Background paper: Office (Work) Future(s)

"…the old conception of the office is dead. Globalisation, the telecoms revolution and the inflation of consumer demands have ganged up to do away with it. A wasted hour commuting each way everyday, one-person-one-desk, telephones tethered to desks, a heavy reliance on face-to-face meetings, territoriality, status hierarchies and an obsession with presenteeism: all have been jettisoned. The sacred cows of 150 years of management practice have been unsentimentally culled." (McNestrie 2013)

"If the first generation of the office was about paper and manual processes, Office 2.0 was about technology, especially the personal computer, email, and emerging mobile devices. Office 3.0 takes account of the possibilities and benefits of the current generation of technology and the flexibility being demanded by corporations, and exploits them to create a people-centered, productive space" (Knoll 2015: 11)

"Most business books are written by consultants and professors who haven't spent much time in a cubicle" (Scott Adams, author of the 'Dilbert' cartoons)

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1 Introduction

The opening quote from 'FM (Facilities Management) World' perhaps encapsulates some of the literature and themes summarised in this background paper. It has been put together to stimulate discussion and responses at the Institute for Social Futures/Demand Centre Workshop on Office (Work) Future(s), and includes a quick survey of the 'grey literature' including a great deal of consultancy work, organised around themes derived from analysis of a previous Demand Centre research project on office building design and its energy demand implications. An executive summary of the report was also produced.

Attendees at the Office (Work) Future(s) workshop will have different interests but the ideas and materials included in this position paper are hopefully broad and diverse enough to provoke thoughts and responses from all. The central question to be addressed is how might we think about Office (Work) Future(s)? Related questions are:

- Where is the future office and whose office is it?
- What will it look like and how will it be serviced?
- Where and when will future office work take place?
- What is the role of technology in these office/work futures?
- What are the energy demand implications of these potential futures and how might they be steered?

This document is a first attempt at corralling and exploring some of these issues, and identifying questions that arise. It is an attempt to capture different 'visions' of the potential futures in this area that are identifiable at this moment in time. It is by no means comprehensive and part of the purpose of the workshop is to capture other work and particularly academic perspectives on this material – suggestions for material to be followed up on is particularly appreciated. In the different sessions of the workshop discussion will be prompted by presentations given by a number of people in response to this document. It is hoped that the responses to the paper and the discussions at the workshop will help to shape ongoing work on energy demand and the future of office work, and the creation of a research programme for a future funded project.

Thinking about the future of offices and office work

The Office (Work) Future(s) project develops and builds on a previous study of speculatively developed offices in London since 2010 – from which much of the material below is drawn. In the workshop we want to address the wider world of office work whilst recognising that for a great deal of central city offices, globally as well as in the UK, the capital's CBD is seen as leading where others will follow.

A consultancy piece by Ramidus for the City of London Corporation and City Property Association is a good framing of all the issues of *Future Workstyles and Workplaces in the City,* from an employer perspective; which is increasingly seen as focussing on an employee perspective. In it, 'the office' is described as increasingly a *showcase* for entertaining, which also includes many more options/typologies of 'office space' to actually work in; more diverse floorplates. It also identifies convergence across the 3 work sectors, summarising the potential **future of office work**:

> *"Evolving workstyles are changing the workplace … the City's core and growth sectors – financial services, professional services and TMT – are not differentiated but focus consistently on addressing the following issues:*
>
> - *A shift from fixed, long term leased space to flexible and on-demand space.*
> - *Less space, used more efficiently, and more effectively.*
> - *Space being a medium for expressing corporate culture and values.*
> - *Design for continuous adaptability and diverse usage patterns.*
> - *Activity-based workspaces providing for collaboration, concentration, communication, creativity, confidentiality and contemplation.*
> - *Use of shared spaces as a means to facilitate collaboration.*
> - *Provision of amenities and services (food, wellbeing, events etc.)*
> - *Creating and managing memorable experiences to attract talent."* (Ramidus 2015: 55)

It then moves on to explore what this means for the **future of the office** itself:

> *"It is also clear that the **role of the office** is evolving rapidly. Despite the increase in agile working there is a clear recognition that offices provide **a place to bring people together**. Meeting face-to-face, and tacit knowledge via **co-location** of colleagues, are still key aspects for businesses, to encourage **innovation and mentoring**. The workplace is also recognised as a **social hub** for colleagues, particularly new joiners who need to become **connected to the organisation**. Our interviews confirmed a shift from a narrow focus on workplace efficiency, towards a more balanced focus including workplace effectiveness and engagement. An **effective** workplace is one that optimises productivity by providing workers with the **environment, tools and support services** they need to fulfil their roles. There seems little doubt that we are witnessing a shift in design and workplace management **from buildings to people and experience**. This will mean that fit outs and management distinguish workplaces rather than specific demands on base buildings."* (Ramidus 2015: 56)

This definition sees an enduring if changed role for 'the office'. In a sense it is a dematerialistion of the office in favour of workplaces and working experiences, however this transformation of 'the office' itself, as traditionally viewed as an iconic corporate building, can be thought of as a rematerialisation of the workplace across different spaces and times, as 'office work' (and work) changes fundamentally.

Taking these observations further, we could also think of Office (Work) Future(s):

- Through the **organisation** (highlighting issues such as rationalising property portfolios, intensifying occupational densities, diversifying the office workplace experience for employees and learning how to manage increasingly distributed and networked forms of work)
- Through the **building**, (looking how the central and obdurate 'hub' of an organisation's physical expression is transforming in response to new roles as a showcase, an expression of

ethos, a meeting place, a hangout, and the site of eating, playing, collisions and even sleeping), or

- Through **practices** (is (office) 'work' transforming, converging, fragmenting, and becoming increasingly flexible and mobile along with other everyday practices of eating, socialising, communicating, parenting, commuting etc.? Does 'the office' try to encompass all of these practices in one place?)

These themes recur and overlap in the following sections which outline topics relevant to the workshop and present related insights mostly using quotes from grey literature. Where appropriate questions are drawn out, challenges are put forward, and research opportunities are identified.

2 Changes in Work

Changes in the nature of work and the economy help to frame changes in office work, organisations, and working lives. Here I summarise changes relating to:

- Employment and work/life
- Business agility
- (Converging) Knowledge Work
- From Technology, Media and Telecommunication (TMT) to all sectors – an 'evolution' of work or a fad?

2.1 Employment and work/life: flexibility and well-being.

External to the office sector itself, there are long-term and broad shifts in the nature of employment and work-life balances: precariousness, flexibility, fragmentation and others. This area of research provides the overlap to the work of The Work Foundation, and at least partly to the interests of employers. The emerging new typologies of office space (see section 4) reflect these changes – the separation of work from one place (see section 8) and the fragmentation of work throughout time and space, but also the rise of part-time work and the and 'gig' economy, seen by some to be a response to economic uncertainty, in which "*in October 2010 in the UK the number of employees and self-employed people who were working part-time because they could not find a full-time job reached 1.16 million, the highest figure since comparable records began in 1992*" (Matthews and Pratt 2011). Globally precarious and 'contingent' workers are said to make up a third of the labour force: "*When the job is no longer 9-to-5, it's hard to keep a work-life balance.*" (Rice 2015)

Changes specifically to office work can be seen in the broader context of historical changes in the structure of the economy outlined by Worthington (2006: 1-2): where like "manufacturing in the 1970s, office work was going through a fundamental restructuring as we moved from a service to a knowledge-based economy. By 1990, white collar work in advanced European industries accounted for approximately 60% of the working population … After the restructuring of the 1990s many firms realised that to stay competitive they would have to rethink the way they worked and how they used technology". From the employee perspective, Ziona Strelitz (2011) highlights the changes in a number of factors including demographics, gender-based domestic work divisions, and responsibilities for aging parents, that make traditional 9-5 commuting work stressful, and suggests that distributed hubs of workspace nearer to a distributed workforce's homes may facilitate work without the distractions of home-working or informal third-spaces.

