Construction Management and Economics

Stakeholder perspectives on developing more adaptable buildings

James Pinder \(^a\), Robert Schmidt III \(^a\) & Jim Saker \(^b\)

\(^a\) School of Civil and Building Engineering, Loughborough University, Loughborough, LE11 3TU, UK
\(^b\) School of Business and Economics, Loughborough University, Loughborough, LE11 3TU, UK

Published online: 09 Jun 2013.

To cite this article: James Pinder, Robert Schmidt III & Jim Saker (2013) Stakeholder perspectives on developing more adaptable buildings, Construction Management and Economics, 31:5, 440-459, DOI: 10.1080/01446193.2013.798007

To link to this article: http://dx.doi.org/10.1080/01446193.2013.798007

Taylor & Francis makes every effort to ensure the accuracy of all the information (the “Content”) contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at http://www.tandfonline.com/page/terms-and-conditions
Stakeholder perspectives on developing more adaptable buildings

JAMES PINDER1*, ROBERT SCHMIDT III1 and JIM SAKER2

1School of Civil and Building Engineering and 2School of Business and Economics, Loughborough University, Loughborough, LE11 3TU, UK

Received 7 August 2012; accepted 17 April 2013

Despite longstanding interest in the issue of adaptability, there has been very little research into the motives and obstacles to constructing more adaptable buildings, particularly from the perspective of the stakeholders involved in the building development process. The purpose of this study was to explore the reasons why more buildings are not constructed to be more adaptable, first through a review of the literature and then through interviews with industry stakeholders in the UK, including architects, developers, engineers, property agents and local authority planners. The literature review and stakeholder interviews revealed a wide range of motives for constructing for adaptability, such as a desire to reduce life cycle costs, to produce ‘future-proof’ buildings, and to ensure that buildings are easier to sell and let. However, the literature and interviews also revealed many obstacles to creating more adaptable buildings, including an assumption that adaptability always costs more, a lack of life cycle costing, uncertainty about the benefits of adaptability, fragmentation between industry stakeholders and short-term development models. The research highlighted the need to develop a better understanding of the costs and benefits of developing more adaptable buildings so that industry stakeholders can make more informed decisions about their buildings under conditions of uncertainty.

Keywords: Cost, decision-making, fragmentation, stakeholder, uncertainty.

Introduction

Over the years there has been recurrent interest in the issue of adaptability in buildings. This interest has come from academics and practitioners in a range of disciplines, including planning, architecture, facilities management and engineering. The word ‘adaptability’ is generally used in these contexts to refer to the capacity of buildings to accommodate changing demands. Most buildings are adapted during the course of their lives in order to satisfy changing social, legal or technical requirements, often in ways that were never intended (or envisaged) when they were originally designed and constructed. In some fast-moving sectors, such as retail or healthcare, buildings may be adapted relatively frequently in order to ensure that they remain fit for purpose. For instance, it is not uncommon for retail units in shopping centres to be refitted every three or four years in order to reflect changes in products, branding or tenancies.

Adapting a building to satisfy new requirements or standards often brings with it costs: building owners usually incur the direct financial cost of adaptation (the costs of materials and labour), but they may also incur indirect costs too, such as having to forgo rental income if their building needs to undergo significant changes and is unoccupied for a period of time; building users may suffer from disruption to their activities, lost income or reduced productivity if the buildings they occupy undergo adaptation; and society also incurs the cost of adapting buildings, in terms of the material waste that is generated when buildings are changed and the embodied energy that may be lost from the existing fabric.

However, while the costs of adapting buildings can be significant, the inability to adapt a building can also be costly. A study by the United States (US) Building Research Board, which involved case studies of government facilities and testimonies from a committee of industry stakeholders, concluded that the failure to adapt buildings to modern requirements can

*Author for correspondence. E-mail: j.a.pinder@lboro.ac.uk

© 2013 Taylor & Francis
... result in lost efficiency, rising costs, reduced output, and declining morale. Even if the occupants are not affected directly, property values may decline as potential tenants and purchasers look to more modern facilities to meet their changing needs and increased expectations. (Iselin and Lemer, 1993, p. 12)

In the United Kingdom (UK), research by BRE Housing (2008), using data from the English House Condition Survey, found that 42% of existing homes in England were ‘hard to treat’; in other words, it is difficult and expensive to upgrade their thermal performance to meet current standards. Such homes are more expensive for households to heat and are a problem for society, because they are less energy efficient than modern homes. Ultimately, buildings that cannot be adapted may fall out of use, become a blight on the cityscape and eventually be demolished, outcomes that can bring significant social and environmental costs.

The case for constructing buildings that are more adaptable is therefore based on the premise that they will be easier and less costly and environmentally damaging to change in the future. Russell and Moffatt (2001, p. 2) succinctly summarize the argument in favour of developing more adaptable buildings when they argued that

All other things being equal, a building that is more adaptable will be utilized more efficiently, and stay in service longer, because it can respond to changes at a lower cost. A longer and more efficient service life for the building may, in turn, translate into improved environmental performance over the lifecycle.

However, their statement is based on conjecture rather than empirical evidence. Moreover, the message from the literature is that buildings tend not to be developed to accommodate change. For instance, Gann and Barlow’s (1996, p. 69) study into the technical feasibility of converting offices to flats in London concluded that ‘... most buildings are designed to satisfy the needs of existing forms of use, they are rarely designed to meet future requirements’. Similarly, Brand (1994, p. 2), drawing on examples of buildings in the US and Europe, argued that ‘Almost no buildings adapt well. They’re designed not to adapt; also budgeted and financed not to, constructed not to ...’. This raises the question: if the case for developing more adaptable buildings is so compelling, why are more buildings not constructed to be more adaptable?

The purpose of this paper is to explore this question in further detail, first through reference to the existing literature on adaptability in the built environment and second by drawing upon the views and experiences of stakeholders in the property and construction industry, including architects, developers, engineers, local authority planners and property agents. We begin with a critical review of the existing literature on adaptability in order to identify the motives and obstacles to constructing more adaptable buildings. In doing so, we draw upon literature from a range of professional disciplines (including construction management, architecture, planning, engineering, real estate and facilities management) and building types (such as housing, office, healthcare, among others). The motives and obstacles from the literature are then compared with those from the stakeholder interviews in order to see whether the issues identified in the literature correspond to those experienced in practice. We conclude this paper by considering what might need to change, in terms of industry conditions and stakeholder mindsets, for more buildings to be constructed to be more adaptable.

Previous research

Despite longstanding interest in the issue of adaptability, there has been very little empirical research into the motives and obstacles to constructing more adaptable buildings, particularly from the perspective of the stakeholders involved in the building development process. In this section we focus primarily on reviewing the evidence-based literature on adaptability, although on occasions we make references to other literature on the subject. It is important to underline the dual role that literature plays in this paper: first, it provides an insight into what has already been written on adaptability; and second, it is a source of secondary data, as we present aspects of the literature alongside our primary data and discuss them in our results.

Cost is usually cited in the literature as the main obstacle to developing more adaptable buildings, the assumption being that adaptability results in higher initial construction costs. For instance, research undertaken by the Norwegian Building Research Institute (Arge and Landstad, 2002), found that constructing for a high level of adaptability in office buildings, using solutions such as higher floor-to-ceiling heights, system walls and soundproof suspended ceilings, could increase initial construction costs by approximately 20–25%. However, other adaptable design solutions, such as easily divisible building forms and floor plans, were found to be cost neutral; that is to say, they were no more expensive than less adaptable alternative designs. Elsewhere, Slaughter (2001) examined the costs of constructing for adaptability in 48 building projects in the US and found that, on average, the design strategies employed resulted in a 1% increase in initial construction costs,
when compared with conventional (less adaptable) designs; one-third of the strategies resulted in longer initial construction times.

