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Integrating views on building performance from different stakeholder groups

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ABSTRACT

Purpose: The paper aims to highlight a broader definition of good building performance that goes beyond the traditional emphasis on technical aspects, only adopting the lens of the social construction of technology (SCOT) in the empirical space of the workplace sector. Several building performance evaluation methods focus on technical aspects such as energy consumption, indoor environmental conditions and compliance with building regulations and standards. Technical aspects, albeit important goals, only embed a partial component of what buildings are expected to deliver. There is growing interest in considering the organisational and experiential expectations of building performance, particularly integrating various views of performance as expected by different user groups.

Method: The paper adopts an archival research method to analyse the archive of the workplace consultants DEGW, particularly focusing on their work on London's Broadgate development in 1980-the 90s.

Findings: The findings reveal how voices from a pluralistic client organisation can be addressed to articulate a broad definition of building performance that integrates different viewpoints encompassing technical, organisational and experiential expectations. In DEGW's work, the views on building performance of various stakeholders involved in the everyday use and management of buildings are identified without imposing predetermined agendas or research notions of performance. Particular emphasis is given to understanding clients as not a homogenous entity but consisting of different interest groups, which implies multiple conceptualisations of building performance and the building itself.

Originality: The paper offers insights by adopting the theoretical lens of SCOT to explore an integrated approach to building performance that captures the varied needs of building users through the example of London's Broadgate development.

Research and practice implications: The performance expectations of a building vary between organisations and even within any organisation. Moreover, the needs of an organisation will change over time, and the BPE criteria need to be changed to ensure better alignment between organisations and the physical spaces they occupy. A critical reflection on the conceptualisation of 'users' and 'building' in BPE methods is required to create an integrated approach towards building performance.

KEYWORDS

building performance evaluation, DEGW archive, performance gap, post occupancy evaluation, social construction of technology

1. Different interpretations of building performance by clients and users in the workplace sector

There is an urgent need to reduce the carbon emissions of the built environment and improve the quality, sustainability and performance of buildings. Building performance evaluation (BPE) provides tools to measure performance targets and assess building quality at different stages of the building life cycle (Preiser *et al.*, 2015). In the past, BPE methods have focused on quantifiable technical aspects such as energy consumption, indoor environmental conditions and compliance with building regulations and standards. The organisational and experiential expectations of building performance remained under-articulated; however, these aspects are gaining traction and interest to reflect various stakeholders' diverse perspectives and expectations. The concept of performance is expanding to include a diversity of factors that arise during the building life cycle to consider the building's contribution to sustainability (Preiser *et al.* 2018).

This paper argues that performance expectations vary between different user groups involved in the use and operation of buildings. Therefore, it is essential to consider ways to integrate diverse perspectives on performance to increase end-users satisfaction with buildings. The theoretical framework of the Social Construction Of Technology (SCOT) (Pinch and Bijker, 1984) is used to explore multiple interpretations of 'good performance' within a client organisation. The paper draws from the empirical investigation of the DEGW archive at the University of Reading. The broader notion of building performance that is not limited to merely technical aspects but includes organisational aspects where the performance criteria are constantly evolving is a unique contribution of DEGW (Patel and Green, 2020). Building on previous research on the DEGW archive, this paper explores

different perspectives of building performance from various groups within organisations, such as senior management, human resources, facilities management and information technology. The case study of Broadgate development in London is analysed using the lens of SCOT. The paper discusses how the needs and expectations of different user groups can be integrated to promote a more integrated notion of 'performance' that encompasses technical, organisational and experiential aspects.

2. Towards a more inclusive conception of building performance

There are four key interconnected aspects to consider in developing an integrated conception of building performance: integrating the technical, organisational and experiential aspects of buildings' performance, including an integrated view of building performance in the design process; understanding buildings as not fixed objects; and incorporating varied needs and expectations of buildings' users in building performance evaluation.

2.1. Integrated view of building performance

Despite a rich body of literature arguing for a multi-dimensional view of building performance, there are fewer conceptual framings and practical applications of BPE that take an integrated view of building performance. A prominent architect and architecture critic, Bruno Taut, argues 'the aim of architecture is the creation of the performance and therefore most beautiful efficiency' (Taut, 1929). Kolarevic (2015) claims that performance-based design addresses both intangible aspects of performance, such as cultural performance and tangible and quantifiable aspects, such as environment and acoustics. In his work on environmental design, Hawkes (2007) makes a similar argument that the architectural environment includes many dimensions in addition to the technical aspects of an indoor environment, such as temperature, noise levels, and illuminance. Good buildings balance aesthetics, place-making, cultural and social expectations and building performance parameters (van der Voordt and Maarleveld, 2006). Vitruvius' notion of "firmitas, utilitas and venustas" suggests that a good building involves integrating three dimensions of performance: "(1) healthy, safety and security performance; (2) functional and efficiency performance; (3) psychological, social, cultural and aesthetic performance" (Preiser, W. and Vischer, 2006, pg. 5). The Vitruvian framework also provided conceptual basis for the Design Quality Indicator tool where the three dimensions were interpreted as Function, Build Quality and Impact (Gann et al. 2003). In order to have a building of good quality, integration of functional, formal, technical, economic and legal aspects is needed (Van der Voordt and Wegen, 2005, pg. 9-11). Moreover, these considerations are to be made alongside foregrounding the health and well-being of building inhabitants (Van der Voordt, 2009).

