures through analysis of their unwritten rules, stories and metaphors. In particular, there is a need for case studies that analyse the complex decision-making and systemically linked data that go into the design and procurement of the modern work environment.

In other words, in the rapidly changing world of work, the implications of linking office design with business performance are so profound that innovation is as important in the conduct of research as in the ways that offices are developed, designed and managed.

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# 10 Appendices

The four case studies included in this appendix provide detailed examples of how different organisations attempted to align their workplace design and management with their business goals. Each case study provides insight into design decisions and outcomes within the individual business context. This is

important, as what is effective for one organisation may not be appropriate for another. In addition, each case study tends to focus on a different aspect of the business performance framework outlined in this report.

**Figure 30: classification of case study examples**

	Efficient accommodation	Adaptability and flexibility	Health and comfort	Alignment with work process	Internal expression	External expression
Forty Grosvenor Place		•				
The Children's Place	•			•	•	
BT Brentwood	•		•	•		
Arup Campus			•		•	•



### **FORTY GROSVENOR PLACE, BELGRAVIA, LONDON SW1**

#### **Project description**

Completed in 1999, Forty Grosvenor Place was developed speculatively for headquarters office accommodation, with ancillary uses on the ground and lower ground floors.

The building comprises approximately 20,000 sq m (214,000 sq ft) of net lettable space with a gross internal area of 30,469 sq m (328,250 sq ft), and was designed for a peak occupancy of 2,500 people.

#### **Business priorities**

The developers identified four key design drivers in an initial briefing workshop:

- (1) development of a contextual landmark building for the 21st century;
- (2) adaptability to future requirements;
- (3) design from the inside out;
- (4) optimise cost in use.

Flexibility and in particular sub-divisibility potential were important factors. Potential occupier groups interviewed during the development process identified “flexibility to accommodate new work patterns and changing ways of working” as the primary demand-side driver.

#### **Design development and components**

##### **Site**

- Location near Buckingham Palace and backing onto a Conservation Area

##### **Shell – skin**

- Materials (Spanish limestone, granite plinth), form and massing (modulated elevations and street setbacks) and detailing
- Large floor plates facilitate communication
- Structural external wall means no perimeter columns, improving space efficiency
- Horseshoe wraparound shape means no workspace is greater than 7.6m from natural light
- Structural grid (7.5m x 7.5m) is a multiple of an effective planning grid
- Four banks of lifts, four cores, and full height atrium provide for sub-divisibility potential
- Raised floor and generous floor-to-ceiling heights





- Twin routes through building at ground level
- Light penetration is maximised through internal glass cladding
- 'The Forum' provides a visual expression of vertical communication through the five storeys of the building

### Systems – services

- Air displacement system and chilled ceilings provide 20% reduction in energy use compared with conventional air-conditioning, as well as reducing draughts and increasing air changes
- Floor level air displacement allows dissipation of high heat gains, making the building suitable for high heat loading activities such as dealer floors
- Reduction of solar gain through fenestration design
- Low energy lighting

### Settings – scenery

- Variety of accommodation, mixed use: office, catering, dining and leisure

### Critical decision points

- Large internal atrium and separate cores and lifts were key to the sub-divisibility potential, but resulted in increased capital costs and reduced landlord efficiency
- Location meant that external design quality and planning approvals were intrinsic to the success of the project

### Business benefits delivered

- The first major test of the adaptability of the building came with the collapse of Enron in early 2002. Enron was the initial tenant and had signed a fifteen year no breaks lease. Events appear to have vindicated the developer's decision to invest higher capital expenditure in flexibility: the principle of horizontal division has been a critical factor in attracting new tenants. Grosvenor Estates report that the building was 85% let within a year of the collapse of Enron, and was full within 18 months.
- Operational aspects played a significant role in the letting process. A service-weighted landlord/ occupier relationship emerged as a requirement, due to the trend for businesses to outsource in-house support services. It would appear from tenants' comments that ease of control of environmental systems outweighed cost-in-use considerations, although this would need to be tested further.
- In interviews given after taking up occupancy, tenants indicated that expression factors such as views and entrance played an important part in their decision to occupy, outweighing slight reservations about location. The atrium space has been a crucial design factor: it appears to have been the deciding factor for at least one tenant purely in terms of image value to clients and prospective employees.
- Floor plate size, floor-to-ceiling height and flexibility were also important differentiators: "Good floorplates stood head and shoulders above other (prospective buildings)".



