Work, ICT and travel in multinational corporations: the synthetic work mobility situation

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Theorising the relationships between information communication technology (ICT), travel and work continues to preoccupy researchers interested in multinational corporations (MNCs). One motivation is the desire to understand ways of reducing demand for and the negative consequences of business travel. Existing studies offer, however, little in the way of theoretical explanation of why situations that require travel arise in the first instance and how they might be avoided. To address this shortcoming, this paper analyses two case study engineering consultancy MNCs to develop a novel sociomaterial perspective on the role of travel and ICTs. It introduces the concept of the synthetic work mobility situation *which highlights the way ICT and travel exert agency that constitutes ways of working and the organisational form of MNCs. The concept also recasts questions about ways of reducing demand for travel as questions about ways of reconstituting the sociomaterial organisation of the MNC.*

Keywords: multinational corporations, business travel, travel demand, information communication technology, work, sociomateriality.

Introduction

The links between international work, information communication technology (ICT) and travel continue to inspire extensive debate in literatures on videoconferencing and related technologies (Montoya-Weiss, Massey, and Song, 2001; Konradt and Hertel, 2002), international human resource management (IHRM) (Mayerhofer, Hartmann, Michelitsch-Riedl, and Kollinger, 2004: 1375; Welch, Welch, and Worm, 2007: 173) and business mobilities (Aguiléra, 2008; Faulconbridge, Beaverstock, Derudder, and Witlox, 2009; Elliott and Urry, 2010; Storme *et al.*, 2013, 2017; Jones, Faulconbridge, Marsden, and Anable, 2018). Cutting across these literatures is a common preoccupation: how to theorise the relationship between ICTs, travel and contemporary forms of international work in terms of the role, substitutability and management of travel. Pragmatically, such questions are motivated by the fact that business travel is both an

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indicator of economic growth but also, significantly, an environmental and social challenge. Dependency on business travel generates concerns about carbon dioxide emissions (Poom, Orru, and Ahas, 2017) and about the social costs for employees in terms of stress and work–life balance (Gustafson, 2006; Ladkin, Willis, Jain, Clayton, and Marouda, 2016). The scale of the challenge is significant. Estimates by market research agencies suggest that, in 2015, $1.25 trillion was spent globally on business travel (Wheatley and Bickerton, 2016). Individual organisations are also highly dependent on travel for their functioning. For example, Apple buys 50 business class tickets from San Francisco to Shanghai *every day* and spends US$150m annually with United Airlines alone (Clover, 2019). The impact of the volcanic ash cloud on air travel in 2010 revealed the potential risks of such dependency (Budd, Griggs, Howarth, and Ison, 2011).

As a result, advancing theorisations of the role of travel in relation to ICTs and international work is seen as a crucial step towards reducing demand for and the negative consequences of business travel. Two bodies of literature have taken forward this agenda most forcefully. First, the substitution debate focuses on when travel is and is not needed (Montoya-Weiss *et al.*, 2001; Konradt and Hertel, 2002). Most recently, this has informed work on virtual teams which examines the possibilities for multinational corporations (MNCs) to establish, operate and generate value through teams staffed by individuals located in multiple countries who interact using ICTs (for reviews see Hertel, Geister, and Konradt, 2005; Gilson *et al.*, 2015). Second, work on IHRM has moved beyond a focus on expatriates to take account of the role of a range of forms of mobility, such as business trips and short-term assignments. Mayerhofer *et al.* (2004) refer to this as 'flexpatriation' as part of efforts to deepen understanding of the expansive role of travel within MNCs and ways of reducing its impacts. Most commonly, the solution of choice involves travel management designed to control travel and permit only 'essential' trips (Welch *et al.*, 2007; Roby, 2010; Gustafson, 2012).