In addition to the studies that focus on the technical and experiential aspects of building performance, DEGW's work has been striving to express organisational aspects of building performance and what occupying organisations need from their buildings (Patel and Green, 2020). DEGW articulated organisational performance by undertaking sectoral studies demonstrating that different types of organisations have different building needs, which could be traced back to Frank Duffy's PhD dissertation (Duffy, 1974). More recently, the field of organisational studies has seen a 'spatial turn' (Kornberger and Clegg, 2004; van Marrewijk and Yanow, 2010), and new empirical work has emerged that explores the relationship between organisations and buildings (cf. van Marrewijk, 2009; Hirst, 2011; Decker, 2014). Thus, an integrated conception of building performance that captures technical, experiential and organisational aspects must be reflected in the approaches to building performance evaluation and how BPE is conducted in practice. This paper focuses on organisational needs and discusses interconnections with technical and experiential aspects of building performance.

2.2. Building performance evaluation as a feed-forward approach to improve the design and use of buildings

Existing research and empirical work suggests that architects undertake different investigations of building performance through Post Occupancy Evaluation (POE) techniques to improve the design of buildings (Hay *et al.*, 2017, Hay *et al.*, 2016). There are multiple benefits of using building performance evaluation (BPE) in the building design and construction process; for example, to foster a better quality of building design (De Wilde, 2014); to increase designers' knowledge about the quality and value of design (Whyte and Gann, 2001); to promote usability and adaptive opportunities in buildings (Bordass *et al.*, 2001) and to inform design strategies (Andreu and Oreszczyn, 2004). Moreover, through BPE, architects are encouraged to integrate design quality and building performance considerations (Stevenson, 2019). Building quality is typically articulated in architectural discussions about aesthetical factors, cultural meaning and functional goals (Van der Voordt and Wegen, 2005, pg. 4). As a result, architectural practitioners tend to emphasise the performance of buildings in terms of their capacity to fulfil their function rather than solely evaluating energy consumption (Hay *et al.*, 2017).

However, the usefulness of BPE is not limited to the design phase of a building. The notion of continuous evaluation is rather more useful for understanding how alignment is achieved between built space and changing

1
2
3 user practices through the life of a building (Patel and Tutt, 2018). This also prompts the need to continuously
4 review the evaluation criteria to match the organisation's changing needs (Patel and Green, 2020). Thus, defining
5 evaluation criteria becomes essential to ensure that the multi-faceted concept of building performance can be
6 operationalised in the BPE practices (De Wilde, 2019).
7

8 **2.3. Buildings as not fixed objects**

9 A key challenge with BPE approaches is that they tend to frame buildings as fixed objects (Patel and Green,
10 2020). This contradicts the notion of architectural performance, which is linked to active human agency (Hensel,
11 2013). In such a view, the building inhabitants are not perceived as passive but as active agents who interact with
12 buildings and their technologies, shaping them over time. As a result, buildings are seen as complex systems that
13 need to support the needs and expectations of their inhabitants (Cole *et al.*, 2008). However, the main approaches
14 to assessing building performance might neglect the multi-faceted concept of building performance that integrates
15 technical, functional and experiential aspects (Tweed and Zapata-Lancaster, 2017). Friedman (2015) argues
16 building performance needs to grasp that "Fixity and permanence are strictly human conceits; built environments
17 are material and social events in a continuous state of becoming." (pg.267). Thus, a shift in the ontology of a
18 building from a fixed object to always emergent is essential in addressing the viewpoints of users and clients in
19 building performance evaluation (Patel and Tutt, 2018).
20

21 **2.4. Varied needs and expectations of building users**

22 One of the shortcomings of technically-focused building performance assessments is the assumption that users
23 are a homogenous group with fixed requirements. There has been a long history of the intellectual argument of
24 built environment clients as not unitary but consisting of different interest groups which may have conflicting
25 objectives (Coleman *et al.*, 2018; Green, 1996; Cherns and Bryant, 1984) and different views on design quality
26 (Gann *et al.*, 2003). Moreover, each group might have different objectives that might reflect diverse values, where
27 value could be defined as:
28

29
30 *"...the trade-off between the benefits and burdens of design and management decisions, i.e., between its*
31 *support of organisational, individual, and societal objectives, and the costs and sacrifices that are needed to*
32 *attain the aimed benefits."* (Van der Voordt, 2022).
33

34 However, the technical debates around building performance have continued to conceptualise the users and
35 clients as unitary and failed to address the needs of different user groups within a client organisation. Watson *et*
36 *al.* (2016) found that existing literature is scant in analysing the impact of building user group dynamics on the
37 design quality evaluation of buildings, including within the workplace sector. In this regard, BPE needs to reflect
38 and communicate a wide range of needs and expectations of different user groups (Mallory-Hill *et al.*, 2012). This
39 paper adopts the theoretical lens of the social construction of technology to obtain insights into how BPE could
40 address this.
41