In the UK the notion that more adaptable buildings cost more to construct has, to some extent, been fuelled by past attempts at 'future-proofing' buildings. Guy (1998) explains how, during the 1980s and 1990s, institutional investors' desire to reduce the risk of depreciation associated with changing occupier requirements led to the emergence of an institutional specification that involved over-specifying, among other things, floor loadings, small-power provision and comfort cooling services. This institutional specification was promoted by property agents, who insisted that all new office developments should incorporate these over-specified design features, even though the specification did not bear any resemblance to what most occupiers actually needed from their office buildings—a case of exchange value prevailing over use value. This misguided attempt at designing in redundancy ultimately had negative and often unintended consequences, as it resulted in more expensive and more energy intensive office buildings, in terms of both the energy embodied in the buildings' fabric and the energy used in operating the buildings.

Spending more on the initial construction costs of a building to make it more adaptable can only usually be justified if the adaptability is likely to generate some form of benefit or return on investment in the future. Slaughter (2001) estimated that all but one of the adaptable design solutions in her study would pay for themselves at the first adaptation cycle, generating, on average, a net saving equivalent to 2% of the initial construction cost. She found that three-quarters of the adaptable design strategies reduced the time required to adapt the building (thereby reducing disruption to users) and allowed for easier access when maintaining the building. In addition, her work confirmed that subsequent changes would not have been technically or economically viable without the use of several of the design strategies. However, it is not clear whether the future cost savings in Slaughter's study were discounted and, if so, at what rate. Discounting is commonly used in investment calculations and is based on the concept of time preference: the tendency for people to attach more value to a benefit realised today than to the same benefit received in the future (Ellingham and Fawcett, 2006).

The choice of discount rate is important in the context of adaptability because as Ellingham and Fawcett (2006, p. 22) point out, 'high discount rates give little weight to more distant entries in the cashflow and place great emphasis on the early years, thus favouring a short-term approach and the minimisation of capital investment.'

For owner-occupiers, institutional investors or developers with a longer-term interest in buildings, investing in adaptable design strategies can sometimes be justified because they may recoup the benefits in the future, for instance through lower rates of depreciation. However, for merchant developers that construct buildings for sale, the incentives to develop more adaptable buildings are less clear, because responsibility for adapting the buildings in the future will fall on another party, who will reap the benefit of the initial investment. Evidence to support this view can be found in Arge's (2004 and 2005) research, which involved case studies of 10 developers (four owner-occupiers, four investor-developers and two merchant developers) in the Norwegian office market. Arge found that the different property development models explained differences in approaches towards adaptability: office buildings developed by owner-occupiers incorporated more adaptable design features than those that were developed to let and manage; the office buildings that incorporated the least number of adaptable design features were those that had been developed for sale by merchant developers. For merchant developers, more adaptable buildings will only be worth investing in if they are more attractive to prospective purchasers, which in turn would mean that they are easier to sell and/or command a rental or sale price premium over less adaptable buildings. However, there is no empirical evidence (i.e. market or transaction data) in the literature to suggest that this is the case.

One of the few empirical studies to (inadvertently) provide an insight into the relationship between adaptability and rental values was undertaken by Baum (1994). Baum was interested in understanding why some buildings experience higher rates of depreciation than others, so he explored this by statistically analysing the relationship between building characteristics and rental values, using data from 125 office buildings in the City of London (in order to control for the influence of location). He found that internal configuration (floor to ceiling height and floor layout) and internal specification (quality of finishes and services) were the most important determinants of depreciation in the sample buildings. Baum suggested that because demand for these characteristics would change over time (due to changes in working practices, fashions, etc.) property investors should look to purchase buildings that were flexible, in terms of their configuration and internal specification. He concluded that 'flexibility reduces the risk of an irreversible and major reduction in the market value of a building' (Baum, 1994, p. 39). However, Baum's study nevertheless failed to quantify the costs and benefits of adaptability.
The lack of empirical evidence about the benefits of adaptability also has implications for the way in which adaptability is (or is not) factored into property valuations (appraisals). In their research in the UK, Ellison and Sayce (2007) consulted four focus groups, involving a total of 16 property agents, and found that only a very limited interpretation of adaptability, relating primarily to the flexibility of internal spaces, is currently factored into commercial property valuations. Valuations therefore fail to reflect other forms of adaptability, such as the ease with which a building can be retrofitted or accommodate changes of use. McAllister (2009) suggests that property valuations play an important role in the property market by acting as a surrogate for prices, but he also argues that ‘... there is some anecdotal evidence to suggest that valuation can act as an impediment to innovation in property markets’ (ibid., p. 316). This is because property values tend to be based on information from past transactions; in other words, if there is no evidence that a particular design attribute has added value to a building in the past, then valuers will not ascribe any additional value to those attributes in the present. This can result in a vicious circle, whereby developers will not include a particular design attribute in their buildings because valuers do not consider that it adds value, and valuers do not consider that it adds value because developers do not include it in their buildings.

Parallels can be drawn with the emerging market for ‘green’ buildings, which until recently was stymied by the failure of property valuations to fully reflect the benefits of more sustainable buildings, such as lower running costs. However, the emergence of voluntary ‘green’ building certification schemes, such as the BRE Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED) and Energy Star, has provided developers, occupiers, valuers and other stakeholders with a means by which to differentiate between different levels of ‘greenness’ in the marketplace. A recent study by Fuerster and McAllister (2010) examined the sale price and rental differential between buildings in the US that were certified through LEED or Energy Star and buildings that were not. They found that LEED certification was associated with a 5% rental premium and a 25% sale price premium, with Energy Star certified buildings commanding a 4% rental premium and 26% sale price premium. In other words, ‘greener’ buildings were found to be worth more to occupiers and investors, and therefore valuers were likely to reflect this in their appraisals by valuing such buildings more highly. Such premiums will create a virtuous circle by sending price signals to investors and developers that it is worth investing in ‘greener’ buildings.

The example of sustainable buildings also highlights another potential obstacle to developing more adaptable buildings, namely the lack of a shared understanding of what constitutes adaptability in the built environment and how adaptability manifests itself in terms of particular building attributes. Adaptability remains a nebulous concept, with different interpretations and definitions of adaptability prevalent in the literature. Despite their shortcomings, ‘green’ building certification schemes such as BREEAM work by bringing about a common understanding of what constitutes a particular level of ‘greenness’; however, there is no analogous certification scheme for adaptability in buildings. Some authors have distinguished between different types of adaptability (e.g. Arge, 2004, 2005) and others have specified principles or guidelines for how to facilitate changes in buildings (for example, see Rabeneck et al., 1974; Slaughter, 2001; Canadian Standards Association, 2006; or Schneider and Till, 2007), but none of these have been adopted as an industry standard. The British Council for Offices Guide to Specification (British Council for Offices, 2009) suggests that adaptability in office buildings can be enabled by ensuring that they have more generous floor plans and storey heights, but this is based on a very narrow definition of adaptability and overlooks many of the other parameters that can enable or constrain change in buildings.

Kendall (1999, p. 2) adopts a different perspective on the issue of adaptability, suggesting that the reason that buildings are not constructed to be more adaptable is because of modern society’s preoccupation with functionalist design. He points to

... a misguided attitude that sees the built environment as a rigid artifact made up of finished, single-use buildings. This view posits that if buildings are well designed by scientific research and professional know-how to begin with, ‘good’ buildings would not need to be changed, except cosmetically.