The following offer different insights into changes which are framed in terms of improving workers' well-being and empowerment through flexibility, but can be seen as intruding into home life and otherwise detrimentally extending work practices into everyday life. Additionally casualization is part of the picture, with (jokey?) advice offered to employers on how to increase employees' happiness without actually offering them more money (Fallon-Taylor 2014). Flexibility is clearly seen as a double-edged sword where for *"many employees flexible working arrangements are a dream come true. However, a change of scene can have some serious repercussions for our health"* (Gilbert 2015), and the much vaunted 'gig economy' of self-employment *"promises a future of empowered entrepreneurs and boundless innovation. To the naysayers, it portends a dystopian future of disenfranchised workers hunting for their next wedge of piecework."* (Sundararajan 2015).

Research opportunity: Data could be found to demonstrate to what extent office work reflects these casualization and flexibilisation trends.

2.2 Business agility

The grey literature also focuses on the need for organisations to be more agile in the sense of responding quickly to opportunities, teams being thrown together for short periods, organisational arrangements that do not fit traditional office architectures, as suggested in our research:

> *"work in hubs … collaborate on one project … being a collective and then dispersing again [changes in] owner of a space … offices had to do, grow and contract quite quickly over the last 10 years" (Architect case 7)*

'Business agility' nevertheless requires the willingness to quickly change organisational structures, including place and times of working in teams etc. It is suggested that the resulting flexibility and agility can be resisted or fail to fit with working practices, because of factors that are characterised as 'barriers' including *"the negative attitudes of senior and line managers"* – for instance in believing that agile work (out of management sight) is less productive (The Lawyer 2016, FM World 2014a), and *"wider organisational barriers, such as habit, lack of flexibility and diversity, and short-term thinking"* (Zheltoukhova 2014: 2)

'Business agility' is also seen as extracting productivity from workers, with or without office buildings, or rethinking how to most effectively use expensive real estate (see section 11):

> *"the ability to … use your property to … get the most out of the people in your office for the longest possible time … In an ideal world property and workplaces anticipate business needs. …* [however] *the rate of organisational change required to remain competitive has accelerated ahead of the rate of change in the UK property industry."* (RICS 2009: 5-6)

2.3 (Converging) Knowledge Work

The nature of 'work' is increasingly seen as knowledge work, agile because it is essentially data manipulation: *"Enter the knowledge worker. Someone who when twinned with … technology which is now widely available, becomes … able to carry out their role from anywhere based on mobile connectivity and the subject knowledge they have … Research skills are … becoming an essential skill required in modern-day "Work.""* (FM World 2010). The technologies (see section 5) are those of *"mobile phones, tablets, laptops, desktop computers and more"* of which we *"now have an average*

of 3.3 devices each" (Harris 2014). In the office, work is claimed to be transforming from a desk-based mono-culture to a diverse series of practices requiring different spaces (see section 4.2):

> *"tasks can be categorised into 'work', 'share', 'source', 'show' and 'refresh'. In a typical working day, a person may need to collaborate with colleagues on a project, find a quiet hour to reply to emails, and then deliver a presentation as part of a wider team. Designers are therefore creating spaces that can facilitate all these activities, as well as rest and relaxation – sometimes with a multi-functional brief."* (Campbell 2015)

2.4 From TMT to all sectors – an 'evolution' of work or a fad?

A consistent claim in the grey literature is that 'knowledge work' and the changing styles of work which it involves, are spreading from the Technology, Media and Telecommunications (TMT) sector to all others, so that *"Large corporates and government organisations are as open to new working patterns as SMEs and start-ups, so workplace designers are working to more detailed briefs than ever before."* (Campbell 2015). The key TMT influences are seen as:

- The digitisation and mobility of work
- Consumerisation of IT, 'Bring Your Own Device'
- Socialisation and domestication of the workplace" (Gillen 2014)

This claim may reflect the recent growth of the sector and its importance to the growth of the economy. TMT let 23% of new office space in London in 2014, together with financial and insurance accounting for 74% of all new space (Deloitte 2014: 18). In our previous project this TMT model of trendy work was described as the Shoreditch mode: *"It's Shoreditch …that is completely different to what we look at here, it's a hot-desking, … a completely different approach. And it's small start-ups, shared space, looking for interesting communal space."* Architects, case 6)

This is also seen as being reinforced by the appearance of younger more technology-savvy workers, who may bring expectations of flexible, mobile, hi-tech work from experiences in University (Harris 2014), into offices *"Generations Y and Z will ensure that mobile devices will become an integral part of the workplace"* (Campbell 2015).

2.5 Challenging the above

It is worth reflecting that this fetishisation of creativity and innovation in knowledge work does not necessarily reflect the content or function of everyday office work in other sectors, and that our focus is drawn particularly by the promotional nature of much of the grey literature to these particular sectors whose members provide their clientele. ***Research opportunity: Empirical work could corral data on the demographics of the workforce and the extent of TMT workstyles (e.g. Ramidus 2015)***

3 Different organisational/work factor changes

The nature of work norms in offices are also changing. This includes changes in norms of dress and behaviour, a more informal approach to work and de-siloed and de-hierarchical (space) relations within the office (Dale 2005, Dale and Burrell 2007; Burrell and Dale 2003) which are supposed to increase the number of interactions and collaborations in the office and therefore maximise innovation through unexpected encounters and exchanges.

3.1 Informality

Increased informality was described in our previous work as being a factor of modern office work, with the potential for 'cool biz'-style approaches to adaptive comfort practice change in line with lower energy demanding office environments such as mixed mode and passive ventilation/cooling (Shove2016): *"It's terrific isn't it, 20 years ago we'd be sitting here and we'd all be wearing suits and ties. I haven't worn a tie in 10 years."* (Engineer, case study 2). As stressed in section 2.4, our previous research suggested that TMT-originating changes are spreading into previously 'traditional' sectors:

> *"professions are changing slowly as always. They tend to be a little on the back foot if anything. But … when we go from, our value core City stock … the Bank of England … towards Stark and Wild we look like dinosaurs dressed in suits. It's like the Flintstones turned up to look round the building. They're there with beards and tattoos and they're the managers of the company"* (Valuation expert)

3.2 De-hierarchisation (and convergence)

This British Council for Offices Guidance outlines

> *"that work practices have moved away from a hierarchical structure - where bosses sat in offices and workers sat in cubicles toiling away - to more open plan structures. This is even true for the more traditional firms such as accountants, financial services firms and lawyers"* (Shepherd 2009)

These less hierarchical arrangements reflect that "Workplace cultures are changing. Under pressure to cut costs, office managers are looking to match more horizontal management principles with innovations in flexible working" (FM World 2013b), changes which are accompanied by facilities management changes such as outsourcing services, but having FM staff more present on office floors. The most significant change for office workspace is the move from cellular to open plan offices, and the removal of the assumption that a personal office or even desk is guaranteed by status, with even directors desk-sharing.