42 **3. Social Construction Of Technology (SCOT)**

43 The theoretical lens of SCOT emerged from the critique of technological determinism and argued that
44 technology was socially shaped (Bijker, 2010). For instance, the SCOT framework has been used to understand
45 different interpretations of the 'green' building concept, articulating the association of 'green' with varying
46 concerns such as indoor climate, waste, hazardous substances and gardening (Stenberg and Räsänen, 2006). SCOT
47 framework has also been used to understand the performance gap when adopting renewable technologies (Boyd
48 and Schweber, 2018). This paper uses the conceptual framework of SCOT to address three challenges of BPE.
49 Firstly, the concepts of 'relevant social groups' and 'interpretative flexibility' are mobilised to bring forth how
50 different social groups interpret the performance of buildings. A relevant social group comprises members with
51 shared meanings attached to an artefact (Pinch and Bijker, 1984). Each social group has a different interpretation
52 of the artefact. Hence, there could be as many artefacts as per the different interpretations (Prell, 2008). Through
53 the empirical analysis of DEGW's work for Broadgate development, this paper will reveal different interpretations
54 of building performance for various user groups. Secondly, SCOT also offers the theoretical tool of a 'socio-
55 technical ensemble' by lending a symmetrical approach between social and technical (Bijker, 2010). This concept
56 enables viewing buildings as not just technical objects and opens the notion of a building to a range of conceptual
57 approaches, including messy relationships between users and buildings (including its several technical
58 components). Thirdly, the concepts of 'semiotic structure' and 'semiotic power' offers an approach to reflect on
59 the implications of the building performance methods. Semiotic structure is *"the reified meanings that constrain*
60 *the extent to which actors can influence and shape an artifact"* (Perell, 2008). The semiotic structures in turn exert
semiotic power which is defined as *"the extent to which meanings attributed to an artefact become reified in*

certain forms" (Perell, 2008). The semiotic structure gathers more power as the meanings become fixed. Methods exert power on how we conceptualise entities (Law, 2005). In relation to BPE methods, it becomes essential to understand the implications of partial approaches to BPE in reinforcing the meanings of both building performance and the building itself. Thus, through operationalising the above concepts of SCOT in the Broadgate case study, an understanding of the semiotic power of building performance methods in conceptualising buildings is explored.

4. Archival method and rationale for selecting Broadgate case study

This paper employs the archival method to unpack different interpretations of building performance by exploring the 'working guide' and related documents for the Broadgate development in the DEGW archive. DEGW, a pioneering workplace consultancy firm, was founded in 1971 by Frank Duffy, Peter Eley, Luigi Giffone and John Worthington. The DEGW archive at the University of Reading includes the firm's project documents. The archive is further accompanied by two collections from DEGW's co-founders, Frank Duffy and Luigi Giffone. The DEGW archive research project adopted a 'living archive' approach (cf. Hall, 2001), whereby the understanding of the archival documents and gaps in the archive were identified and supplemented through collaborative engagement with members of the DEGW diaspora. While there are several methodological issues to be considered when undertaking archival research, one of the key aspects of differentiating the archival documents analysed in this paper as empirical sources from the literature is made by using the endnotes (cf. Patel and Green, 2018).

In various conversations with the DEGW members and their collaborators, Broadgate was identified as a key project both in the context of the firm's evolution (Patel and Green, 2020) as well as in the UK workplace sector (Firley and Grön, 2014). The application of DEGW's building appraisal method in the Broadgate project has been discussed in Patel and Green (2020). This paper focuses on how views of different user groups on building performance were incorporated into DEGW's work on the Broadgate project. While much of the Broadgate-related reports analysed in this paper are dated from the 1980s and early 1990s, the Broadgate case study is equally relevant for current challenges due to the following reasons:

- Broadgate development constituted a series of buildings, and DEGW's work influenced the design of these buildings. The buildings that form the focus of this paper, namely Bishopsgate Exchange (155 Bishopsgate), 1 Exchange Square (also includes 175 Bishopsgate), 199 Bishopsgate and Exchange House, are still in use. While these buildings have been refurbished over time, much of their structural elements and circulation cores have been retained per the original design.
- The technological changes and deregulation of financial services in the 1980s led to a demand for a new type of office building in the UK. Based on extensive user research, Broadgate development enabled a significant shift in office building standards within the UK and worldwide'. This user research included evaluating existing buildings to identify critical factors for future design. This feed-forward approach enacts BPE as a continuous process. Thus, Broadgate is a crucial case in the historical study of workplace design and BPE.
- The shifts in the ways of working caused by the COVID-19 pandemic have forced a significant rethink of office design (cf. Gillen et al., 2021). The Broadgate case study exemplifies the office building design process during significant contextual changes. The design of Broadgate buildings was based on systematic and rigorous user research (see Figure 1). Moreover, the technique of Building Appraisal developed by DEGW as part of this user research has set an approach for BPE for office buildings, which has been tested through the legal system in rent arbitrations.ⁱⁱ

- Managing Urban Change 1988 – studies of the process by which all the constituencies involved in the Changing City negotiate to achieve their ambitions.
- Post occupancy Evaluation 1988 – An assessment of the building performance in use of One Broadgate and five other buildings
- Trading in Three Cities 1988 – An analysis of UK, USA and Japanese financial services organisations in London, New York and Tokyo.
- Professional offices study 1987 – An analysis of the requirements of solicitors and accountants in the City
- Trading in Two Cities 1986 – Analysis of trading floor requirements of financial services organisations in London and New York
- Services in the City Fringe 1986 – An analysis of the growth of backup service industries requirements in South Shoreditch.
- Eleven buildings compared 1986 – comparison of 1-2 Broadgate, 4 Broadgate and nine City buildings against the requirements of financial services tenants.
- Accommodating the changing city 1985 – survey of requirements and movements of City firms, i.e. Professional and insurance markets.

Figure 1 A list of user research reports carried out by DEGW that informed the Broadgate developmentⁱⁱⁱ**5. DEGW's user research methods for Broadgate development**

DEGW adopted four methodological approaches to develop user research that informed Broadgate development: focus groups, sectoral studies, building appraisal and post-occupancy evaluation (Duffy, 1992).