This argument is interesting, because it represents a departure from the more orthodox view that adaptability is simply a function of rational economic forces. Instead, Kendall hints at the social and cultural influences that shape our buildings. These influences have been discussed elsewhere in the literature; for instance, Davis (1999, p. viii) highlighted the ‘... importance of the social contexts in which building happens, and how those contexts affect the built results’. However, to date there has been no detailed study of how such social and cultural factors influence the level of adaptability in the built environment.

User empowerment and control is another motive for developing more adaptable buildings that is
discussed in the literature. In their study of flexibility in housing, Schneider and Till (2005, p. 159) suggest that '... flexibility is seen as something that gives the user the choice as to how they want to use spaces instead of architecturally predetermining their lives'. Nevertheless, they then go on to discuss how the desire to create more adaptable buildings can be compromised by other factors, such as other design objectives taking precedence, the use of inflexible forms of construction or the lack of life cycle costing during the design process. Moreover, they highlight how some approaches to designing and constructing for adaptability can, despite their intent, be more restrictive by predetermining a limited set of possibilities.

There is also some limited, but nonetheless interesting, evidence in the literature to suggest that the way in which buildings are procured can influence the degree to which they are constructed to be adaptable. For instance, research in the UK by Barlow and Köberle-Gaiser (2008a, 2008b) looked at the impact that the Private Finance Initiative (PFI)—a funding mechanism for new healthcare facilities—was having on adaptability. Their research involved 12 case studies of PFI healthcare projects and 50 semi-structured interviews (some undertaken as part of their case study research) with industry stakeholders, including architects, contractors and client-side representatives. They found that, despite the fact that PFI was supposed to engender longer-term thinking by infrastructure providers, the complexity of projects and the way that risks were being allocated meant that '... the PFI process has impeded innovative solutions for accommodating future changing healthcare needs through adaptable hospital infrastructure' (Barlow and Köberle-Gaiser, 2008a, p. 1400). This finding is particularly insightful, given that adaptability has long been seen as an important design goal in the healthcare sector (for example, see Weeks, 1965; Bachmann, 1972; and more recently Bjørberg and Verweij, 2009).

A number of conclusions can therefore be drawn from the existing literature on adaptability. First, although the literature identifies a wide range of motives and obstacles to developing more adaptable buildings (Table 1), there is no coherent framework that brings all of the issues together. Consequently, there is little understanding of how the different motives and obstacles relate to each other or how other contextual factors may influence building outcomes. Second, the literature provides little insight into how industry stakeholders view the issue of adaptability or how the 'competing social practices' (Guy, 2006, p. 653) of different stakeholders influence the degree to which buildings are constructed to accommodate change. Finally, some of the purported motives and obstacles that are mentioned in the literature, such as the impact of different interpretations of adaptability, appear to be based more on anecdote and conjecture, rather than empirical evidence. Such issues are therefore in need of further investigation.

**Data and methods**

Our aim in this research was to explore whether the motives and obstacles to developing more adaptable buildings that are discussed in the literature (Table 1) were evident in practice. In doing so, we sought to access the views of internal stakeholders—those people that are engaged in the building development process and influence how buildings are designed and constructed—rather than the views of external stakeholders—people that may be affected by the building development process but do not have any influence over it (Olander, 2007). For the purpose of this study, a stakeholder is defined ‘... as a person or group of people who has a vested interest in the success of a project and the environment within which the project operates’ (Olander, 2007, p. 279).

Our research was grounded in a subjective view of the world in which ‘... knowledgeable individuals create and recreate their social worlds through deliberate action and enactment’ (Orlikowski and Robey, 1991, p. 145). From this subjectivist perspective, buildings are ‘socially constructed’ (Guy and Henneberry, 2000, p. 2407) and industry stakeholders are ‘... actors who actively fashion their world according to their own particular logic of social action’ (Guy, 2006, p. 651). Schiellerup and Gwilliam (2009, p. 804) argued that ‘... insufficient attention has so far been paid to the way in which those actors which are not directly involved in using buildings shape the structures (physical and otherwise) which users have to interact with’. Hence, in our study we sought to access the views of those actors through interviews. Interviews were considered to be the most efficient and practical way of accessing the views of industry stakeholders, due to the limited opportunities for interacting with stakeholders in the field (they tend to be busy people), an issue that precluded the use of more participatory and immersive methods of data collection. Interviews are also a tried and tested method for researching what Knox (1987, p. 354) called the ‘social production of the built environment’, having been used by Guy et al. (2002) to research urban regeneration in Manchester and by Schiellerup and Gwilliam (2009) to study the role of property agents in the development of more sustainable buildings.
Table 1  Summary of motives and obstacles to developing more adaptable buildings (sourced from existing literature)

<table>
<thead>
<tr>
<th>Motive</th>
<th>Source</th>
<th>Obstacle</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings will be easier to sell in the future</td>
<td>Israelsson and Hansson (2009)</td>
<td>Property valuation/appraisal practices</td>
<td>Ellison and Sayce (2007)</td>
</tr>
<tr>
<td>Buildings will be easier to let</td>
<td>Ellison and Sayce (2007)</td>
<td>Different interpretations of adaptability</td>
<td>Friedman (2002), Finch (2009)</td>
</tr>
<tr>
<td>Reduced risk of depreciation</td>
<td>Baum (1994)</td>
<td>Functionalist approach to design</td>
<td>Kendall (1999), Schneider and Till (2005)</td>
</tr>
<tr>
<td>Reduction in material waste/embodied energy</td>
<td>Russell and Moffatt (2001)</td>
<td>Other design considerations take precedence</td>
<td>Schneider and Till (2005)</td>
</tr>
<tr>
<td>Seek to ‘future-proof’ buildings</td>
<td>Schneider and Till (2005), Barlow and Köberle-Gaiser (2008a, 2008b)</td>
<td>Inflexible forms of construction</td>
<td>Schneider and Till (2005)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concerns about over-specifying buildings</td>
<td>Ellison and Sayce (2007), Finch (2009)</td>
</tr>
</tbody>
</table>

The data employed in our study were in the form of transcripts from 82 interviews that we undertook with industry stakeholders over a two-year period between June 2009 and June 2011. The interviews were undertaken as part of an independently funded study into adaptability, involving a multidisciplinary team of researchers with backgrounds in architecture, civil engineering, construction management, facilities management, and business and management. The purpose of the interviews was to unpack stakeholders’ understanding of adaptability and explore the factors that give rise to different types and levels of adaptability in the built environment. In some cases stakeholders were interviewed as part of descriptive case study research, in which case the interviews also served to provide an insight into the adaptable design strategies employed in a particular case study building and the decision-making processes behind the use of the design strategies.

The interviews were unstructured and undertaken face-to-face with stakeholders from a range of professional disciplines (Table 2). Gaining a multidisciplinary perspective on adaptability was considered to be important because as Fischler (1995, p. 21) points out, ‘One’s professional culture gives one a predisposition to frame situations and problems in particular ways’. Likewise, it is also important to acknowledge that the background of the interviewer(s) also influenced the line of inquiry during any given interview. The majority of interviewees were architects, primarily because they were generally our first point of contact when finding out more about the case study buildings. Around one-quarter of interviewees worked on the client side of the industry: a mix of owner-occupiers, property developers (investor developers), facilities managers or in-house specialists (engineers, project managers and an environmental manager). The remainder were supply-side (architects, quantity surveyors, engineers, etc.) or intermediaries (local authority planners and valuers/agents). Although some stakeholder groups might be considered underrepresented, this is not deemed problematic since the aim of this paper was to explore stakeholder perspectives rather than quantify differences in the occurrence of particular motives and obstacles across stakeholder groups.