3.3 Interaction, collaboration and productivity

As hinted in section 3, these de-hierarchical and horizontal organisational structures are intended to promote interaction, collaboration and productivity as key features of technologically enabled new work practices, leading to calls to *"Design offices to reflect how 21st-century digital work actually happens … Merging digital communication patterns with physical space can increase the probability of interactions that lead to innovation and productivity."* (Waber et al 2014)

An historical trend can be traced from an architectural focus on 'circulation' through office buildings, through valuing water-coolers and coffee points as spaces of interaction, to the present where the most 'valuable' spaces in modern offices are seen to be the 'breakout', 'touchdown' and other informal and relaxed work environments:

> *"a shared amenity space, every media fit-out you see … they show you the trendy space that you can hang out and have a coffee and a chat with your mate and you can brainstorm. The value of that space is much greater, actually the individual desk is less*

important because a lot of that work can be done on a laptop in Starbucks" (Architects, case study 9)

This 'coffee shop' model of the office links to the agility, flexibility, domesticity and out-of-office work space trends explored below.

4 Different occupational densities, space planning and budgeting

These new, less hierarchical arrangements of space within offices can be framed in terms of (critical) organisational theory (Dale 2005, Dale and Burrell 2007) but also in terms of a general shift in office typologies (Duffy and Powell 1997, CABE 2004) which there is not space to describe here, particularly from panopticon-like arrangements through narrow, cellularised offices on corridors through open plan offices and to the more dense desking and diverse floor plans of the present. These changes link with the historical changes in the organisation of space to reflect organisation (section 3): *"Historically, workspaces were designed to communicate hierarchy, confidentiality and organizational structure. The design DNA of spaces like WeWork and others resonates instead with net- culture and is built on values like openness, sharing and co-creation."* (Magnolfi 2015)

4.1 Open plan and hot-desking

Moving historically from cellular to open office offices with meeting rooms allowing cooling to be corralled (like PC processing before) and focussed. Stuart Brand's How Buildings Learn summarises these changes:

- *"Invention of the **open** office — 1958 … the idea spread in the 1960s via magazine articles … Herman Miller introduced modular furniture…*
- *Three trends: open offices in 1960s, energy efficiency in 1970s and IT in 1980s. Created, respectively: "**deep** office buildings" (no need to have everyone near a window), **sealed** windows, "**smart**" buildings (all services integrated and computer controlled). Whole buildings expensively shaped around a trend. When trend moved on, building was obsolete.*
- *"Cave and commons" offices — small office per person opening onto a communal space — balancing privacy and interactivity."* (Gyford 2004)

The trend continues with hot-desking and 'hotelling' (literally booking desks, but see section 10.2) to maximise efficient use of space, to 'soak up' diversity or exploit real effective densities (numbers of desks occupied), leading to high design density in desk spaces ameliorated with far more diversity of spaces in an office, with break-outs and 'trendy' spaces. The question is whether or not these can be serviced in lower energy ways?

Hot-desking requires the de-personalisation of workspace IN the office, even while the office might also be seen as becoming more domestic in other ways: *"Hot-desking* [requires] *a system that will ensure desks are available when people need them … a clear-desk policy … that people don't have fluffy toys on the computer screens or photographs on the desk."* (FM World 2013b)

This was seen in our public sector case study who adopted high density hot-desking open plan offices as part of a very low energy office building design: *"There's no desk fans allowed in here …* [a policy] *to not let anyone else personalise their stuff so that other people feel infringed they're going into your space. This is your space, you've got your family photos on the desk why am I sitting there?"* (Occupier)

4.2 Rising desk densities and diversifying non-desk space

Linked to the idea that the office is moving beyond the office building it is suggested that there is a new role for Facilities Managers to fit occupational densities and workspaces to the changing needs of flexible workforces: *"a core role to play in identifying just what staff require and ensuring they have the tools with which to do their job … a 'workplace manager', who needs to take responsibility for all of the systems and facilities that enable them to do their best work and do it anywhere"* (FM World 2013b). More effective use of space - because *"most desks in most offices are only occupied around 50 per cent of the time"* (Mawson 2010) - raises occupational densities (the 'hot' in hot-desking) but then demands a variety of workspaces, as *"space that's full of collaborative space but has zero quiet space is just as unsuccessful as a space that's full of offices and has no collaborative space … That ratio depends on the type of work that companies do."* (Markowitz and Lagorio-Chafkin ????)

This variety of work, of work spaces and of atmospheres, can be seen as diversifying work practices, as this quote highlights that office fit-out and furnishing innovations can be described as experimentation in work practice: material forms are brought into office work practice from other spheres and the resulting configurations also import their own meanings (domesticity, café relaxation and interaction, health etc.) and to a lesser extent, competences (e.g. standing work).

> *"Quads. Hotel space. Couches. Rotating desk assignments. Standing desks. Treadmill desks. No desks. With apologies to Mark Twain, there's no such thing as a new office design. We just take old ideas, put them into a kind of kaleidoscope, and turn."* (Waber et al 2014)

4.3 Kick-back against hot-desking?

As noted above, space budgeting is changing with uncertain outcomes – workers' desk spaces are increasingly 'hot' and while there is a rise in non-desk space that *might* totally mitigate this, there is also the potential for workers to stay away, due to increased opportunities for flexible/out of office working but also a kick-back against hot-desking. Similar 'kick backs' have been suggested against open plan and hot-desking (Fairley 2014), and indeed collaboration (Schumpeter 2016), and flexible working (Smith 2016):

> *"It's the workplace of the future … Sure, it works for some people … But don't for one second think that everyone is a fan … most young staff at this company "hate" 'hot desking' … While the idea is to move around a lot to mix-and-mingle with your colleagues, at this company anyway, people just want their own space."* (Collins 2013)

Research opportunity: Perhaps there is a need to identify empirical work on floorplate planning and space budgeting: in 3.2 the speculative spare-plans were there in brochures for buildings, whose job are they? How closely are they followed?"

5 Different technologies and devices – mobile, energy efficient but ubiquitous?

The main technological trends identified in office are from PCs to laptops and then tablets, also from landlines to WAP and then online phone/mobiles, and from VDUs to flat-screens.

"it is over the IP now, it's over the comms. … why bother having a phone on the desk … you put in the password and the system knows where you are." (M&E case 10)

There are energy implications to these changes to supposedly more energy efficient devices. An early transformation with energy demand reduction was the removal of processing power from desks to server rooms, and then off-site. Previous predictable desking arrangements used to allow targeted displacement ventilation grills under the backs of multiple monitors. Wireless IT has made raised floors redundant and theoretically re-usable for under-floor ventilation and cooling. There are claims for rebound effects from the need for redundancy across many sectors (in case of disruptions/breakdown), and similar demands for security of data making doubling up of systems (and back-up) necessary. In terms of purely technical changes interviews mentioned the potential for DC power delivery for the mainly DC devices, and the possibility of wireless charging.

Research opportunity: There is a need for research to back up how much of this is happening (lower desk loads), what the energy demand/consumption implications are, is there rebound (e.g. greater numbers of devices)?

In fit-out, furniture is also said to be increasingly IT-enabled (e.g. with charging ports and screens distributed around multiple spaces: *"an ergonomic desk set-up that encourages interaction across a multitude of devices, or breakout furniture pods with access to charging ports … all aids productivity, and creates the feeling of a seamless, integrated workspace."* (Campbell 2015)

There is a huge amount of consultancy literature on the digital/intelligent/smart office/business (Deloitte 2016, Oktra 2016) however in terms of more theoretical thinking, it is interesting to challenge ideas of technological or demographic determinism raised by assertions such as those in section 2.4: "that flexible, mobile, hi-tech etc. work is reflecting expectations of 'millenials': (Harris 2014) and that "Generations Y and Z will ensure that mobile devices will become an integral part of the workplace" (Campbell 2015). The Demand Centre sees the spread of mobile and digital devices into multiple areas of everyday life practices as a practice change/co-evolutionary story of practice time-spaces fragmenting and moving beyond times and spaces to which they used to be moored.