5.1. Focus groups

DEGW adopted a small focus group method to conduct user research that informed Broadgate's development. The user research aimed to identify user priorities to improve design specifications, inform the architects, leasing agents and other supply-side stakeholders to listen to users' demands and inform the property-related decision-making process for potential tenants. Duffy mentions that focus group methodology was novel in the 1980s in the London real estate market and was heavily used by the firm Building Use Studies (co-founded by DEGW and the architectural practice ABK) to inform architectural design through the systematic study of buildings in use (Duffy, 1992). For Broadgate's user research, 67 financial and professional firms were interviewed:

"Facilities managers and other senior managers and directors from many of the leading financial services organisations were invited to a series of lunches held in the prestigious surroundings of the City of London Club. A typical meeting involved about ten such managers. A brief presentation was made by the author (Duffy) about trends in office design, particularly in relation to information technology. This talk was designed to stimulate a wide-ranging discussion among the facilities managers about their problems in finding and planning suitable office accommodation to satisfy their firms' changing requirements. After about an hour of general (and invariably lively) discussion, which was recorded on flip chart sheets hung up as they were completed until the room was lined with a record of the discussion, the presenter got each participant to list in order of importance the three most vital priorities for his or her organisation for improving the effectiveness and quality of the office environment." (p. 90, Duffy 1992)

5.2. Sectoral studies

These studies involved identifying the requirements of different types of organisations through conducting interviews, surveys and building visits (Duffy, 1992). These studies examined user priorities and expectations in various sectors (pp. 49-50, Duffy et al. 1998). For the Broadgate project, sectoral studies were undertaken for the financial services industry, including lawyers and accountants that serviced the industry (Duffy, 1992). A range of studies were also conducted to inform the design of trading floors by comparing American, Japanese and British trading floors at the time.

5.3. Comparative building appraisal

This DEGW method to compare a building's capacity to accommodate organisational needs has been studied in detail by Patel and Green (2020). Over the late 80s and early 90s, DEGW conducted building appraisals of over 200 significant office buildings (Duffy, 1992). This method was used at all stages of Broadgate development, from design to post-occupancy evaluation and matching tenant requirements with new buildings being built at Broadgate.

5.4. Post-occupancy evaluation

The impact of user studies developed by DEGW to inform the briefing of the Broadgate development was tested once the tenants occupied those spaces, providing an exemplar of continuous BPE from practice. One of the evaluation approaches used at Broadgate consisted of observation, measurement and comparison of different use patterns on typical floors. An example of such an approach is a post-occupancy study conducted in 1990 to examine the characteristics of the actual tenant occupancy of Broadgate Phase 7 (i.e. Bishopsgate Exchange)^{iv}. The key findings from this study revealed that while DEGW expected a range of organisation types, including non-financial professional firms such as lawyers, to occupy the space, all the tenants were from the financial services sector. This meant that the demand in Broadgate Phase 7 for cellular offices was not as much as expected (never more than 22% of the net lettable area). The post-occupancy evaluation also verified the user research. For example, eight out of ten tenants utilised the opportunities for subtenancies, who had allocated between 22%-43% of their space for subletting. The measurement of tenant efficiency as derived from the percentage of usable area to the lettable area was expected to be above 80%. The post-occupancy study found that the tenant efficiency was between 85%-91%, thus confirming the excellent efficiency of primary circulation for all tenants regardless of layout differences.

6. Satisfying the expectations of different interest groups at Broadgate

DEGW developed working guides as part of their Building Appraisal service for Broadgate, commissioned by Rosehaugh Stanhope Development (RSD) (Patel and Green, 2020). The working guide, titled "Broadgate: Bishopsgate & Exchange Square – A Working Guide", and dated July 1989, could be found in the Frank Duffy Collection. It outlines how Broadgate development's Bishopsgate and Exchange Square buildings respond to potential tenants' requirements.^v The document includes checklists developed from the perspective of corporate/organisation, staff or personnel managers, building managers and information technology requirements. The checklists also included options for tenants seeking a part of the floor, a complete floor within a building, or the whole building. The purpose of the guide "*... is to explain to senior managers why these buildings are an important means of achieving business success. Too often property has been thought of by tenants as an afterthought or even a nuisance. RSD's view is that office accommodation, properly used by management, is an extremely powerful instrument for achieving corporate goals.*"^{vi}.

Interestingly, energy efficiency is not a prominent concern for these interest groups and might reflect the historical context at the time. It should be noted that building regulations in the United Kingdom have limited the amount of energy loss through the fabric of new dwellings since 1965 (Building Regulations, 1965), with explicit thermal insulation guidance included in the 1972 Building Regulations (Part F) (Building Regulations, 1972). Energy efficiency requirements were expressed mainly in terms of target U-values of elements in the building fabric up until 2002 when the Energy Performance of Buildings Directive 2002/91/EC introduced a range of strategies and metrics addressing the energy efficiency of buildings (EPBD-European Commission, 2002).

6.1. Corporate identity

The checklist for corporate identity is presented in Figure 2. Prime location was considered an essential aspect for potential tenants at Broadgate. Being part of a corporate community that included prestigious organisations as neighbouring tenants was deemed attractive. Signature buildings were designed to enhance corporate image. If parts of Broadgate development were to be let to multiple organisations, the design allowed the creation of impactful entrances for individual identity, with an ability to provide and control separate vertical circulation routes for staff, executive and visitors access.