The substitution and IHRM literatures, whilst explaining what travel enables, when it can be substituted and how travel can be managed to ensure only 'essential' trips are taken, offer however little in the way of theoretical explanation of why situations that require travel arise in the first instance and how they might be avoided. The literatures assume that, once any possible substitution or prevention of 'discretionary' travel has occurred, an embedded demand for travel remains that is unavoidable and cannot be disrupted. This limitation of the substitution and IHRM literatures results from the theoretical perspective on the role of travel and ICTs adopted. In line with what Orlikowski and Scott (2008: 438) describe as a 'discrete entity' approach, studies begin with 'a deeply taken-for-granted assumption that technology, work, and organisations should be conceptualised separately' (Orlikowski and Scott, 2008: 454). This separate conceptualisation results in travel and ICT being viewed as independent entities that play a role in servicing the work of an organisation. As such, travel demand and ICT use is a product of decisions about ways of working and corporate strategy. Disrupting the forces that create demand for travel in the first place—particular forms of work organisation—is not considered as a possibility, this being outside of the theoretical conceptualisation of those concerned with the 'discrete entities' of travel and ICT.

Such a 'discrete entity' perspective is challenged by a sociomaterial perspective (Orlikowski, 2007; Orlikowski & Scott, 2008; Knorr-Cetina, 2009). When viewed from a sociomaterial perspective, travel and ICTs exist not as independent entities but as integral parts of the sociomaterial assemblage that is an organisation such as an MNC. Relationships between travel, ICTs and work *assemble* the MNC and its organisational form. Travel and ICTs have, then, agency in organisations that is missed when we only look at their functional role in facilitating virtual teams or meetings. In particular, the 'discrete entity' approach fails to adequately conceptualise travel and ICTs as performative (Orlikowski & Scott, 2008). Performative is used here to indicate enactment, with travel and ICTs, through their relationships with one-another and with ways of working, helping to bring into being the MNC organisational form and associated strategies, not just service needs created by the form and strategies.

In this paper, we, therefore, argue that a reconceptualisation of the relationships between international work, ICT and travel as sociomaterial relations can reveal new

ways of approaching questions about the role, demand for and management of travel. A sociomaterial perspective challenges approaches that presume one element can act as a substitute for another and approaches that assume an element can be removed through management efforts (e.g. ICTs substituting for travel; better management of decisions about when to travel reducing demand). Instead, a focus on sociomaterial relations highlights questions about the sociomaterial organisational form of the MNC and ways of reconstituting it through new performative relationships between ICT, travel and work. In this paper, we, therefore, ask: *How do the sociomaterial relations between work, ICT and travel constitute the organisational form of MNCs? How might changes in sociomaterial relations allow new forms of organising that reduce demand for travel?*

The remainder of the paper begins by summarising insights from existing business travel, virtual teams and IHRM research in terms of relationships between work, ICT and travel. This is then contrasted with the perspective offered by work on sociomateriality, and the concept of the *synthetic situation of work mobility* is introduced as a way of understanding how performative travel and ICTs constitute work and forms of organising in MNCs. We apply this concept to a case study of two global engineering and design consultancy MNCs. Interviews empirically illustrate the different ways in which the procuring and delivering projects are tied to particular work, ICT and travel interdependencies that have changed over time and make reducing travel difficult. The concluding section of the paper then draws attention to the need to think differently about the management and future of business travel, with *synthetic situations of work mobility* needing to be understood and their reconstitution steered rather than travel or ICTs managed as independent entities.

ICT, business travel and work

Existing literatures document how ICTs (the Internet, firm intranets, wireless networks, laptops, tablets and mobile telephones, videoconferencing) have helped to weaken the 'spatial fixity of the workplace' (Felstead, 2012: 32). This creates the potential to work from home, hotels and in transit (Hislop and Axtell, 2009). It also makes possible to work as part of project teams and practice groups with colleagues, customers and suppliers around the world (Jones, 2007; Millar and Salt, 2008). Yet, research also reveals an important caveat, in that ICTs alone cannot deliver such spatially stretched working. ICTs 'cooperate' (Faulconbridge *et al.*, 2009) and form 'allegiances' (Haynes, 2010) with travel to produce an ecology of mobility within MNCs. This ecology is characterised by an equally important role for ICT and travel in the completion of work tasks (Aguiléra, 2008; Elliott and Urry, 2010).