Interviewees were asked a variety of questions, some relating specifically to the development of a particular building (or buildings) and others about adaptability more generally based upon their personal
Table 2  Number of interviews, by discipline

<table>
<thead>
<tr>
<th>Professional discipline</th>
<th>No. of interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect</td>
<td>36</td>
</tr>
<tr>
<td>Engineer</td>
<td>5</td>
</tr>
<tr>
<td>Environmental manager</td>
<td>1</td>
</tr>
<tr>
<td>Facilities/estates manager</td>
<td>3</td>
</tr>
<tr>
<td>Planner</td>
<td>5</td>
</tr>
<tr>
<td>Client/developer</td>
<td>14</td>
</tr>
<tr>
<td>Project manager</td>
<td>10</td>
</tr>
<tr>
<td>Quantity surveyor</td>
<td>1</td>
</tr>
<tr>
<td>Urban designer</td>
<td>2</td>
</tr>
<tr>
<td>Valuer/agent</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
</tr>
</tbody>
</table>

experiences. They were typically not asked explicitly to talk about the motives and obstacles to developing more adaptable buildings; instead these issues emerged indirectly from the conversations between interviewer(s) and interviewee(s). In many cases, interviewees needed very little prompting and talked extensively about their thoughts and experiences, providing a rich narrative for subsequent analysis.

The case study buildings covered a wide variety of use types, including healthcare, retail, office, education, residential and industrial. Case studies were largely descriptive and their purpose was to illustrate different approaches to designing and constructing for adaptability in buildings. All of the interviewees and case study buildings referred to in this paper were located in the UK; however, some of the interviewees talked about their experiences in other countries. In some cases, we were able to elicit multiple stakeholder perspectives on a given case study building. For instance, in one case study we interviewed an architect, a quantity surveyor, a developer, an engineer and a property agent. In this paper we focus primarily on reporting findings from the anonymized stakeholder interviews, although where necessary references are made to anonymized case study buildings in order to illustrate particular issues.

The interviews were recorded with the consent of the interviewees and transcribed prior to analysis. The interview transcripts were then subjected to a template analysis, in which a pre-prepared list of codes was used to identify themes in textual data (King, 2004). The template that was used in our analysis was based on the motives and obstacles to developing more adaptable buildings that were identified in the literature review (Table 1). However, when the issues that were discussed in the transcripts did not match any of the prior themes, then a new theme was devised and the template was adjusted accordingly (King, 2004). The revised template is in Table 3 below. We did not count the frequency with which interviewees referred to particular motives and obstacles because as Pratt (2009, p. 858) points out ‘quantifying the data does not serve most small-sample qualitative studies well’. Among other problems, quantifying qualitative data ignores the context in which interviewees discussed a given issue and the importance they placed on it; it may also misrepresent the voices of the people being studied (Pratt, 2008, 2009).

Following the completion of the interviews and during the latter stages of our research, we also undertook five workshops: four with design teams from two separate architectural practices and one with members of a developer’s design team. The workshops were primarily designed to help us to develop a series of case studies; however, they also provided us with an opportunity to validate the interview findings presented in Figures 1 and 3 below.

Interview findings

Analysis of the interview transcripts revealed a wide range of motives and obstacles to constructing more adaptable buildings. Table 3 distinguishes between: the motives and obstacles that were discussed in both the literature and interviews; the motives and obstacles that were only discussed in the literature; and the motives and obstacles that were only discussed in the stakeholder interviews. As is apparent from Table 3 the stakeholder interviews substantiated many of the motives and obstacles that were discussed in the literature; however, they also revealed a number of other issues that have not been explored previously in the literature. These issues are discussed in further detail below under three sub-headings: costs and benefits; uncertainty; and fragmentation.

Costs and benefits

All of the stakeholders interviewed in our research claimed to be in favour of developing more adaptable buildings, although the reasons why they were in favour tended to vary from stakeholder to stakeholder. For instance, one architect saw designing for adaptability as an opportunity for his practice to differentiate itself from competitors and gain an advantage in the marketplace, arguing that

...we’re always looking for an angle or something that will add value to the service that we offer and flexibility’s obviously a key part of that. If we can show a
Table 3 Summary of motives and obstacles to developing more adaptable buildings (from literature and stakeholder interviews)

<table>
<thead>
<tr>
<th>Motive</th>
<th>Obstacle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussed in interviews and literature</td>
<td></td>
</tr>
<tr>
<td>Buildings will be easier to change in the future</td>
<td>Assumption that adaptability costs more</td>
</tr>
<tr>
<td>Buildings will cost less to change in the future</td>
<td>Build-to-sell development models</td>
</tr>
<tr>
<td>Buildings will be easier to sell in the future</td>
<td>Property valuation/appraisal practices</td>
</tr>
<tr>
<td>Buildings will be easier to let</td>
<td>Different interpretations of adaptability</td>
</tr>
<tr>
<td>Reduced risk of depreciation</td>
<td>Functionalist approach to design</td>
</tr>
<tr>
<td>Less disruption to occupiers/users</td>
<td>Fragmentation/complexity in procurement</td>
</tr>
<tr>
<td>Uncertain/unpredictable future user needs</td>
<td>Other design considerations take precedence</td>
</tr>
<tr>
<td>Seek to ‘future-proof’ buildings</td>
<td>Disconnect between payer and beneficiary</td>
</tr>
<tr>
<td>Opportunity for architects to add value</td>
<td>Lack of life cycle costing in construction projects</td>
</tr>
<tr>
<td>Less risk of failed communities</td>
<td>Inflexible forms of construction</td>
</tr>
<tr>
<td>Market knowledge/experience of previous projects</td>
<td>Concerns about over-specifying buildings</td>
</tr>
<tr>
<td>Asset/facilities management input into design</td>
<td></td>
</tr>
<tr>
<td>Build in value for the future/protect the asset</td>
<td></td>
</tr>
<tr>
<td>Good design/architectural planning</td>
<td></td>
</tr>
<tr>
<td>Long-term property ownership models</td>
<td></td>
</tr>
<tr>
<td>Long and complex building development projects</td>
<td></td>
</tr>
<tr>
<td>Flexible planning consent</td>
<td></td>
</tr>
<tr>
<td>Uncertainty about future user requirements</td>
<td></td>
</tr>
<tr>
<td>Recycling culture</td>
<td></td>
</tr>
<tr>
<td>Discussed in literature only</td>
<td></td>
</tr>
<tr>
<td>Reduction in material waste/embodied energy</td>
<td></td>
</tr>
<tr>
<td>Increased user control/empowerment</td>
<td></td>
</tr>
</tbody>
</table>

track record, particularly if people are looking at buildings we did 20 years ago and they hold up well, then that’s part of adding value, isn’t it? (Architect #3)

Another architect had an altogether different perspective, seeing adaptability as a way of mitigating against the risk of ‘failed communities’ (Architect #1), by constructing buildings that are better able to accommodate future social and economic changes. One of the property agents that we interviewed was in favour of adaptability because he wanted the buildings that he manages on behalf of clients to be ‘as marketable as possible’ and ‘appeal to as broad a market as possible’ (Property agent #1).