Corporate checklist		
10-30,000 sq. ft. part floor tenancies	Whole floor tenancies	Whole building tenancies
<ul style="list-style-type: none"> - Individual identity in a prime location - Clearly identified entrance ("front door") at building lobby 	<ul style="list-style-type: none"> - Buildings reflecting individual corporate identity; 'signature buildings'. - High profile neighbours – strengthening the market place position 	
<ul style="list-style-type: none"> - Sense of belonging to the overall environment within an established image - Clarity of reception areas for tenancy options on each floor 	<ul style="list-style-type: none"> - Corporate identity and image on the individual floor let - Control of interiors specification in reception and waiting areas - Ability to provide and control separate vertical circulation routes for staff, executive and visitor access. 	

Figure 2 Corporate checklist as noted in the Working Guide

6.2. Personnel managers and staff

The checklist for Personnel managers and staff is presented in Figure 3. A key concern for personnel managers is attracting and retaining good staff. Ease of access to the workplace, a rich mix of recreation and staff support facilities and other amenities such as retail and restaurants, an attractive work environment and developing a sense of belonging were considered essential requirements for tenant organisations that Broadgate intended to fulfil. While well-being issues have gained traction in current times, health and well-being were highly regarded: "*the new squares provide the opportunity for relaxation away from the workplace, an important factor in the health and well-being of an organisation's most important asset – its people.*"^{vii} In this regard, DEGW created a range of performance criteria to evaluate Broadgate buildings to match those requirements.^{viii}

Personnel managers and staff checklist		
10-30,000 sq. ft. part floor tenancies	Whole floor tenancies	Whole building tenancies
<ul style="list-style-type: none"> - Proximity and provision of amenities – retail, restaurants, services and leisure - Attractive workplace environment 		
<ul style="list-style-type: none"> - Ease of public transport access – local and South East areas - Sense of interface with the community 	<ul style="list-style-type: none"> - Ease of public transport access - local, regional and international 	
	<ul style="list-style-type: none"> - Provision for executive car parking - Provision of internal amenities such as catering facilities - Sense of contributing to surrounding community 	<ul style="list-style-type: none"> - Provision of secure car parking facilities - Provision of internal amenities such as dining and executive functions - High profile as part of the City community

Figure 3 Personnel managers and staff checklist as noted in the Working Guide

6.3. Building managers

The checklist for Personnel managers and staff is presented in Figure 4. The aspects covered in facilities management's considerations for performance mainly included the adaptability of office space to cope with churn rates and the adaptability of services (ducts and HVAC) to suit the organisation's changing requirements. A good landlord and tenant relationship, fostered by the onsite Broadgate Estate Management Company, was also deemed an attractive feature for building managers.

Building managers checklist		
10-30,000 sq. ft. part floor tenancies	Whole floor tenancies	Whole building tenancies
<ul style="list-style-type: none"> - Good relationship between landlord and tenant during construction and management phases 		
<ul style="list-style-type: none"> - Clear identification and security of shared services (voice and data) risers, mechanical risers, controls and maintenance 		<ul style="list-style-type: none"> - Clear identification and security of shared services (voice and data) risers, mechanical risers, controls and maintenance
<ul style="list-style-type: none"> - Economical price for services - Clarity on issues related to shared space such as boundaries of responsibilities for lobby areas, lifts, storage and service access - Ability to accommodate change – growth or contraction of the workforce – potential for expansion across the floor. 	<ul style="list-style-type: none"> - Control and security for service access and storage - Control and security of designated car parking facilities - Ability to accommodate change in size of workforce – potential for expansion within the building 	<ul style="list-style-type: none"> - Clear identification of boundaries between landlord and tenant for responsibilities such as security, image maintenance and services (emergency backup facilities) - Provision of secure global voice and data links - Building specification accommodating specific requirements such as trading floors conferencing facilities, dining rooms, dedicated computer rooms - Ability to meet the changing requirements of the organisation through time= coping with high churn rates

Figure 4 Building managers checklist as noted in the Working Guide

6.4. Information technology

The checklist for Personnel managers and staff is presented in Figure 5. The design and use of office space in the 1980s were profoundly impacted due to the advent of information technology. The Broadgate development was informed by in-depth user research, primarily carried out by DEG, on the implications of information

technology.^{ix} Raised floors, information ducts, additional air conditioning and provision of standby electricity generators were essential to facilitate tenants' business.

Information technology checklist		
10-30,000 sq. ft. part floor tenancies	Whole floor tenancies	Whole building tenancies
- Building specification that accommodates information technology providing raised floors and adequate information risers		- Ability for building specifications to meet changing information technology demands through time with particular emphasis on size of vertical risers - Provision of additional air conditioning capacity and zoning for special tenant requirements such as large dealing floors, dedicated areas for large computer suites - Landlord provision of UPS and standby generators to meet power surges or potential power failure
<ul style="list-style-type: none"> - Floor plan configuration that can be easily planned for interior planning options that maximise opportunities for information technology at the workplace - Clarity from landlord regarding responsibilities for shared risers - Assurance on security issues for vertical and horizontal distribution of voice, power and data 	<ul style="list-style-type: none"> - Adequate provision for voice, power and data outlets to serve information technology demands at the workplace - Assurance on security issues for vertical distribution of voice, power and data (shared risers serving many floors in one building) 	

Figure 5 Information technology checklist as noted in the Working Guide

7. Evaluation criteria integrating organisational performance

The above checklists could be related to various evaluation criteria that DEGW developed for their building appraisal method. These criteria were used in comparative studies to establish a benchmark for the relative value of office buildings in the City of London that were legally tested in rent arbitration. One such case was that of a building named Angel Court (built in 1979). In this case, DEGW, based on their building appraisal method, argued that despite being a comparatively older building than Broadgate development, Angel Court had the potential to serve specific sectors of the financial services industry in the City of London^x. This study compared Angel Court with its contemporaries 6-8 Bishopsgate, 99 Bishopsgate, City Tower, Commercial Union, Dashwood House, 20 Fenchurch Street and The Stock Exchange (tower). Relatively newer developments than Angel Court were also included in the study: Alban Gate and Bishopsgate Exchange (Phase 7 of Broadgate). The comparison criteria are listed in Table 1.