To date, the relationship between ICT and travel has primarily been examined through the lens of substitution. This has, in particular, spurred studies of the sources of demand for travel, such as attending meetings (Lyons, 2013; Wheatley and Bickerton, 2016) and conferences (Strengers, 2015; Storme *et al.*, 2017) working on global projects (Faulconbridge, 2006); corporate management coordination (Jones, 2007; Jones *et al.*, 2018); managing existing clients (Millar and Salt, 2008; Hislop and Axtell, 2009); and identifying new clients (Wickham and Vecchi, 2009). The aim is to understand what travel allows that ICT might need to reproduce if it is to act as a substitute, in particular as the 'band width' of videoconference technologies increase (Gallié and Guichard, 2005).

This literature has led to demand for travel being understood as derived from the teleo-affective nature of work. Teleology highlights the goals and ends of a particular practice (e.g. attending to existing clients), whilst affectivity highlights a range of emotions and feelings that inform the doing and are experienced through in-person interaction, and the expectations associated with any type of interaction (e.g. social expectation of co-presence when pitching an idea to a new client) (Schatzki, 2009, 2013). Teleo-affective accounts of the need for travel are thus organised around questions of travel demand generated by function (travel to compete a specific task that requires physical presence, such as machinery maintenance), social compulsion of

proximity (to share a social space and time with others because ICT remains unable to reproduce many features of corporeal interaction (Vayre and Pignault, 2014; Strengers, 2015)) and hybrid situations (when both functional needs and social compulsions exist).

Understanding of the teleo-affectivity of travel has been central to the development of work on virtual teams. In its early stages, this literature explored in detail the ways that travel enables the establishment of virtual teams (Gibson and Cohen, 2003; Piccoli, Powell, and Ives, 2004). In particular, travel and face-to-face meetings were recognised as crucial for initial acquaintances between team members and clarifying roles and responsibilities (Montoya-Weiss *et al.*, 2001; Konradt and Hertel, 2002). In addition, travel was highlighted as needed for meetings to generate new ideas and take major decisions (Maznevski and Chudoba, 2000). In contrast, ICT was highlighted as effective for completing bounded tasks, gathering information and solving an immediate problem. Since the initial interest in the role of travel in virtual teams, the literature has, however, paid much less attention to this topic. In their review of a decade of research on virtual teams (between 2004 and 2014), Gilson *et al.* (2015) have no discussion of the role of travel, with studies considering the importance of face-to-face contact primarily comparing entirely virtual teams with teams organised around entirely co-present individuals. This reflects the way that travel has become accepted as playing a central role in addressing the shortcomings of ICT-mediated interactions (Haynes, 2010; Räsänen, Moberg, Picha, and Borggren, 2010). Similarly, the IHRM literature accepts the need for travel for skills transfer and problem-solving, management control of subsidiaries, and talent management in the form of the development of individuals through international experience (Tahvanainen, Welch, and Worm, 2005: 665).

The acceptance of a teleo-affective role for travel raises, however, a series of questions for those concerned with explaining current and identifying future ways of reducing demand for travel. In particular, work on IHRM has emphasised the inescapable demand for travel in MNCs but also the negative impacts on employees. As part of a shift away from emphasising the role of expatriates that relocate to overseas subsidiaries and towards an emphasis on 'flexpatriates'—'flexible, short-term travellers' (Mayerhofer *et al.*, 2004: 1375)—the literature has documented the 'perennial challenge' (Welch *et al.*, 2007: 173) associated with employees travelling as part of their work. As a result, a series of IHRM policies and practices have been recommended to offset the costs of travel. A body of work has developed around travel planning and management which seeks to ensure all travel is necessary and only completed when ICT enabled interactions will not suffice (Roby, 2010; Gustafson, 2012). The intention of such approaches is to influence decision-making processes in ways that favour ICT use (Lu and Peeta, 2009). However, the underlying presumption in the IHRM literature is that most travel cannot be avoided and thus managing the impacts on employees is the only option (see Mayerhofer *et al.*, 2004, Tahvanainen *et al.*, 2005, and Welch *et al.*, 2007 for investigations into physical, social and emotional impacts related to business travel).