However, having spoken in favour of adaptability, most stakeholders then went on to cite the reasons why buildings are usually not constructed to be more adaptable. Perhaps unsurprisingly, given what we already know from the literature, interviewees cited cost as an obstacle to adaptability. The tension between wanting to develop more adaptable buildings but being constrained by costs was summed up aptly by one architect, who suggested that:

I completely concur and I like buildings to last 500 years. I’d like them to change uses 10 times. I’d like to be able to dismantle an office façade and put another kind of façade and respond to the climate and all of that. I guess the problem is that the more flexibility you create probably the more cost there is. (Architect #3)

Convincing clients to spend more in order to ‘future-proof’ their buildings was seen by some stakeholders to be a major challenge. Nevertheless, some interviewees questioned the conventional wisdom that adaptability must always cost more money, arguing that adaptability is often a function of ‘good architectural planning’ (Architect #3) and that ‘... if you catch it early enough you could reduce that reliance on cost’ (Engineer #2). For instance, the choice of a more adaptable structural grid was cited as an example of a design strategy that need not lead to an increase in
<table>
<thead>
<tr>
<th>Q1</th>
<th>'Life-savers'</th>
<th>Q3</th>
<th>'Luxuries'</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERSIZED COLUMN S</td>
<td>INCREASED STORY HEIGHT</td>
<td>OVERSIZED FOUNDATION</td>
<td>ADDITIONAL LIFT PITS</td>
</tr>
<tr>
<td>ADDITIONAL PLANT CAPACITY</td>
<td>MODULAR FURNITURE</td>
<td>ADDITIONAL LIFT PITS</td>
<td>ZONED SERVICES</td>
</tr>
<tr>
<td>PLUG 'N' PLAY CONNECTIONS</td>
<td>STANDARDIZED FENESTRATIONS</td>
<td>MAGNETIC DOOR SIGNS</td>
<td>REDUNDANT LINTELS IN WALLS</td>
</tr>
<tr>
<td>RECYCLABLE CARPET TILES</td>
<td>DEMOUNTABLE PARTITIONS</td>
<td>LARGE SERVICE VOIDS</td>
<td>MAGNETIC DOOR SIGNS</td>
</tr>
<tr>
<td>STANDARD STRUCTURAL GRID</td>
<td>SUSPENDED CEILINGS</td>
<td>REDUNDANT LINTELS IN WALLS</td>
<td>SUPPLEMENTED CEILINGS</td>
</tr>
<tr>
<td>RAISED FLOORS</td>
<td>STANDARDIZED FENESTRATIONS</td>
<td>PLUG 'N' PLAY CONNECTIONS</td>
<td>LOW COST</td>
</tr>
</tbody>
</table>

**Figure 1** Examples of the interplay between cost and uncertainty when developing more adaptable buildings (sourced from case study buildings)

construction costs, if considered early enough in the development process.

Clients were generally more willing to meet the additional cost of adaptability if it was likely to yield them financial savings or some other tangible benefits in the future. An employee of one developer suggested that:

... we try to cater or provide a degree of flexibility for spatial changes so we over-provide because it’s a lot easier to put more connections in at day one rather than retrofit later because of the impact of builders’ work. (Engineer #3)

For clients with a longer-term outlook adaptability was seen as a way of ‘building in value for the future’ (Property agent #3) and ‘protecting the asset’ (Engineer #2) from being damaged by tenants and users as they adapt the building to their own specific needs. One corporate occupier described how they had constructed one of their buildings so that it could be sub-divided in the event of their space requirements changing, stating that

‘... it still pays, in terms of if we get a five-year sublet, it still pays in for us to pay for that work, it still makes sense to do it’ (Client/developer #13). In some cases the opportunity cost of not being able to adapt a building was considered to outweigh the costs of designing in the adaptability. For instance,

... over-specifying floor loadings is great, but it costs money. Under-specifying, it may not cost you money when you first let it. It costs you a hell of a lot of money later when you muck around with bits of the building and you affect the floor loadings and you can’t let the shop because you can’t put a book store in. (Property agent #3)

Developing more adaptable buildings was also seen as a way of making it easier and cheaper to adapt buildings during construction (when making changes can be very costly) or immediately after completion (when making changes can be disruptive for users). This type of adaptability was considered to be particularly
Figure 2  Fragmentation between industry stakeholders and through the building life cycle (based on interviews and case studies)

Figure 3  Interplay between influencers and beneficiaries when designing for adaptability (based on interviews and case studies)
important in large and complex developments, such as hospitals and retail schemes, where occupier requirements may change in the time between project inception and completion.

However, not all clients were seen to value adaptability in their buildings. One interviewee (Architect #3) cited the example of hotel chains, which have very prescriptive design briefs and see their buildings as assets that are there to be ‘sweat’ and then disposed of, with little consideration for adaptability. Another interviewee used the example of pharmaceutical companies, for whom real estate costs were seen to be ‘a drop in the ocean’ and ‘the argument [in favour of adaptability] would be less about value creation or retention, it would be more about enabling a swifter exit’ (Property agent #1). As was evident in the literature, some developers have short-term business models, based around the sale of their newly completed buildings, and therefore focus on minimizing construction costs:

I think all landlords look for that flexibility, but obviously they rein it in against cost, and if you’re going to sell a scheme at practical completion plus one, it’s not quite as important. (Property agent #3)

As well as increasing construction costs, there were also concerns that constructing for adaptability might compromise a building’s first use and that people did not want to be seen to be ‘planning for failure’ (Client/developer #2). For instance, one interviewee cited the example of developing office buildings that can be converted to residential use, suggesting that the optimum floor depths and core positions for the two functions are incompatible; a developer would end up with either sub-optimal offices or sub-optimal housing.

Uncertainty

Uncertainty also emerged as a significant obstacle to developing more adaptable buildings, with one interviewee suggesting that ‘...we might be spending money on anticipating these changes which aren’t either realized at all or aren’t realized as they were intended’ (Architect #2). Indeed, the interviews revealed a paradox, in which uncertainty was considered to be both a reason to develop more adaptable buildings but also a reason not to, because the benefits of adaptability were uncertain. Sometimes the decision to invest more upfront in adaptability was undertaken in the certain knowledge that the adaptability would generate benefits in the future, whereas in other cases there was a great deal of uncertainty about whether the adaptable design features would be utilized.

The interplay between cost and uncertainty is illustrated in Figure 1, using examples of design solutions utilized in the case study buildings. Working as a group, we positioned the examples in one of the four quadrants based on qualitative information taken from the interviews (relative costs, frequency of change); their positions are therefore intended to be indicative, rather than absolute. In the bottom left-hand corner are examples of what could be termed ‘good buys’; low cost solutions that are almost certain to be used in the future, such as demountable partitions or raised floors in an office building, or the over-provision of power outlets in a retail scheme. In contrast, some low cost solutions (‘cheap tricks’) might be worth investing in, even if they might not be used, because they add little to the cost of construction but mean that the building could be adapted more easily and cheaply in the future should the need arise; for instance, the architects of one case study building included lintels (the additional cost of which was marginal) into the design of an external wall to allow new openings to be made in the future. The top left quadrant of Figure 1 contains examples of ‘lifesavers’; more expensive design solutions that are worth investing in because otherwise adapting the building at a later date may be technically impossible, prohibitively costly or disruptive to users. For example, providing additional plant room capacity to support an increase in the number of building users was a tactic that was used in some case study buildings. The design solutions in the top right hand corner could be described as ‘luxuries’, because they are expensive and there is uncertainty as to whether they will ever be utilized. Examples include oversized foundations and increased storey heights.