Table 1 Comparative building appraisal evaluation criteria

Criteria ^{xi}	Mapping relevant user group checklists that the criteria relate to
Physical characteristics – Building identity and location <ul style="list-style-type: none"> - Address - Architect - Developer - Date of completion - Amenity / Environment - Facilities in development 	Corporate checklist (See Figure 2) Personnel managers and staff checklist (See Figure 3)
Building characteristics – building size and image <ul style="list-style-type: none"> - Building size <ul style="list-style-type: none"> o Net lettable Area (NLA) o Number of floors - Image <ul style="list-style-type: none"> o External appearances/finishes o Reception appearance/finishes 	Corporate checklist (See Figure 2)
Building characteristics – access <ul style="list-style-type: none"> - Transportation - Parking <ul style="list-style-type: none"> o Number of spaces 	Personnel managers and staff checklist (See Figure 3)

<ul style="list-style-type: none"> ○ NLA/Number of parking spaces - Car drop off 	
<p>Quantity of space</p> <p>Floor Analysis – Landlord and tenant efficiency for a typical floor</p> <ul style="list-style-type: none"> - Gross Internal Area (GIA) - Core area <ul style="list-style-type: none"> ○ %GIA - NLA (for the floor analysed) - Primary Circulation Area (PCA) <ul style="list-style-type: none"> ○ %NLA ○ Landlord efficiency NLA/GIA% - Net Usable Area (NUA) (deducting PCA from NLA) <ul style="list-style-type: none"> ○ Tenant efficiency NUA-NLA% 	Building managers checklist (See Figure 4)
<p>Quality of space</p> <p>Depth of space analysis for a typical floor</p> <ul style="list-style-type: none"> - NLA for the floor analysed - Depth A (NLA within 6 metres of external or atrium walls. Suitable for cellular office accommodation or open plan with aspect) <ul style="list-style-type: none"> ○ % of NLA - Depth B (NLA within 6-12 metres of external or atrium walls. Suitable for open plan workstations, internal enclosed offices, ancillary and support functions) <ul style="list-style-type: none"> ○ % of NLA - Depth C (NLA deeper than 12 metres of external or atrium walls. Suitable for support functions or special usage such as dealing floors, presentation suites, computer rooms etc.) <ul style="list-style-type: none"> ○ % of NLA - Column Grid - Core to Glass dimensions - Glass to Glass dimensions 	Building managers checklist (See Figure 4)
<p>Cellularisation potential</p> <p>The capacity of a building to provide enclosed offices with aspect on a typical floor, each of approximately 13.5 sqm (3m x 4.5m for a 1.5m planning grid)</p> <ul style="list-style-type: none"> - NUA - Potential Cellular office area <ul style="list-style-type: none"> ○ % NUA - Floor analysed - NUA - Highly serviced area <ul style="list-style-type: none"> ○ % NUA 	Building managers checklist (See Figure 4)
<p>Potential sub-tenancy</p> <p>This was based on four characteristics. Two characteristics related to Landlord included clearly identifiable and logical sub-tenant areas, the minimum amount of lettable area lost to common areas to provide access to shared means of escape, shared facilities, and separate core access. Two characteristics related to tenant included: separate core access, reception, and facilities from that of other tenants to retain security and in high-security data or computer-based organisations, safeguarding access to services/ducts against deliberate or accidental interference can be an essential requirement.</p>	Corporate checklist (See Figure 2) Building managers checklist (See Figure 4) Information technology checklist (See Figure 5)
<p>Comparative specifications</p> <ul style="list-style-type: none"> - Building section (for comparing the potential for upgrading older properties and the provision of raised floors to accommodate the new technologies) <ul style="list-style-type: none"> ○ Raised floor depth ○ Floor to floor height ○ Floor to ceiling heights - General specifications: Shell/core or other <ul style="list-style-type: none"> ○ If shell/core developers' allowance – budget for tenant fitout - Finishes <ul style="list-style-type: none"> ○ Floors ○ Designed floor loading ○ Walls 	Corporate checklist (See Figure 2) Building managers checklist (See Figure 4) Information technology checklist (See Figure 5)

- | | |
|---|--|
| <ul style="list-style-type: none"> ○ Ceilings - Windows <ul style="list-style-type: none"> ○ Sizes and types - Servicing – air conditioning <ul style="list-style-type: none"> ○ Type ○ Capacity ○ Plant configuration ○ Additional plant allocation ○ Control system - Servicing – power <ul style="list-style-type: none"> ○ Power/cabling ○ Incoming supply (small power allowance) ○ Standby generator provision (for tenants) ○ Power distribution - Servicing – Telecommunications facilities - Servicing – Plumbing <ul style="list-style-type: none"> ○ Distribution of wet locations (typical floors) ○ Number of toilets per floor - Servicing – lighting <ul style="list-style-type: none"> ○ Type ○ Control ○ Lux levels - Servicing – security systems - Lifts <ul style="list-style-type: none"> ○ Number of passengers per lifts ○ Number of passengers per lift ○ Number of goods lift ○ Number of passengers per goods lift ○ Number of fireman lifts ○ Number of passengers per fireman lift ○ Number of escalators ○ Number of floors served by escalators | |
|---|--|