### **THE CHILDREN'S PLACE RETAIL STORES INC, SECAUCUS, NEW JERSEY**

#### **Project description**

The Children's Place designs and markets children's clothes and accessories, operating stores throughout the United States and Canada. All functions with the exception of manufacturing are handled in-house. In 1997, The Children's Place embarked upon a project to develop a new distribution centre and corporate headquarters in New Jersey. This was part of an aggressive growth strategy which also included a strong marketing campaign, a new merchandise presentation strategy, and an automated inventory and shipping programme.

In July 1999 the company moved into its new 204,000 sq ft (22,700 sq m) distribution centre and corporate headquarters facility.

#### **Business priorities**

Within the context of an aggressive growth strategy, and following several years of focusing on retail front end, the company needed to renew its focus on infrastructure and administration. Priorities for the new headquarters included:

- develop a workplace to support the changing organisation;
- encourage open and informal teamwork to support an energetic pace of product development;
- limit the cost of the real estate commitment;
- support staff recruitment and retention.

#### **Design development and components**

##### **Site**

- Less expensive and less convenient location than the company's previous address
- HQ located adjacent to new distribution centre

##### **Shell – skin**

- Retro-fitted warehouse

##### **Settings – scenery**

- 'Bringing the brand home to headquarters' through imagery, reproduction of store designs and marketing campaigns; the interior also features the same materials as are used in The Children's Place stores
- Integrated working areas for design and merchandising staff, including a mock store front or 'working laboratory' for testing design and merchandising concepts
- High quality finishes and employee amenities; high quality work tools including flat screen technology





- Open spaces to bring employees together; areas which allow employees to sit and work together

### Critical decision points

- Focus energy on headquarters without detracting from resources available to develop new stores
- Higher spend on fit-out but lower spend on real estate
- Decision to relocate to a location which was cheaper but less convenient than the company's previous address

### Business benefits delivered

- Speed has improved: styles on offer in stores now change based on 12 seasons per year (previously four per year), while the proximity of the headquarters to the Distribution Centre has contributed to the company's ability to move its e-commerce department in-house and reduce the time that clothing spends in the warehouse
- Stock prices and store profitability have made significant advances on The Gap, one of the company's major competitors
- Employee retention is estimated at 95%: *once they saw the building, nearly all employees chose a longer commute to the new headquarters over quitting – yielding savings in intellectual capital, as well as money.*<sup>192</sup> Improvements in recruitment and staff productivity have also been noted
- In a post-occupancy survey, 83% of employees who had relocated to the new headquarters rated their new space "better" or "much better" than the previous location in providing for concentrated work, fostering a sense of belonging, encouraging interaction, providing a sociable atmosphere, enhancing productivity, and providing a place where employees were happy to bring guests
- The company has opened 482 new stores since its move-in date, bringing the 2004 total to 693, from a 1999 total of 211.



### BRITISH TELECOM, BRENTWOOD

#### Project description

British Telecom's Brentwood site, completed in 2001, was a design project under the umbrella of the Workstyle 2000 strategy. This was conceived and applied by BT to re-engineer working procedures as the organisation moved from public to private, and to support the organisation's comprehensive flexible working strategy.

Part of the re-engineering process involved a move from outdated existing buildings to new ones which would help to "shake up" existing work patterns. An important element of the programme was a change management process: staff and stakeholders were consulted and involved through workshops, questionnaires, exhibitions, videos and brochures.

#### Business priorities

BT's priorities in terms of the Workstyle 2000 strategy included:

- do more with less: provide better space within the context of organisational consolidation;
- change communication and work patterns: move towards a more open hierarchy;
- provide an exit strategy in case of takeover or other precipitous event.

For the Brentwood site, BT wanted a comfortable, energy-efficient environment to stimulate and motivate the building's users.

#### Key design drivers included:-

- (1) a coherent and clear, adaptable office layout;
- (2) good air supply, controlled by the occupants;
- (3) good lighting, from both daylight and artificial sources controlled by the occupants;
- (4) a feeling of spaciousness, with views out of the building and contact with nature; and
- (5) a stimulating social environment to promote interaction between occupants.