The interviews also provided an interesting insight into how stakeholders make decisions about the degree of adaptability to incorporate into their buildings in the light of uncertain future requirements. The existing literature implies that decisions about adaptability are based upon rational calculations of costs and benefits (e.g. see Arge, 2004, 2005; Slaugh-ter, 2001), examples of which were certainly evident in some case studies. For example, in one project the structural engineer (Engineer #2) was asked by the client to undertake an appraisal of the different options for the building’s structural frame, based upon the costs of construction, buildability and ease of change in the future. Elsewhere, however, decisions about adaptability were often made by guessing what the ‘most likely eventualities’ would be (Property agent #3), based upon a combination of past experience and market knowledge. One interviewee suggested that ‘...the best way you can guarantee that you’re effectively future-proofing the building is
by trying to second guess what will be as relevant today as it will be in 10 years’ time or 20 years’ time’ (Property agent #1).

**Fragmentation**

Industry fragmentation was found to be a particularly important obstacle to developing more adaptable buildings. This fragmentation was found to occur in two dimensions: across stakeholders and through time (Figure 2). Fragmentation between stakeholders was frequently cited as a reason why a particular building had not been constructed to be as adaptable as it could have been. For instance, architects and engineers described how adaptable design solutions had been ‘value engineered’ out of a scheme by a client, quantity surveyor or contractor. The problem of fragmentation was seen to have been made worse by the increased use of contractor-led procurement routes, such as design and build, which had created a disconnect between the client and design team. One architect suggested that

> You can plan for flexibility but then the contractor might come in and say, ‘I’m going to do the whole thing in load bearing masonry with short spans,’ and then actual flexibility of use is limited. So I think there’s one aspect which is designing for adaptability and then there’s another aspect which is actually constructing for adaptability. (Architect #2)

When it came to making decisions about adaptability, property agents were considered to play a particularly important role as intermediaries between client and design team. In some instances property agents were seen to have a positive influence by encouraging clients to invest in more adaptable design solutions, particularly in projects where the property agent was likely to have an ongoing asset management role and would therefore benefit from increased adaptability. However, some interviewees felt that property agents were often too conservative and stymied efforts to develop more adaptable buildings. For example one corporate occupier described how property agents had advised developers against incorporating certain adaptable design solutions because ‘... if you do something that’s different from the developer next door, you’re not going to let your building’ (Client/developer #13).

The interviews provided an interesting insight to the interplay between the influence exerted by different stakeholders, regarding the degree to which buildings are constructed to be adaptable, and the level of benefit derived by that particular stakeholder from more adaptable buildings. Experienced, repeat-order clients were seen to have a significant influence on how adaptable buildings were designed to be; however, in projects with inexperienced clients it was often the architect that was the driving force. One architect explained how ‘we have a degree of responsibility to actually open up the client’s eyes to the potential for flexibility’ (Architect #4). In contrast, some stakeholders felt that they had little or no influence over the degree to which buildings are constructed to be adaptable. For instance, one of the local authority planners interviewed claimed that

> I can say, ‘This particular individual design doesn’t seem to sit very comfortably with its neighbours.’ Or I can say, ‘The materials you’re using clash with surrounding materials.’... There are all those sorts of parameters, or even if it’s high enough, interfering with air traffic and we’ve had cases of that. But I can’t turn round and say, ‘That building isn’t sufficiently adaptable for a future that I can’t anticipate.’ (Planner #1)

Some stakeholders believed that local planning authorities should have more power to compel clients to incorporate more adaptable design solutions in their buildings, but were unsure how that would work in practice, particularly given the separation of powers between planning and building control departments in UK local authorities.

Figure 3 illustrates the interplay between stakeholder influence and benefits in relation to adaptability, based on the accumulated knowledge gathered from our interviews and case studies. The position of each stakeholder is not meant to be absolute but indicative of general conditions in practice: influences and benefits will ultimately vary depending on the building in question. As with Figure 1, we worked as a group and came to a consensus about the relative positions of the different stakeholders. The validity of Figures 3 and Figure 1 were subsequently confirmed in the workshops with the design teams.

In the top left quadrant of Figure 3 are the ‘champions’; those stakeholders that influence whether or not buildings are developed to be adaptable but are also likely to benefit from the adaptability in the future because they have a long-term interest in buildings. It should therefore be in both their interest and their power to develop a building that is more adaptable. Adjacent to the ‘champions’ are the ‘gatekeepers’, stakeholders that have some degree of influence over whether buildings are adaptable or not, but are less likely to benefit from the adaptability. Examples include members of the design team, merchant developers, design and build contractors, and property agents. Stakeholders in this quadrant have less incentive to develop more adaptable buildings, as they often
only have a short-term interest in buildings, and it is sometimes in their interest not to, for instance because increased adaptability may impact on their bottom line. In the bottom left quadrant are the ‘outsiders’, those stakeholders that stand to benefit from adaptability but have little or no influence over the degree to which buildings are constructed to be adaptable. Examples include end-users, facilities managers and society in general. The final quadrant includes ‘bystanders’; stakeholders such as local authority planners and traditional construction contractors, who are less likely to benefit from more adaptable buildings and have little or no influence on adaptability.

Fragmentation through the building life cycle was also found to be an obstacle and disincentive to developing more adaptable buildings, as there was often an assumption that ‘... the person who pays initially is not the person who will get the benefit eventually’ (Architect #5). This was clearly the case in schemes where the client was developing the building to sell after completion, but even in situations where a client had a longer-term interest in a building, the need to reduce capital costs often meant that adaptability was given less consideration. One client’s in-house specialist described how

Development teams work to a budget and they don’t necessarily design with assisting management costs at a later stage... Property industries don’t work on a 40 or 60 year basis. It might be that in five, 10 years’ time ... you’ve sweat the asset, you move it on.

(Environmental manager #1)

Short-termism was also found to be an issue in the public sector, where capital expenditure is often detached from the revenue streams that will be used to operate and maintain the building. One interviewee (Architect #5) felt that the introduction of PFI had encouraged greater consideration of adaptability, by creating an incentive for contractors to take a long-term perspective due to the fact that they will be the ones managing the buildings for 20 years or more. However, this view was contradicted by another interviewee (Architect #10) who suggested that PFI buildings are typically designed to change only once in their 25-year life, reflecting the findings of Barlow and Koberle-Gaiser’s (2008a, 2008b) research into this method of procurement.

Discussion

Despite the fact that adaptability in buildings was considered to be a desirable characteristic by all of the stakeholders in our study, our interviews suggested that there are a multitude of reasons why more buildings are not constructed to be more adaptable. The additional cost of developing more adaptable buildings was cited as an obstacle to adaptability, confirming what we found in the literature (e.g. Slaughter, 2001; Arge, 2004, 2005); however, the interviews suggested that the decision as to whether or not to incorporate particular adaptable design solutions was often about much more than economics alone. Developing more adaptable buildings usually involves:

- balancing the competing demands of different stakeholders;
- inter-temporal choices involving costs and benefits at different points in time, sometimes over long time horizons; and
- making complex decisions under conditions of uncertainty.

Fragmentation in the property and construction industry emerged as a significant obstacle to developing more adaptable buildings. The property development process usually involves a wide range of stakeholders, including clients, funders, architects, engineers, planners, contractors, valuers, quantity surveyors, facilities managers and manufacturers. Each of these stakeholders has different—and sometimes conflicting—motives and values. For instance, whereas developers and funders may look to minimize risk and maximize profit by investing in projects they consider to be safe and predictable, architects may be motivated by the opportunity to design high quality and innovative buildings. Ball (2002) suggests that the emergence of industry associations and professional bodies, such as the Royal Institute of British Architects (RIBA) and the Royal Institution of Chartered Surveyors (RICS) has exacerbated these differences by creating shared identities that intensify mutual distrust between stakeholder groups.