A similar account claims that practice change came first – with innovators in 'work practice' using mobile technologies in their pioneering of flexible working, driving change in organisations and in the socio-technical 'system' of office-provision, leading to the question again of what an office is and will be (see section 11): *"The innovators: digital nomads make office sharing a reality. The concept of flexible space has become firmly entrenched in the corporate world, helping companies like WeWork, LiquidSpace and ShareDesk to thrive"* (Hickey 2014). Myerson and Ross (2003: 9) on the other hand note that new office spaces "support new styles of team-based, knowledge driven, community oriented working, [and] the demands of an increasingly mobile and self-deterministic workforce". Such discussions of what drives change need to be noted in thinking through futures.

6 Smart systems: Integrating building systems

M&E engineers interviewed in our previous work, but also consultancies in the grey literature, focus on the potential for integrating all aspects of Building Management Systems from the entrance and automatic lift-calling to HVAC and lighting combined with smart space allocation and hot-

desking/hotelling, with IP phones or mobiles, to reduce background demand from inefficient space usage.

> *"our version of a modern worker, in a modern office environment … [will] have a password …[t]hat will call the lift …it will switch the lights on for you, it will get you there, it will already energise your workstation …, flexible working … mean[s] that that's how the office needs to be, responsive to that environment … IT is the hub"* (M&E, case 9)

> *"It will eventually get to the point where … you'll flash your watch and it will call the lift for you … All of those systems exist actually it's just about designing the interface to work between piece of kit A and kit B."* (Architect, case 5)

Office environments are thus predicted to become more intelligent and responsive**.** There are too many phrases being used to summarise, but examples include:

- the smart office (http://www.smart-office.co.uk/)
- intellispace (BCO workshop: http://www.bco.org.uk/Events/IntelliSpa4345.aspx)
- the programmable environment (http://www.hermanmiller.com/content/dam/hermanmiller/documents/always_building/always_building.pdf)
- the intelligent office: Niezabitowska and Winnicka-Jasłowska (2011)
- the intelligent building http://www.tandfonline.com/toc/tibi20/current (Intelligent Building International journal)

Again, this may be technological optimism, a Promethean discourse, and there may be a kick-back: *"The Edge in Amsterdam has smart HVAC based on iPhone controls of users, most people want to use opening windows rather than subscribe to the smart system."* (London Roundtable notes)

7 Different modes of working – agility in the office and flexibility to work out of office:

> *"BusinessWeek began reporting on "the office of the future" in 1975. It would be paperless and "non-territorial"; you wouldn't have your own office, or your own desk, or even your own little corner—you'd work wherever you needed to."* (Lapore 2014)

> *"Everything which is not the stereotypical 9am-5pm, working in an office building and at the same desk, for your whole working life … is termed 'flexible working'. We have moved from a workplace that needs to support the 'standard worker' to supporting most employees' exceptional work-styles."* (RICS 2009: 13)

There is a literature of predictions of telework/distributed work, which have come true to varying degrees (Worthington 2006), and the idea of the mobile worker and the distributed office reflect this (Harrison et al 2003). In a sense, the preceding sections can be seen as providing the framing for this central issue, of different and new modes of working, that are characterised in a number of ways, are seen to be on the increase, allegedly approaching some sort of tipping point. We can also ask whether there is evidence of a kick-back against such forms of work, whether we are hearing a story

from a particular (managerial) sector and whether flexibilisation and agility is therefore a top-down managerial discourse which may be resisted.

7.1 Definitions of agile/flexible/mobile work.

Although there is a general consensus about the fluidity of emerging work practices, they are described in different ways with subtly different meanings. The following is a summary. Increasing agile (non-desk tied) and flexible (non-office tied) work was identified in project 3.2, although perhaps not for all workers in all sectors.

> *"There's several trends which are beginning to kick in which are linked to this phenomena of people using tablets and doing everything on the move and not necessarily in an office building."* (Architects, case study 1)

7.1.1 Mobile working

Working on the move is a newer phenomenon arising with mobile devices; a new practice entity based on material innovation, with new competences arising, leading to office designs that reflect and facilitate it: *"trying to read their phone while they were walking … slowing down like drivers who try to get on the phone, they drive differently. So … the extent to which people do it … The office building is the same."* (Architects, case study 1)

7.1.2 Flexible arrangements versus flexible practices

Brinkley (2013: 11) makes this important distinction, where the latter is in the interests of workforce and management *"and includes part-time work, flexitime, jobsharing, and term-time working"*, and the former a managerial strategy *"more about the employer's ability to manage workforce size and hours and include*[s] *zero hours alongside shift-working, annualised hours, temporary staff, freelancers and contracting in and out."* (Brinkley 2013: 11). This obviously has the potential for casualization and precarity.

7.1.3 Flexible working

There are suggestions that flexible working has reached a tipping point (below) that are challenged by some: *"The structure of the labour market is not changing as much have some might think. More surprisingly, the share of employees reporting formalised flexible working arrangements has also shown little advance over the past 15 years"* (Brinkley 2013: 16)

7.1.4 Remote working

This is essentially another term for home, third-space or mobile working including any work away from 'the office', something that at least a third of the UK (Garner et al 2016: 5) and global (Taylour cited in Harris 2015) labour force does all or some of the time.

7.2 Increasing – to a tipping point?

This percentage is almost universally claimed to be rising, although with different indicators and figures arising from different surveys:

- *"CBI's 2011 Employment Trends Survey of businesses found that 96% of UK companies offered at least one type of flexible working practices"* (Mitie 2013)
- *"The Making Agile Working Work For You strategy guide [Mitie 2013] says around 25 per cent of companies have implemented agile working … The study also says that latest data*

from the Confederation of British Industry suggest that the figure will be close to 90 per cent by the end of the decade." (FM World 2013a)

- *"Our survey results indicate that mobile working was the norm by 2014 for over one-third of respondents and over one-third of the organisations they worked in."* (Zheltoukhova 2014: 2)
- *"JLL data shows that 10% of all the office space leased in London during 2015 was accounted for by serviced office providers compared to 4% in 2013"* (JLL 2016: 8)
- *"According to Harvard Business Review, by 2025 around 40 per cent of US work space will be contracted with staff working in a project-based environment."* (The Lawyer 2016)

The Work Foundation (Garner et al 2016) claim that the degree of flexible working now evident constitutes a tipping point in the classic terms of Gladwell (2000), and therefore the office is likely to transform.

7.3 Kick-backs – questioning flexibility

Four main questions and issues arise from these observations. The first is to ask what role, then, remains for the office (building) if such a transformation is taking or will take place? However, much writing asserts that *"for the vast majority of large organisations in the public and private sectors the office is still where work is done, sometimes because of custom and practice and sometimes because there are regulatory, cultural or operational issues that make it difficult to go down the utopian flexible model."* (Mawson 2010). In short, there is a suggestion that the flexible work world might have been over-hyped, similar to the claim of the 'gig economy' which turns out to by largely constituted by e.g. Uber, where *"aside from Uber, there's mounting evidence that few companies are doing this successfully. The so-called gig economy barely registers in traditional labor-market data … there's been a large growth in tenuous work arrangements. But … the growth has taken place largely offline—in traditional jobs and industries where a growing number of workers are in contract arrangements."* (Zumbrun 2016). In other words, flexibility might be mostly managerially-benefitting flexible arrangements.