As such, in the IHRM literature, as well as in work on virtual teams, a linear causal relationship is assumed to exist between the organisation of MNCs and the need for talent management that encourages whilst managing the effects of travel (Collings, 2014). Most fundamentally, travel is seen as an inevitable outcome of the spatial organisation of MNCs and the shortcomings of ICTs. This understanding of travel demand is now widely recognised. However, a sense of unavoidability results from this perspective. In turn, research focused on managing the negative effects of travel and not on how MNCs might change to radically reduce demand for travel is, we suggest, a limitation that results from a particular theoretical perspective on the role of travel and ICTs in MNCs. Both travel and ICT use are conceptualised as an output of decisions about the spatial organisation of MNCs. In this 'discrete entity' approach (Orlikowski & Scott, 2008: 438), travel and ICTs are understood as standalone tools deployed in MNCs in *response* to organisational needs. This presumes that any change in the role of travel and ICTs will emerge from focussing on these entities in isolation—that is identifying ways to better use ICTs and less use travel to meet organisational needs. Below,

and in Table 1, we argue that such a perspective is inherently limited and misses important considerations about how reduced demand for travel may result from the form and role of work, ICTs and travel changing *together* as part of the *reconstitution* of the organisation of MNCs.

The synthetic work mobility situation

Reconceptualising links between work, ICT and travel poses a number of challenges. As Aguiléra, Guillot and Rallet (2012) suggest, it requires shifting focus away from travel and what it enables (in the form of meetings etc.), and towards the underlying organisational reasons for the need for travel in the first place. Changes in ICT and the speeding up of travel are well documented as central to extending the global reach of MNCs (Dicken, 2011). For instance, 'time-space compression' (Harvey, 1999) reflects markets that are stretched across space but serviced through combinations of ICT and business travel (Faulconbridge, Beaverstock, Derudder, and Witlox, 2009; Haynes, 2010). Indeed, when discussing the need for IHRM to concern itself with travel, Mayrhofer *et al.* (2012: 304) highlight how 'better travel connections at lower cost and dramatically improved broadband data connection have reduce the 'effective distance' between many part of the world and enabled more flexible forms of coordination'. It is the way such 'flexible forms of coordination' are co-constituted through interdependencies with travel and ICT that needs further attention. We address this need by drawing on Knorr-Cetina's (2009) idea of the 'synthetic situation' to develop the concept of the *synthetic work mobility situation*.

The *synthetic work mobility situation* is an example of the way 'the social and the material are *constitutively entangled* in everyday life' (Orlikowski, 2007: 1437, original emphasis). In such a sociomaterial perspective, agency is ascribed to human and non-human actors; the 'synthetic situation' (Knorr-Cetina, 2009) that develops being a new arrangement that results from interactions between the different actors. This associational perspective (Latour, 1987) emphasises how forms, function and effect emerge in an ongoing manner as 'these entities relationally entail or enact each other in practice' (Orlikowski, 2007: 1438). This implies that we must understand how work, ICT or travel co-constitute one-another's form, function and effect in a particular synthetic situation. As such, ICT and travel are performative in that they contribute to enacting particular organisational situations, rather than just passively serving an already existing situation (Orlikowski & Scott, 2008). Three examples illustrate such sociomateriality, performativity and the synthetic situations that develop.