In this report for Angel Court, Duffy refers to Baum's (1991) distinction between 'curable' and 'incurable' depreciation; curable depreciation relates to specifications and services which could be replaced comparatively easily as compared to incurable depreciation, which relates to the configuration and plan layout of a building. Based on the comparative building appraisal, Duffy was of the opinion that the building had several advantages and its disadvantages were 'curable':

"In terms of the "incurable" features – particularly floor layout and floor to ceiling height – the DEGW comparative building appraisal of nine City office buildings shows that Angel Court performs well, on standard measures of such features, with comparable office towers of the same design generation. Angel Court, in key aspects, also compares not unfavourably with the two examples of the latest wave of post-Big Bang offices quoted in the DEGW study. Had it been required that the DEGW study had gone on to the next step of being specifically related to the needs of certain sectors of the financial services industry – e.g. Corporate Finance, with its need for prestige, for intimate group spaces, and for high levels of security – it is likely that the configuration of Angel Court would have been seen to outperform even some of the latest City office buildings in certain respects."^{xii}

In this case, building performance is not seen as merely the function of technical services but location, layout and security:

"All office buildings are obsolescent. Not only are office organisations subject to continual change in technology and user expectations but the buildings that house such organisations should be designed in such a way that they can be adapted to accommodate the consequences of such changes. Although building components, such as ceiling tiles and light fittings, tend to wear out and be superseded by more efficient or smarter models, the most important cause of obsolescence is simply the inevitable divergence between the short term nature of corporate planning and the long term nature of buildings."^{xiii}

8. DEGW's approach to conceptualising building performance

As can be seen from the different checklists discussed above, DEGW's notion of building performance was highly sensitive to the pluralistic view of clients recognising that: "... *business priorities vary between sectors and, within businesses, even between departments*" (Duffy, 2008). DEGW were aware that workplace performance measures always needed to relate to the business purpose. Moreover, they also recognised that businesses' priorities change over time, and the measurement criteria need to be revised in response to those changes, such as introducing information technology-related criteria. Thus, it is essential to conceptualise and practice BPE as an ongoing evaluation, whereby the evaluation criteria need to adapt to the changing user needs.

Duffy (2008) also argued that there are two kinds of data related to the performance of office buildings. The first kind is the performance measures from the viewpoint of the supply side, often associated with building construction. The second kind is the performance measures from the perspective of the consumers and users of office space. Aligning with these measures, the evaluation criteria described above demonstrate the criteria that matter to building user groups. Even within a client organisation occupying an office building, DEGW acknowledged that different constituencies have different interests, which need to be incorporated in building performance evaluation:

"The views and priorities of the Boardroom, both long-term and strategic, are likely to be very different from the shorter-term and target-driven needs of department heads, which in turn are certain to be different from the expectations of staff at other levels. Different reporting mechanisms, different targets and different time horizons can be expected. All are legitimate." (Duffy, 2008)

DEGW had developed such an integrated concept of building performance since their first multi-client study, 'Office Research: Buildings and Information Technology (ORBIT)', published in 1983:

"...there are no widely accepted measures of building performance. One reason for this is lack of feedback about buildings in use and hence a poor understanding of how buildings perform over time. Consequently, buildings tend to be described in the world of real estate in terms of quantifiable measures: capital costs, construction methods and area statistics. These give little indication of the long term utility of buildings from the client's point of view. Criteria which help organisations choose space and assess it against their needs are long overdue."^{xiv}

The ORBIT study and subsequent user research by DEGW, as listed in Figure 1, formed the basis of their work for the Broadgate development, particularly in the form of Building Appraisal (Patel and Green, 2020).

9. Challenging semiotic power and semiotic structures imposed by BPE methods

The technical interests of the supply side delivering the building as a technical product have dominated the building performance debate, exerting a semiotic structure of reified meanings pertaining to defining building performance in solely technical terms (cf. Patel and Green, 2020). This semiotic structure, subsequently, exerts semiotic power through the methods adopted to evaluate building performance, which in turn reifies a building as a technical object, thus forming a reinforcing conceptual circle. As a result, such semiotic structure constrains the extent to which actors, including designers, organisations and users, can influence and shape the interpretation of a building and what is expected from that building's performance.

The findings from the empirical analysis of the DEGW archive and particularly the Broadgate project reveal how voices from a pluralistic client organisation demand different performance from the building, for example, expression of corporate identity, local amenities, the relationship between tenant and landlord and capability to incorporate changes in information technology. The 'working guide' demonstrates how different views on the building performance of various stakeholders involved in the everyday use and management of buildings are identified without imposing predetermined agendas or research notions of performance. DEGW's work provides practical examples for the call made by Van der Voordt and Jensen (2018) to extend standards for benchmarking, such as European Standard EN 15221-7, to include aspects such as adaptability and image.