This raises the second issue – the data above arise from surveys and research largely conducted with managers: *"we surveyed over 500 managers from medium to large organisations across the UK in early December 2015."* (Zheltoukhova 2014: 2); *"The survey research was conducted by Censuswide, with 503 managerial level employees at medium and large organisations across all sectors"* (Work Foundation 2016). Are these findings then only being *hypothesised* to apply more broadly?

> *"according to industry analysts Garner, around 60% of senior managers in large private and public sector organisations work to a greater or lesser extent away from their office … But it's not just senior managers that are benefitting … Staff at all levels in whitecollar organisations are enjoying the ability to take more control of when and where they work, leading to greater productivity and employee satisfaction"* (Mitie 2013: 2)

If flexible/agile working a privileged practice, enjoyed by managers and specific types of knowledge workers (including academics) but not the workforce more generally, or those in occupations that are more spatially or temporally 'fixed' (Breedveld 1998), then rather than an opportunity it might be seen as an imposition. Agile working is clearly a change to many established work practices, meaning that organisational change, especially when associated with changes in office fit-out and technology, has to sometimes be implemented as a top-down management process which:

> *"requires lots of people who have engrained attitudes and behaviours to change their ways … Getting people to work in a mobile, agile way within the office takes leadership and commitment and a carefully constructed change programme to prepare people for change"* (Mawson 210)

Are we hearing a director/knowledge worker/manager-centric story? 'Backroom' work with PCs is still required, and is still a significant 'always-on' contributor to office energy consumption?

Third, Google and Yahoo, the epitome of TMT organisations whose productivity is the rationale behind many of these identified trends, are keen to tie people back to their desks and/or buildings, on the basis that productivity is best secured through face to face work:

> *"I think it was Yahoo or one of them, the chief exec said no. The interesting thing about Google is everybody has a desk. They may only have a small desk but everybody's got a place to go, a place to call home. And I think that's recognising what it is to be human rather than trying to impose an idea of how the workplace should function."* (Construction)

> *"Press reports at the time balanced the official 'no comment' with unconfirmed reports that despite connection to* [Yahoo's] *IT network being required for people to do their jobs, the average log in time for home workers was just one hour per day."* (Mitie 2013: 8)

A kick-back against agility and flexibility from the innovators might indicate a different and more secure future for the desk and the office building?

8 Different sites of work – where, what and whose is the office?

> *"Office buildings are no longer the sole locations for knowledge work. In fact, research from the consulting group Emergent Research suggests that two-thirds of it now happens outside the office."* (Waber et al 2014)

If not the classic building, where or what is 'the office'? These new modes of working take place in new sites, including the home (Gillen et al 2013), on transport (Lyons et al 2007, Holley et al 2008), in different parts of the office, in other 'public' spaces and buildings, in found and bespoke third-spaces (Strelitz 2013). An identifiable trend is for 'office space' to be provided as quasi-third-space, either within an organisation's own building (e.g. using fit-out to provide 'coffee shop' style offices) or beyond (e.g. serviced offices and co-working spaces).

This de-territorialisation of work, dissolving the traditional spatial fixes, works towards globalisation and localisation at the same time, through ICT connectivity:

> *"The dichotomy here of course is that while the technology advancements have in some ways helped to shrink our world and facilitated globalisation; work can now, just as easily, be carried out on the other side of the world, from home or the local Starbucks coffee house. It is no longer centered around the 'Workplace,' and the 'Work station.'"* (Haury 2010)

There is little research on home-offices, and rather more on the increasing practice of mobile work particularly on trains, with a suggestion that their noisy atmosphere might better suit focused work than open-plan offices full of relevant conversation:

> ""Language is more disturbing than other types of noise," said Taylour who went on to explain that while we have adapted to new environments – we are able to work on noisy trains, for example – language that we can relate to, such as an overheard conversation about a project in the office, can steer focus away from the task at hand. It appears that there is a limit to unplanned collaboration." (Harris 2015)

By far the dominant concept applying to new spaces of work is the third-space.

8.1 Third-space

The 'third-space' is a separate category to the work-home dyad. This space can include transport, leisure, hub and 'no-place' spaces, which as the following quote suggests are "not domestic and it isn't corporate, somewhere in between":

> "through technology we're not as chained to a work station as we once were … a generation of people who are used to, maybe even more comfortable, working in coffee shops and things of that ilk … that third space thing that's not domestic and it isn't corporate, somewhere in between … enabled by technology that's changing things quite markedly I think" (Architects, case study 1)

Third-spaces can now be found within and beyond the office.

8.1.1 Third-space in the office

The idea of a third-space applies to the *internal* differentiation of space within offices (see section 4), which includes *""tertiary spaces": spaces that aren't conference rooms and that aren't personal desks, either … in-between areas that are quiet, where technical people can focus without being locked away."* (Markowitz and Lagorio-Chafkin ????). Our previous project identified that these are multiplying: *"That's an interesting one, that's changing work patterns as well … The third space … fairly consistently now at least a third of the office is not work stationed, it's other stuff: meeting rooms, breakout spaces, kitchenettes, that kind of stuff."* (Architects, case study 1)

The origin of this model of work space is famously the coffee shop where innovative TMT workers were seen to congregate. This is now recreated because: *"people come to the office … for meetings and collaboration, so the type of space you need to provide is different… more project rooms, meeting rooms and soft chairs, and catering … People want a Starbucks or Costa Coffee-type experience internally."* (FMW 2013b).

> "**The rise of the coffee shop workplace** … fundamental changes in office fit out and office refurbishment requirements … The need for the desk as a space to work is fading in importance and new work areas with Wi-Fi, sofas and coffee tables are emerging as the preferred choice." (Andrew 2014)

8.1.2 Third-space beyond the office

Of course, the majority of third-space remains literally beyond home and office. The main distinction analytically can be drawn between authentic or found third-spaces such as *"libraries, coffee shops,*

business centres and lounge settings … the café model – … open areas for free third-place working"
and increasingly, bespoke spaces that are beyond an organisation's home building, rented as
serviced office space: *"Third-place workspaces as businesses in their own right are burgeoning …
Privileged paid-for third-place working solves the associated hitches of venues that can be used free
of charge"* – such as overcrowding, lack of privacy, weak wifi or ambient noise (Strelitz 2013).

A work culture centred on such 'third places' is said to be becoming popular, with surveys identifying
a global average of 75% of workers who have used a business centre or business lounge, with 49.1%
of respondents in India using one, and 47% using informal spaces such as coffee shops, hotels and
public areas (Economic Times 2011).

***Research opportunity: Assess the actual 'spec' or working conditions of various non-office work-
spaces? This might support an argument for lower spec office buildings? Does this work culture
reflect ideal neo-liberal flexibility in the worker, shaping their self around work/deliver work
whatever the conditions? Can we identify the essential elements of 'an office working space'
similar to the 'mobility kit' of Urry (, which included technological elements but also social
networks? Which (energy demanding) services are expected and/or provided in serviced offices,
domestic office spaces, the train? Might we compare the relative energy demands of each?***

9 Different times of work

This is another aspect of flexible working practice as the fragmentation of work across the day and
across space. It is linked by many to a younger digital generation and to flexibility. It also links to staff
retention in that some organisations attempt to force or entice their staff to stay in their buildings
longer – *"the whole idea being once they're here they don't even need to leave"* (Letting agent case
5) -and to the Demand Centre interests in peaks and synchronisation. It also links to the changing
nature of work (section 2.1). Stanley Blue is applying a practice rhythmanalysis to hospitals as a case
of such temporal issues, and it is therefore perhaps unnecessary to develop a specifically temporal
aspect to this research.