The notion that buildings are a product of ‘competing social practices’ (Guy, 2006, p. 653) is by no means new; for instance Davis (1999) alluded to it in his book The Culture of Building, in which he suggested that

The institutions involved [in the construction industry] have individually legitimate but often contradictory agendas. Although the procedures are coordinated with each other, the result may represent less a common vision than an unobjectionable compromise. (Davis, 1999, p. 127)

The contested nature of building development usually dictates that the building that is eventually constructed is not the most technically ‘optimal’ or ‘rational’ solution (e.g. see Guy, 2006). The impact of competing demands on adaptability was evident in
our interviews and case studies, for example when stakeholders talked about the tension between designing for adaptability and compromising the building’s first use. Elsewhere, interviewees talked about how adaptability is sometimes compromised by a preoccupation with ‘haute couture’ architecture (Architect #1) (which itself was seen to be a product of architectural training) and a tendency for ‘designing for ego’ (Planner #2). Some modern methods of construction were also seen to be potential obstacles to adaptability, either because they were considered to be less durable or because they meant that building components were melded together and were therefore difficult to change. Here the tension was between buildability (increasing the speed and quality of construction, and reducing costs) and adaptability in later life.

Developing buildings that can accommodate future change usually involves making decisions under conditions of uncertainty, and the further that one looks forward, the more uncertain the future becomes (Nutt, 1988). One of the stakeholders in our study wondered whether developing more adaptable buildings was merely an example of ‘speculation’ and questioned whether this was good value for money (Architect #2). Another suggested that

... these days I get the impression, certainly with industrial and commercial stuff, it’s, ‘Well, we can’t see any more than about 20 years into the future so why bother building something that’ll be here in 100 years’ time because it’ll be somebody else’s, not ours.’ So they just want the cheapest that they can throw up. (Engineer #1)

Nevertheless, there were numerous examples in our case studies of where adaptable design solutions had been adopted and had proven to be successful. Often these solutions were found in projects in which the client had a long-term outlook, and the design and development team had a good understanding of the clients’ core business and how this might change over time. This underlines the important role that briefing—a process that has often been problematic in construction projects (e.g. see Barrett et al., 1999; Blyth and Worthington, 2010)—can play in the development of more adaptable buildings. Briefing is when the client’s need for adaptability is ‘... translated and incorporated into the building process’ (Ryd, 2004, p. 248). However, the words ‘adaptable’ and ‘flexible’ often find their way into design briefs without proper clarification of their ‘meaning and intention’ (Paton and Dorst, 2011, p. 582). This ambiguity, or lack of shared understanding, can result in unintended and inappropriate design solutions. For example, one interviewee recalled how he had to work hard to ‘... persuade our customers that adaptable doesn’t mean throwing every conceivable option or addition at a building’ (Client/developer #2).

Applying learning from past projects was also found to be a critical success factor in developing more adaptable buildings, particularly for repeat-order clients. One developer recounted how

It comes from experience, it comes from gut feel, it comes from what we’ve done in the past well, it comes from what we’ve done in the past not well. And learning from those mistakes and thinking right, next time we’re going to make sure that we cover that. (Client/developer #1)

However, the benefits of such learning were not usually available to inexperienced or one-off clients, for whom the design and construction team would be the main source of knowledge about adaptability. The construction industry is notoriously poor at learning from the buildings that it delivers, as development teams come together to deliver bespoke solutions and then disband once the project is completed. Although the notion of ‘post-occupancy evaluation’ has gained currency in recent years, such evaluations are often undertaken using disparate methodologies and the information from them rarely enters the public domain. Improving the sharing of knowledge and ideas about what works and what does not work in terms of adaptability is therefore a prerequisite to developing a more adaptable built environment.

For a client, deciding whether or not to invest in a particular adaptable design solution is a classic example of an inter-temporal choice: a choice involving costs and benefits at different points in time (Read, 2004). Whole life cycle costing techniques have been developed to help people make more informed choices between alternative building design options and to enable clients and their design teams to take into consideration all of the costs that are likely to emerge during a building’s life (e.g. see Kishk et al., 2003; Boussabaine and Kirkham, 2004), but there was little evidence in our interviews to suggest that such techniques were being used to inform decisions about adaptability in buildings. One interviewee conceded that ‘... whole life cycle costing really should come into it [the development process], but it doesn’t in reality’ (Environmental manager #1). In some cases this was because there was a lack of time, skills and resources to apply such techniques in practice. However, it was often because of the disconnect between the people paying for the construction of the building and the future beneficiaries of the adaptability: for some clients there was no reason or
incentive to look much beyond the construction phase of the building, never mind model the costs of the building over its life cycle.

Myopia was found to be a major obstacle to developing more adaptable buildings, as even clients with a long-term interest in buildings focus on reducing the capital costs of projects, sometimes at the expense of future adaptability. This can partly be explained by the way that funding for such projects comes about (the separation of capital and revenue funding streams); however, it is also a function of time preference: our innate tendency to discount the value of future costs and benefits, particularly when those costs and benefits are going to be falling at someone else’s door (e.g. see Frederick et al., 2002). Time preference and discounting mean that often ‘... the course of action that is most desirable over the long run is not the best course of action in the short term’ (Laverty, 1996, p. 825). Heal (1997, p. 335) summed up the problem of discounting succinctly, when he argued that:

Discounting has always been a source of controversy between economists and those from other disciplines interested in the environment. After all, if you discount at 5% over 100 years, then you are giving a future dollar a present equivalent of ... roughly 2/3 of a cent. It is hard for a non-economist to reconcile this with taking the future at all seriously.

One of the key principles of sustainability is that development today should not compromise the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987; Stern, 2006). However, buildings that are difficult to adapt pose a problem for future generations, because those buildings need to be demolished, or undergo costly and potential environmentally damaging refurbishment or remain vacant, which itself can have indirect negative social and economic consequences. Developing more adaptable buildings is therefore a matter of ‘intergenerational equity’ (Portney and Weyant, 1999): ensuring that the buildings that we construct today are assets, rather than liabilities, for future generations. An in-depth discussion of time preference, discounting and intergenerational equity is beyond the scope of this paper, but the issues are discussed extensively elsewhere in the literature (e.g. see Stern, 2006).

So, given the obstacles discussed above, what would need to change in the property and construction industry for more buildings to be constructed to be more adaptable? One change would be to develop a better understanding of the costs, benefits and risks of adopting different adaptability strategies, and to challenge the longstanding notion that ‘... the maximum possible flexibility probably equates to maximum cost of build and design’ (Property agent #3). Zhang and Yang’s (2006) research (involving surveys, interviews and focus groups) with industry stakeholders in Australia showed how ignorance about the benefits of adaptability can inhibit the adoption of particular adaptable design solutions (in this case raised access floors), a fact also reflected in our interviews. Some of the potential benefits of developing more adaptable buildings were alluded to earlier in this paper; however, understanding who receives the benefits is a key part of developing a business case for adaptability. Furthermore, providing more robust evidence as to the real costs and benefits of adaptability and the way in which these play out in practice could enable clients and their advisors to make more informed decisions about which, if any, adaptability strategies to deploy in their buildings. Learning from examples of existing buildings can also be a useful way of understanding the costs and benefits of adaptability.