But most importantly, the DEGW checklists reveal that the ontology of a building for users is not limited to it being a fixed physical object. As seen in the checklists, the concept of performance in DEGW's work is not limited to the physical boundaries and conditions of a building but also its surroundings. The building is perceived as fluid (Patel and Tutt, 2018; De Laet and Mol, 2000), and its spaces are connected to the adjacent plaza and even the transport hubs. By bringing into the discussion surrounding amenities and associated user practices, a building in the DEGW worldview is a 'socio-technical ensemble' that is fluid and breaks out of its physical boundary (Bijker, 2010; Patel and Tutt, 2018). By foregrounding these criteria, the semiotic structure of BPE and the building itself is

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3 expanded and in turn offers opportunities to continually challenge the semiotic power imposed by BPE methods
4 that do not foreground the voice of user groups.
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6 **10. Integrating the views of different user groups in BPE**

7 Despite the widely known benefits of post-occupancy evaluation to consider building performance aspects in
8 light of users' perceptions of the buildings, such exercises are still limited. They are unlikely to be routinely carried
9 out in buildings as an ongoing and continuous improvement process either from a technical viewpoint or from the
10 users' views. The paper focuses on how different stakeholders articulate the notion of 'good building
11 performance'. The checklists and other documents relating to the Broadgate development reveal how the
12 'expectation gap' was bridged through continuous user research (cf. Coleman *et al.*, 2018). The scope of such user
13 research was beyond the technical aspects of building performance, thus foregrounding the socio-technical
14 interactions between people and buildings. The Broadgate development provides an example where the design
15 processes included a systematic understanding of user organisations' needs while acknowledging that
16 organisations are not a homogenous group but comprise different interest groups with different values about
17 what constitutes 'good' performance. (cf. Van der Voordt, 2022; Gann *et al.* 2003)

18 In terms of BPE, lessons learnt through the lens of SCOT reveal a need for a more reflexive and responsive
19 approach to the BPE methods and evaluation criteria that address the needs of different stakeholders involved
20 when buildings are in use. For instance, the 'corporate identity' checklist addresses the importance of aesthetics
21 for tenant organisations and becomes integral to the performance of Broadgate buildings. This challenge of
22 bringing a multi-stakeholder perspective in building performance debates is being addressed by new research
23 methodologies, such as visual and sensory methods facilitated through social media (Dalton *et al.*, 2013; Koolhaas
24 and AMO, 2006; Shortt *et al.*, 2020).
25

26 **11. Limitations and suggestions for future research**

27 There are four limitations of this study. Firstly, this paper focuses on organisational performance and its
28 connections with the technical and experiential aspects by presenting detailed evaluation criteria. Future research
29 could synthesise these different performance aspects and criteria into a holistic conceptual framework, building on
30 existing works such as Van der Voordt and Jensen (2018). Secondly, the theoretical framework of SCOT used in this
31 study is not devoid of limitations. Future work could explore the implications on performance evaluation criteria if
32 the concepts of "technological frames" and "socio-material practices" are mobilised. The technological frame
33 could provide an understanding of how the values and views of different user groups are shaped (Prell, 2008). The
34 concept of buildings emerging in socio-material practices (Patel and Tutt, 2018) could provide an opportunity to
35 construct evaluation criteria that sprout from a contrary conception of buildings as mere technical objects.
36 Thirdly, this study focused on DEGW's work on the Broadgate development during the 1980s and early 1990s due
37 to the availability of archival materials only. Future research could explore BPE conducted by DEGW and others for
38 Broadgate development and its implications on subsequent interventions to the Broadgate buildings. Fourthly,
39 different user groups could have conflicting requirements and the mechanisms and power negotiations for
40 achieving a consensus needs to be explored further. In fact Frank Duffy himself acknowledged that evaluation of
41 the buildings' performance from various interest groups such as developers, tenants and design teams was less
42 successful in Broadgate (pg. 92, Duffy, 1992). Evidence in the archive suggests that DEGW later developed further
43 methods, such as surveys, interviews and observation techniques which might have been to address this issue.
44 Having said that, DEGW's work for Broadgate, as discussed below, establishes that these different interest groups
45 have varied expectations.
46

47 **12. Conclusion**

48 This paper demonstrates an approach to building performance that integrates the technical, organisational and
49 experiential needs of different user groups. While this paper may not cover all the needs in these three aspects, it
50 offers to make a start at particularly articulating the criteria pertaining to organisational needs and how those
51 needs could be integrated with the technical and experiential aspects. As discussed in the literature review, the
52 existing research on integrating views of different user groups in BPE is scant, and the dominant approaches to BPE
53 tend to emphasise technical aspects. Through the empirical analysis of the DEGW archive using the theoretical lens
54 of SCOT, this paper contributes to the special issue "Integrated Corporate Real Estate management" by arguing
55 that 'good' building performance is interpreted differently by varied interest groups and presenting a case study
56 that demonstrates how these various interests could be operationalised in BPE practices.
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58 As demonstrated in the checklists for Broadgate development, the performance expectations of a building vary
59 between organisations and even within any organisation. The findings from this study propose a framework to
60 consider organisational performance, built on DEGW's BPE practice, to create an integrated view of building

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3 performance. Moreover, the needs of an organisation will change over time, and the BPE criteria need to be
4 changed to ensure better alignment between organisations and the physical spaces they occupy. The case of the
5 Angel Court highlights that conceptualising buildings as fixed objects creates an impoverished understanding of
6 buildings. When viewed through the needs and expectations of users, the evaluation of a building could give
7 surprising results compared to viewing the building from the technical point of view only. Thus, BPE methods must
8 integrate the criteria that matter to different user groups and the technical aspects. Only through taking an
9 integrated view of different user groups can we challenge the outmoded conceptualisations of 'buildings' and
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11

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^{xii} *ibid*

^{xiii} *ibid*

^{xiv} ORBIT - Appendix 3 - The Building Assessment Study by Patrick Manwell and David Tooth, 1983, DEGW A/214/1.