#### Design Development and Components

##### Site

- Brownfield site located close to the M25

##### Shell – skin

- General building depth of 18m (24m maximum)
- Atria with open double skin and light wells in floors
- Construction grid of 9 x 9m



- Planning grid of 3m
- Fenestration of openable double sash windows in double skin

### Systems – services

- Provision for changing technologies included ducts, risers, raised floor
- Services split into three to allow for subdivisibility
- Floor supply cooling with natural ventilation to perimeter
- Moveable floor grilles
- External blinds controlled by a switch on the window, with BMS override
- Uplighting and dimmable downlighting, linked to daylight, under occupant control using the telephone
- Main servers and some PC's backed by standby supply
- Network access throughout, including restaurant and café
- Emphasis on allowing occupants control over the space: the ventilation system, external automatic blinds, lighting in work areas, and heating from radiators can all be controlled by occupants

### Settings – scenery

- Business groups identified

### Critical decision points

- The building was designed to provide a unique and bespoke “home” for BT, but also to ensure commercial flexibility, with potential subdivision of tenancies and future proofing of servicing strategies providing a viable exit strategy.

### Business benefits delivered

- The building was in the top 2-5% of buildings in the BUS database with regards to indices for comfort and occupant satisfaction
- Occupants estimated an increase of 8% in productivity due to the building
- Under the Workstyle 2000 initiative, 4,500 BT people currently work from home and 40,000 have remote access capability, enabling them to work from any location. The programme has saved BT £180m in property costs and aims to reduce property overheads by a further 40%.
- Use of the restaurant for meetings and quiet work is a clear sign of both the success of this space and occupants’ freedom from inhibition in terms of what is ‘meeting space’.



### ARUP MIDLAND CAMPUS, SOLIHULL

#### Project description

Arup is a professional services firm providing technical solutions. In 1994 Arup took the decision to integrate its Birmingham and Coventry offices in order to improve performance in the Midlands region; previously these two major offices had found themselves effectively competing for business. The decision to integrate led to the development of the Arup Midlands Campus in Solihull, completed in 2001.

#### Business priorities

Within the context of the decision to integrate two existing offices, Arup's priorities for the new campus included:

- achieve full representation in the Midlands of the firm's capabilities; mobilise large multi-disciplinary teams;
- provide a showcase for the firm's design capabilities; a means to demonstrate in physical and operational terms Arup's philosophies;
- provide an attractive and convenient base for client contact, and a convenient and stimulating workplace for employees;
- recruitment and retention of top employees;
- improve communication and team working and interaction between teams;
- provide a long-term, cost-effective, flexible workplace, with an exit strategy in case of downturn in workload;
- an 'all in' build rate of about £85/sq ft - a demonstrably challenging unit cost.

#### Design development and components

##### Site

- Business park close to the M42, equidistant from the two existing offices

##### Shell – skin

- Three pavilions
- Building depth of 24 m glass-to-glass
- Construction grid of 24 m x 6 m
- Planning grid of 3 m
- Daylight performance target was a fundamental generator of the building form
- Roof profile based on studies of the effects of glare and sun penetration as well as air flows

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- External iconography includes roof pods in the landscape, use of natural materials and external shutters
- Specified minimum design life of the structure is 60 years
- Embodied energy was used as the measure of the environmental burdens of materials used in construction. Materials were selected on the basis of low embodied energy (or high embodied energy but recyclable); recycled content; maintainability; sourcing; and total exclusion of deleterious and hazardous materials.
- High floor-to-ceiling heights, holes in mezzanine floors, upper pitched roof volume and site configuration create a feeling of spaciousness and operational unity.

### Systems – services

- Well sealed, well insulated, naturally ventilated building with openable sash windows and perimeter heating.
- Occupants control lights, thermostatic valves and external blinds from a window switch with BMS override.
- Uplighting and dimmable downlighting linked to available daylight and occupancy.

- 75% of the useful floor area is in the 3% to 7% daylight factor range (target was for 50% of the floor area to fall within this range).
- Raised access floor throughout provides for IT cabling and building services distribution and includes space for future cooling systems should the need arise.
- Life cycle cost analysis was undertaken for the replacement of plant and fabric over a 20-year building life; resulting in the installation of a much higher specification raised access floor.

### Scenery – settings

- Business groups identified.
- Central terraced and landscaped courtyard acts as an outdoor work area and social space.

### Critical decision points

- Design a building which is a unique and bespoke home but also provides commercial flexibility.
- Employee consultation at all stages of design and post occupancy.
- Employee retention schemes for the new location.
- Use of a target cost model based on rents obtainable from a notional office in a business park in Solihull.

### Business Benefits Delivered

- Arup are proud to show clients the space and use it as a showcase for the firm.
- Occupants self-reported an average increase in productivity of 4.5%.
- Within the Building Use Studies UK 2003 dataset, the Arup Midlands Campus was in the top 20% for the Comfort index and the top 10% for the Satisfaction index.

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