The findings of our research suggest there needs to be a clearer articulation of what constitutes adaptability in buildings, so as to overcome some of the misconceptions that surround the issue. Evidence from the related field of ‘sustainable’ buildings suggests that being able to certify or label a building as ‘green’ can help to improve transparency in the property market and help occupiers to make more informed decisions about which buildings to purchase or lease. Moreover, such certification schemes can help valuers and investors to factor the benefits of adaptable design features into their appraisals of worth and send positive price signals to developers that more adaptable buildings are worth investing in. A useful goal for researchers and industry bodies might therefore be to develop a similar scheme for the adaptability potential of buildings or to see how adaptability potential can be factored into existing ‘green’ building certification schemes, such as BREEAM and LEED. Indeed, there have already been moves in this direction. For instance in the UK, the Lifetime Homes standard—a set of design criteria for ensuring that new homes are adaptable for lifetime use—has been incorporated into the Code for Sustainable Homes (Department for Communities and Local Government, 2006). In the US, the American Institute of Architects has adopted the ‘long life, loose fit’ principle as one of its 10 measures of sustainable design in its annual top 10 green projects competition, in which entrants are asked to describe, among other things, the adaptive reuse potential of their buildings (American Institute of Architects, 2004).
Constructing a more adaptable built environment will also require a change in stakeholder mindsets. Again, parallels can be drawn with the slow adoption of 'green' or 'sustainable' building techniques in the UK. As is the case with adaptability, many of the technical solutions to developing more sustainable buildings have been around for years but it is only recently that these solutions have begun to be adopted by the property development industry. Some authors have attributed this slow up-take to a 'circle of blame', whereby constructors do not produce 'greener' buildings because they claim that developers do not want them, who in turn claim that investors will not fund them because there is no demand from occupiers (Hartenberger, 2008). For years, the lack of a clear business case for more sustainable buildings meant that the property development industry was unable to break out of this circle of blame, a situation that has only recently started to change, for reasons discussed earlier in this paper. However, as yet no comparable business case has been articulated for developing more adaptable buildings.

Figure 4 depicts an idealized and conceptual view of a property and construction industry in which adaptability in buildings is the norm due to an alignment in the interests of different stakeholder groups: developers procure buildings that are more adaptable because they attract higher prices from investors, who in turn find that they are more attractive to a wider range of occupiers and end-users because they are easier to adapt to their specific requirements. This 'virtuous circle' is reinforced by a series of other

---

**Figure 4** Creating a virtuous circle for more adaptable buildings (adapted from Hartenberger, 2008, p. 6)
influences: valuers factor the benefits of adaptability into their appraisals and industry bodies encourage their members to think about adaptability when procuring, designing or constructing buildings; similarly local authority planners encourage clients and developers to construct more adaptable buildings, and banks lend to investors and developers at more favourable interest rates because more adaptable buildings are seen as less risky investments. Underlying all of these relationships is a higher education system that instils in architects, engineers, planners and members of other professional disciplines the importance of ‘valuing the future’ (Heal, 2000; Pearce et al., 2004).

Government regulation may also play a role in changing stakeholder mindsets towards adaptability in buildings. For instance, rising landfill taxes in the UK and other countries mean that waste from building demolition and refurbishment will be increasingly costly to dispose of in coming years and although the principle of extended producer responsibility is unlikely to be applied to whole buildings any time soon, it could potentially be applied to particular building elements and components (Guggemos and Horvath, 2003). Less restrictive use ordinances and zoning laws would allow clients and developers to foresee a broader potential for a building without having to go through the trouble of obtaining planning permission again in the future. In their study into the feasibility of converting offices to flats, Gann and Barlow (1996, p. 65) observed that

> The capacity to change depends to an extent on local infrastructure and amenities—there is a direct relationship between the way that design decisions affect the future use of a building and constraints imposed by planning and building control systems.

A more flexible planning environment might therefore give rise to greater demand for buildings that are more adaptable, particularly in terms of the ease with which they can be retrofitted, scaled up or down in size, or converted to a new use.

**Conclusions**

Our objectives in this paper were to:

- determine why, despite the compelling arguments in favour of adaptability, more buildings are not constructed to be more adaptable;
- explore whether the motives and obstacles to developing more adaptable buildings that are discussed in the literature were evident in practice; and
- consider what might need to change, in terms of industry conditions and mindsets, for more buildings to be constructed to be more adaptable.

The literature review and stakeholder interviews suggested that developing more adaptable buildings can provide a range of potential benefits, but often the beneficiaries (society, end-users, future owners, facilities managers) have insufficient influence over the way buildings are designed and constructed to ensure that these benefits are realized. In some cases, developing more adaptable buildings may run directly counter to the short-term interests of influential stakeholders, for instance by increasing initial construction costs or compromising a building’s first use. Adaptability will only therefore be seen as a desirable characteristic if it provides more immediate benefits to influential stakeholders (for instance by making buildings easier to change during construction or easier to sell after completion) or if influential stakeholders have a longer-term interest in buildings, which is often not the case due to the fragmented nature of the building life cycle. Add to this our innate tendency to place more value on short-term costs and benefits rather than longer-term outcomes, and one can see why adaptability often slips down the list of priorities during the building development process.

Our interview research largely substantiates the findings of previous research into adaptability, but it also highlights the drawback of viewing individual motives and obstacles in isolation. For instance, whereas Arge’s (2004 and 2005) research investigated the influence of development models on adaptability and Slaughter’s (2001) study focused on analysing costs, our research suggests that a building’s level of adaptability is usually a function of a complex range of social, economic, political and technological factors, the interaction between which can result in design outcomes that might not necessarily be seen as rational or optimal when viewed in retrospect and taken out of context. Furthermore, our research has highlighted a range of other motives and obstacles that were not discussed in the literature on adaptability, such as the impact of modern methods of construction and stakeholder concerns about compromising a building’s first use. Future studies could therefore explore these and other factors in context, perhaps by employing a participatory action research methodology (e.g. see McIntyre, 2008). Moreover, given that almost half of the interviewees in our research were architects, future studies into adaptability could put more emphasis on exploring the views and experiences of other stakeholder groups, such as clients (as the ultimate decision makers) and facilities managers (as the people responsible for operating buildings).
One of the most surprising findings of this research was the lack of quantitative evidence—both in the literature and in industry—about the costs and benefits of developing more adaptable buildings. Our interviews suggested that decisions about whether or not to incorporate particular adaptable design solutions into buildings were often based on guesswork, 'gut feel' or past experience, rather than 'hard' data. The lack of such data means that it is often difficult for designers to justify the inclusion of adaptable design features in buildings, particularly if the adaptability gives rise to additional construction costs or compromises another aspect of the building's design. Future developments in (and the more widespread use of) life cycle costing techniques and building information modelling may help stakeholders to make more informed decisions about adaptability in buildings, particularly during the early stages of development when the costs of designing in adaptability may be lower. However, there also needs to be a better understanding of the impact that adaptability can have on investment returns. An interesting avenue for further research would therefore be to use hedonic pricing techniques (see Rosen, 1974) to determine the value of different types of adaptability in buildings. Such research may help to change stakeholder mindsets about the benefits of developing more adaptable buildings.

Acknowledgements

This paper is based on research undertaken as part of the Adaptable Futures project at Loughborough University. We would like to acknowledge the financial support of the Engineering and Physical Sciences Research Council and the Innovative Manufacturing and Construction Research Centre at Loughborough University, together with the input and case studies provided by our industry partners. Further information about Adaptable Futures can be found at www.adaptablefutures.com.

References