However there are hints that out of hours energy demands might also be new and spreading peaks –
for example as cleaners switch on lights, use hoovers and dishwashers after hours:

> *"What happens when they're using all the hot water for cleaning and washing stuff
> down? What happens when they start mopping the areas at 10 o'clock at night when
> people have left and people say all the lights are on and there's no one in it. Well often
> cleaning is going on from eight to 10 in those buildings."* (Consultant)

There is also the issue of different temporalities overlapping in office buildings, which has bearing on
the debates about whether buildings can or should be tightly fitted to end user practices – a key
argument about what makes a future-proof office:

 "Frank Duffy (of DEGW) sees a building as four layers:

- Shell — structure, lasts 50 years in UK, 35 in US.
- Services — cabling, lifts, etc, replaced every 15ish years.
- Scenery — partitions, dropped ceilings, etc, 5-7 years.

- Set — furniture.

[Stuart] Brand expands on this:

- Site — geographical setting, eternal.
- Structure — foundation and load bearing elements, 30-300 years.
- Skin — 20ish years.
- Services — 7-15 years.
- Space plan — interior layout, from three (commercial) to 30 (domestic) years.
- Stuff — furniture and belongings." (Gyford 2004)

There is scope for thinking about how these concepts play out across 'futures' of different scales – for example, over 50 years hence.

10 Domesticity and consumerisation of 'the office': amenities at the destination

> *"Leisure may be over, but that's only because when your office is a cloud it follows you everywhere … Work will no longer be a place, and home no longer an escape."* (Lapore 2014)

There are three aspects to this trend and developing future for offices: that there is a convergence between the expectations and atmospheres and possibly services and fashions of home and work spaces – the domesticity of workplace reflecting the introduction of work into the home; the transformation of 'the office building' into a a 'destination' with increasing amenities available in an effort to attract and retain talent and encourage them to spend more time there (also referred to as a 'consumerisation' of the office); and a discursive focus on workforce 'well-being' in office design, which similarly can be seen as a mask for concerns around productivity.

10.1 Domestic fit outs

Brighter colours, soft furnishings and 'funkiness' were stressed in our previous research as increasing trends again moving from the TMT sector into even the most conservative (legal/finance) sectors. The rise of soft furnishings is seen as part of the 'death of the desk' in the pursuit of collaborative working *"in a more inspiring setting than the traditional desk":*

> *"soft seating has also provided an alternative to the traditional way of working … typified by … Orangebox's 'Away From the Desk' range … the concept of collaborative working in soft seating configurations is … [of] proper working spaces … the integration of … facilities to accommodate laptops, tablets … integral power and data requirements … with the facility for a display screen, to further accommodate team presentations or collaborative working."* (Ahmed 2014)

These technologically-determined changes in fit-out reflect that the *"office is no longer just a workplace … the nature of work is changing and so is how businesses occupy and utilise their workspaces"* – and these changes are strategically aimed at business objectives: *"bespoke, efficient, innovative and productive working environments will help attract and retain talented staff, increase performance and allow businesses to grow"* (Andrew 2014). Such technologically compatible

domestic modes of offices were identified in our previous interviews as desirable and spreading globally:

> *… a completely different environment where people bring their own computer, plug it into potentially sockets that are already integrated in the furniture and just a different way of thinking about the office space I suppose. And you're not necessarily sitting at your desk but you change your location, you work standing up … the client … said … "don't make it look too office-y" … We've looked at examples worldwide … It's like that warehouse, New York loft type of thing"* (Architects, case 6)

10.2 Destination and amenities – hotel style

> *"offices are increasingly used to attract and retain the young, skilled and international workforce upon which T&M companies rely … [with] … their non-corporate local ecosystem offering floorspace variety, a young and fast growing resident population and a unique amenity offer"* (JLL 2016: 3)

> *"gym facilities as standard, … usually staff restaurant … some of the other big banks do all sorts of other things like dentists, doctors, all available on site. … dry cleaners, travel agents, it's all there… an indoor swimming pool for their staff … the major occupiers,* [all offer] *all these amenities."* (Letting Agent, case study 8)

This theme links to the identified focus on well-being (and productivity: WGBC 2014) and "exemplary working environments" as a priority for attracting and retaining staff: "*the Google way that they operate and they work, it's all about their staff, it's all about their lifestyle … the time spent in the office … They want to be in nicer environments"* (Letting agent case In our interviews providing amenities was seen as eclipsing issues of energy efficiency, given that staff costs are e.g. 10 times higher than energy costs: *"They're going to put a physio in, a doctor in, a gym, a kitchen. … the occupiers look at this as a total all in cost … I don't think the cost of the energy is going to alter where an occupier locates."* (Letting agent, case 5). Our interviews also revealed a model of an office as a hotel style 'destination', a relaxing hub for work and interaction:

> *"a destination location, hubs where you can more casually meet people but have got great connectivity, you can sit there and work but you can sit there and chat and be more relaxed. There's going to be more relaxing environments to have a coffee and have a chat and be in a teleconference and work again"* (M&E case 9)

This mode is intended to entice staff back into the office, presumably from their flexible and agile remote work: *"the office has become a selling point for businesses. People have greater choice about how and where to work, so the office must have the facilities and surroundings to make it a destination of choice rather than just a place we go to work"* (Campbell 2015) and this focus on the workers' *choice* of work location can be seen to reflect neoliberal consumerist discourses:

> *"WeWork and coworking in general point to a deep structural shift in work culture, characterized mainly by … a consumerization of the workplace and the emergence of a new set of values around work and the office … Workspaces that can deliver on both of these elements resonate greatly with today's work culture."* (Magnolfi 2015)

Not only amenities in the sense of (often outsourced: Economist 2014) services, but also consumerised appliance and gadgets are involved, with an article on the 'top 5 desirable office features' including a *"Luxury Coffee Maker, Massaging Chair, Apple Computer [and] Snack Vending Machine"* (Ryan 2014).

In addition, the need to entice people back to the office is seen as a response to the hollowing out of the office by flexible work, and a concern once more for productivity:

> *"the workplace has expanded beyond the office … many businesses are now trying to attract people back to the office … while flexibility is an incentive for staff, ultimately, collaboration and good communication have a higher impact on productivity."* (Campbell 2015)

Many articles from consultancies advise on 'What Makes Your Office Cool?' (Lennox 2013) and how to create a 'cool', "creative, collaborative, and innovative workspace"(Markowitz and Lagorio-Chafkin ????) involving e.g.: *"rooftop gardens and games rooms and cool slides at your workplace instead of boring grey cubicles?"* (Ng 2013) or "[the BBC] *transforming their once-drab offices into futuristic playgrounds. From an in-house tattoo studio to a changing-colour meeting room"* (Li, 2016).

10.3 Biophillic design, well-being and productivity

As stated, lying behind these concerns for trendiness and cool are more practical issues of their influence on innovation and productivity, taken to arise from staff well-being. This is an identifiable discursive change emerging in e.g. BCO and WGBC Guidance, along with specific design trends reflecting similar concerns such as 'biophilic design':

> *"there was a report done by the World Green Building Council recently … Health, Wellbeing and Productivity. As soon as you can link productivity to the environment that people are in it becomes a bit of a game changer … many of the speculative buildings they have the sort of ambience of an extremely hygienic hospital."* (Architects, case study 1)

Puckett (2015) notes that a new standard has emerged in this area – always a sign of discursive hegemony – which is the "WELL Building standard, developed in the US, is designed to be compatible with existing sustainability rating tools."

Research opportunity: There is scope for further research on what different people want from offices? Going beyond the consultancy work, which is designed to appeal to specific audiences and may generalise from management concerns, and the rather dry Post Occupancy Evaluation work, what is the empirical reality for the majority of office workers?

Work in this area includes consultancy by Alexi Marmot: *"architects with a keen interest in people, and social scientists with a keen interest in buildings. AMA draws together … architecture and design, sociology and psychology, technology and planning - to create a unique, evidence-based approach to workplace and learning space strategies"* (http://aleximarmot.com/), and the BCO and letting agents Savills commissioning a *"report to look at what workers want from their office workplace … this survey was to … provide insight into what occupiers want from their office space. The findings*

showed that employees want a comfortable office space with adequate temperature control, lighting and space." (BCO 2013).

11 Different understandings of office 'use' – buildings not necessary?

> *"our expensively constructed 'glass buildings' … will be turned into apartment blocks in the future … the traditional 9-5 role is gradually becoming obsolete … thousands commute … to sit halfway up a skyscraper to be in the same building as the rest of the organisation's employees – only to send emails to someone a couple of floors away … Duffy …foresaw a future in which, if businesses are procuring services as much as space, those services would be paid for by the hour in much the same way that space is paid for by the square foot."* (FM World 2013c:, a report on the Worktech conference)

What, then, is 'the office' for? Is it a destination? For face-to-face work and 'co-location'? Thinking as an organisation, is there actually any need for 'an office' as such? Or can the business of the organisation – 'office work' understood as knowledge work, take place across a diverse set of spaces that are not necessarily owned by them? Again, does this spell an end to 'the office' as it dissolves into a virtually connected network of homes, third-spaces, transport and transport hubs, co-working spaces and serviced office space?

Holm (2008: 73) suggested that the office remains with a 'nodal' role, a somewhat symbolic fixed point or hub, acknowledging the virtual organisation of work and a *"place for 'rituals of bureaucratic capitalism' (The Architectural Review, May 2004)"* to take place in.

Of course there are arguments *for* the continuing need for the office*: "fostering relationships, creating team spirit, learning from each other quickly, developing a sense of mission … useful but incidental conversations"* (Smith 2016). However flexible work has made the need for so much floorspace inefficient, leading to calls for property to be rationalised into smaller, more densely occupied units, supplemented by the types of distributed workplaces described above, networked into something of a virtual organisation.

11.1 Property rationalisation

As Ramidus (2015) outline, flexibility and hot-desking mean that "the traditional relationship between headcount growth and space demand is changing, resulting in 'spaceless growth' … and the overall impact on the City could be profound."(Ramidus 2015). Mawson (2010) describes how office space can be squeezed, as:

> *"most desks in most offices are only occupied around 50 per cent of the time"* (see AWA 2015: 14) *"in most offices we can improve both the effectiveness of the working environment, the efficiency of working practices AND reduce the waste in building capacity by increasing the number of people that use the building by 25 per cent to 30 per cent. We do this by getting people to work differently in the office and providing a range of the right IT tools and spaces to help people do their jobs better."* (Mawson 2010)

Strelitz (2011) concurs that with solo work moving out of the office *"where people do individual work is a matter of their own choice, rather than a business responsibility"*, and space is freed up for transformation to reflect new 'office practices':

> *"the advent of agile work has been a catalyst for countless workplace transformation projects … efficient CRE and FM strategies* [mean] *the overall amount of workspace can be reduced. The contingent savings in capital and building running costs … replace larger quantities of poorer workspace with less, but more up-to-date, accommodation – a move that usually pays for itself in just a few years through associated property disposal."* (Strelitz 2011)

This property rationalisation leads to higher occupational densities that are arguably more energy efficient per capita, although the question remains as to what energy is demanded in the spaces where the displaced flexible workers re-locate. But it is also argued that it can in itself be 'green':

> *"more efficient use of office space can be better for the environment … the most powerful way to reduce CO_2 is to use fewer buildings by consolidating occupancy and increasing utilisation through agile working"* (FM World 2014)

In this model of 'green occupancy', property rationalisation can result in raised occupancy, with baseloads that can absorb it, providing savings that can be used to re-fit property to be agile (and lower energy?). Using an example of rationalising from 5 to 4 buildings, Mawson (2010) argues that costs of £5m per annum can be saved, allowing the remaining space to be retrofitted:

> *"We might spend £3m to augment the retained buildings with new meeting spaces and quiet spaces, upgraded IT and telephone systems and possibly invest in new energy efficient building controls and lamps and we've got our money back almost immediately. We've saved … over a five-year period £22m AND saved probably around 15 per cent in carbon emissions per annum … we can achieve more CO2 and cost savings faster by introducing agile working as part of a green occupancy programme."* (Mawson 2010)

This enforced transition to agile working again requires serious top-down management:

- *"Estate management – especially building, desk and meeting space allocations;*
- *HR – agile staff need a very supportive environment;*
- *Management systems – productivity needs to be carefully monitored;*
- *Building management – sweating assets increases wear and tear;*
- *Energy management – consumption needs careful management."* (Mitie 2013: 10)

11.2 Multiplying workplaces

> *"I've come to prefer work environments that are more common in startups"* (Chase 2013)

An alternative of complement to this real estate focused strategy is to actively spread the 'workplace' or perhaps work-net across diverse spaces, particularly those linked to or modelled on the innovative workstyles of TMT start-ups such as hackerspaces, skunkworks etc., so that a *"new trend is emerging where hot studios (that combine design, business and technology skills) are building startups from scratch for large companies"* (Thompson (2013). This can be viewed as a shift

in the property market where "*some of the reduced demand for fixed office space* [is] *re-emerging as a market for workspace venues that are available on looser, less formal terms*" (Strelitz 2013).

Thus organisations may use temporary spaces for different ways of working, e.g. 'activity-based working', collective/collaborative working for set periods. This matches the illustration (figure 11) in Ramidus (2015: 36) which shows a hypothetical organisation's workspace diversifying from a single, 25-year lease freehold in 1990 to encompass 'workplace solutions' based on 15 year leases, 'Son of PFI', serviced offices, managed space, 5-10 year leases, co-working space, pay-per-hour, hotel-style spaces and 'garden offices'.

Co-working (http://www.coworkinglondon.com/, http://co-work.co/) is the most common name for the practice of sharing a non-organisation-specific office environment. Co-working has a history of originating in found spaces (e.g. third-spaces) by bored and lonely home workers, but its popularity has spread to such an extent that bespoke co-working spaces are now highly popular, and large organisations have begun to invest in them or to use the spaces for ad hoc teamwork by employees (see section 8.1.2). Co-working space and serviced office providers such as Regus, Impact Hub, Liquidspace, NearDesk and Hoxton Mix are multiplying, and their providers are contributing to a 'hybridisation' of office space where "*traditional serviced office operators have threaded coworking-style workspace options and memberships into their office space packages to offer greater variety for their clients*" as "*businesses of all shapes and sizes are looking for spaces that accommodate not just workspace, but 'in-between spaces'* for cafes, lounges and meeting areas designed to encourage collaboration and knowledge-sharing between staff.*" 'Flexible office providers' such as The Office Group, Workspace Group and WeWork are cited as examples of such hybridisers (Disney 2016).

This transition has been anticipated, with Worthington (2006) describing these changes in office use as a shift in the understandings of major corporations as to what their valuable assets are; from real estate to knowledge and innovation. This means that the 'flexible firm' lives in a "*portfolio of properties with a mixture of tenancy arrangements to provide the most appropriate space at the right time*", a portfolio consisting of:

- Core space "*symbolic of the values of the organisation, providing hearth and home;*
- Flexi-space "*adaptable generic space with outsourced services…providing the ability to respond to rapidly changing market demands";* and
- Space-on-demand "*such as serviced offices… where workstations and meeting spaces are available on short-term licences*"

Strelitz (2013) also points out that the 'consumer choice' nature of office work options now available not only to individuals but to organisations is a shift from a 'real estate' mode of thinking about offices.

Research opportunity: Cleaners are also 'office workers' albeit with a different relationship to the workplace, employed by outsourced companies that may not share the building organisation's energy efficiency behaviour or FM strategies. What are the cleaning and other services arrangements in new and different 'workspaces'?

11.3 Smart working – local hubs

The governmental discourse for this process of promoting agile working, and changing workplaces to more local hubs, is 'smart working' (Grewal 2016) which acknowledges: *"that technology and flexible working are changing the way we work … by creating modern workplaces … to give staff a better work/life balance. This means greater productivity and efficiencies for employers* [and involves] *commuter hubs to reduce the need and expense of long journeys"* (Cabinet Office, in Grewal 2016).

However, there is also a countervening strand of thought that the use or diversification of uses of office spaces that are underused due to flexibility can be increased, as *"offices are available for occupancy for 365 days a year, but only open 12 hours a day most days and are unused at weekends, making them "a waste of space""* (FM World 2014b). This is perhaps already the case in the amenity-heavy 'destination' offices discussed in section 10.2, where multiple practices of entertainment, relaxation, eating drinking, meeting and exercising are all becoming concentrated in a single site.

13 The future adaptability of office buildings

The future of office buildings might include a role as non-office spaces. Although 'flexibility' is the key design criteria particularly for speculatively developed buildings, this is flexibility to different (and potentially high power/cooling demand) *office* typologies. In our interview data there was also discussion about the potential to convert offices to other uses – a key factor for sustainability understood as the re-use of materials, avoiding wholesale demolition and re-build. Preferred structural factors for adaptability include narrowness and/or shallowness plan (for daylight demands of residential/hotel uses), high ceilings, and slab rather than steel frame structure to maximise the flexibility of internal lay-outs. Issues of obduracy (Hommels) and 'tight fit' (see Leaman 2006 in Worthington 2006) are linked to this potential future. Building in such future flexibility is rare in the buildings we studied:

> *"it was designed with very high floor to floor heights, with a 350mm raised floor zone … But there was nothing in the floor, just electrics. So what they can do in years to come is … They can duct air through the floor … and then take the ceiling out … flexibility in the future … So it's a decision that is made very early on and can't really be changed … somebody has to take the view that there's 200mm of air effectively that's unused on every floor plate which is quite a big decision for a developer to take … Unusual and a good long term view."* (Architect, case 1)

In a similar vein Gyford (2004) says that in the view of William McDonough *"any new office he designs should be potentially convertible into housing, as he sees this as the most fundamental use for buildings."* (Gyford 2004).

14 Future Energy Implications

> *"… I think people will have to create buildings which are more environmentally friendly, more sustainable … other companies are then taking their influence and their style of working. So I think the TMT sector will mean, and they will have an impact on the way buildings are designed in future."* (Letting Agent)

This brings us to the issue of the energy demand implications of the above. Mawson suggests that property rationalisation (squeezing people into fewer, more agile workplaces), has a negligible effect on energy usage, probably because the offices are engineered to take the higher densities anyway, in an inefficient manner, and this is base-load, irrespective of occupancy: *"there is not much real research in the public domain … but the anecdotal evidence … is that increasing the intensity of occupancy from 50 per cent utilisation to 75%-80% has only had a marginal impact on energy consumption probably between 4 per cent and 6 per cent."* (Mawson 2010)

Regarding the use of increasingly energy-efficient devices for mobile work, some predict that it could revolutionise the energy efficiency of office spaces if services could be sized to match lower energy working practices: *"the energy consumption of iPads, if you've seen all computers end up that efficient you go from 15 watts a square metre to maybe half a watt. And that's a game changer, a huge game changer."* (Architects, case study 1). However there is still a major question as to whether there is a rebound effect, with such 'techno-fixes' being undermined by increasing numbers of devices, linked to more diverse practices and the ratcheting of expectations. Also, to what extent do organisational policies and guidelines attempt to keep a lid on technical innovations, the redundancy of e.g. doubling up comms and IT systems in workplaces, and cranking up ventilation or cooling to deal with increased occupancy and electronics?

As described in section 6, the integration of different aspects of office building management systems – entrances, lifts, HVAC and lighting, IT and phones – is seen as a potential hi-tech future, and importantly it is viewed as having potential for reducing energy demand/consumption with a study by an independent engineering consultant for Herman Miller finding that offices using their 'programmable environment platform' Convia *"can gain up to 30 percent in annual energy savings as compared to the ASHRAE standard 90.1-2004, the current energy benchmark for buildings … energy use is at or below ASHRAE 2004 codes 90 percent of the time, an improvement over last quarter's 85 percent"* Of course, the benchmark might be questionable. Convia is a proprietary smart office system: *"controlling and controlled components and building subsystems … provide rudimentary brains—in the form of sensors … so that the whole environment, the building zones, and scenes themselves can continuously evolve."* (Long et al 2008: 63,66).

Underutilisation of office space is energy wasteful as discussed, and the same consultants point out that the dematerialisation of office (knowledge) work means that it is near impossible to work out the 'efficiency' of office workspace in traditional ways:

> *"in an economy with knowledge and service as increasingly large parts of our commercial output, we're without metrics for measuring the value of space for knowledge and service workers. Is it workstation occupancy? How, then, factor in community space, the collaboration that happens outside the office, travel to suppliers, research partners, and customers?"* (Long et al 2008: 33)

In the following interview segment, transition to flexible and remote work was seen as a trend with accidental/incidental (*invisible?*) demand reduction implications, and as more effective than strategies such as behaviour change or imposing 'adaptive comfort':

> *"younger people have grown up you work anywhere, anytime, whatever, just suits. It might be at midnight, it might be in the coffee shop or it might be in the middle of the*

day in an office. So it's really flexible. So if you can link in the sustainability and energy efficiency benefits as well, when you're already making those changes … it's a lot stronger case than saying right everyone do exactly the same but we're going to try and cut 10% off your energy or something, so all start wearing jumpers"
(Developer/consultant)

The use of more places for work, even within a day, may or may not have implications for energy demand, depending on the travel (and distances) between them, the servicing levels in different places and so forth – essentially an empirical question. A Demand work programme focusses on business travel implications. More amenities (especially catering) also have their own ventilation and cooling requirements. Keeping people in the office has implications for working hours, and also for cleaning and dish-washing (as mentioned above). Home working involves its own energy demand and so does technology use – this project will liaise with other Demand work on these issues. As this position paper has hopefully demonstrated, the technical challenge of designing and operating energy efficient buildings is not the key one determining the sustainability of office work futures.

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