Using the example of foreign exchange traders who interact via their screens as well as in person, Knorr-Cetina (2009) considers the nature of face-to-face contact (through travel) in global 'microsociologies' and argues that it impossible to understand such 'microsociologies' without consideration of the simultaneous effects of 'arrangement[s] of hardware, software and human feeds' (Knorr-Cetina, 2009: 64). Her key argument is that we live in a 'synthetic situation' in which multiple human and technological elements 'are always in the process of being assembled' (Knorr-Cetina, 2009: 70). For foreign exchange traders, the act of trading is organised by how screen-based and in-person interactions together constitute a way of working that did not exist before the affordances of screens existed, that is trading takes on a completely different organisational form in the post-screen era, rather than screens simply replacing what used to be done in person. Similarly, Orlikowski (2007: 1441–1443) shows how the emergence in the early 2000s of the BlackBerry mobile phone with its email capabilities significantly reconfigured communication practices and ways of working in a private equity firm. As a result, asking about how the BlackBerry is used to communicate is the wrong question. This misses the fact that the acts of communication and work co-constitute one-another and were reassembled with the development of mobile phone technologies. In the private equity firm studied by Orlikowski (2007), the new 'synthetic situation' that emerged was defined by changes in places and times of working, expectations about responsiveness to client and manager requests, and ultimately the fundamental

Table1: Existing approaches to understanding the role of travel and ICTs in MNCs, their limitations and the new insights offered by a sociomaterial perspective

Existing literatures	Key insights/perspectives of existing literatures	Key silences/gaps of existing literatures	Key sociomaterial literatures	Key insights from sociomaterial perspectives	Implications of sociomaterial perspectives for research
Affordances of ICTs (Montoya-Weiss et al., 2001; Konradt and Hertel, 2002; Gallié and Guichard, 2005)	• What ICTs enable; • The kinds of travel that can be substituted. • The 'allegiances' between ICT and travel	• How do the affordances of ICT shape the organisational form of MNCs, in ways that impact on demand for travel? • How can ICT be conceptualised in ways others than substituting for face-to-face contact?	Dixon and Panteli (2010), Knorr-Cetina (2009), Orlikowski (2007), and Orlikowski and Scott (2008)	• ICTs and travel (re)shape work and the organisational form of MNCs, that is they are not just tools to serve existing organisational needs. • The role of ICTs and travel in an organisation vary depending on the synthetic situation produced by relationships with work.	• Conceptualisations of ways of reducing travel demand are limited by their focus on either substitution with technology or restriction of travel to what are constructed as 'essential' trips. • Relationships between work, ICT and travel need to be considered, in particular in terms of how they exert agency and shape the organisation of the MNC
Affordances of face-to-face contact (Jones, 2007; Millar and Salt, 2008; Lyons, 2013; Wheatley and Bickerton, 2016)	• When people need to meet in person. • The affective nature of embodied encounter. • The 'allegiances' between ICT and travel enabled face-to-face meetings	• How does the ability to travel (cheaply, as an expected part of work) shape the organisational form of MNCs? • Which strategies, structures and processes are constructed as a result of presumptions about the ability to travel?		• The social need for, purpose and frequency of travel is dependent on its relationships with ICTs and the way the two together coordinate the synthetic situation in an organisation.	• Focus on travel and ICT as the factors to manage is limiting—changes to work and the organisation of the MNC need to be explored, this requiring the agency of ICTs and travel in such changes to be conceptualised.

(Continues)

Existing literatures	Key insights / perspectives of existing literatures	Key silences / gaps of existing literatures	Key sociomaterial literatures	Key insights from sociomaterial perspectives	Implications of sociomaterial perspectives for research
Virtual teams in MNCs (Gibson and Cohen, 2003; Piccoli et al., 2004; Gilson et al., 2015)	• The role of travel and ICTs at different stages in the lifecycle of project teams and their activities. • The differences between face-to-face teams and teams working virtually at a distance. • The unavoidability of travel when working in a virtual team	• How current ways of organising teams in MNCs emerged and might be changed? • How spatially distributed subsidiaries, clients and suppliers might be worked with whilst reducing the need for the travel?		• Virtual teams and their operation are a constituent part of the synthetic situation in MNCs. Their existence, function and coordination depend on interdependencies between ICTs, travel, work and the organisation of the MNC	• Attempts to reduce demand for travel should not treat symptoms (already existing demand; problems caused by travel) but should seek to re-work the organisation of the MNC by reconfiguring the agency of and interdependencies between ICT, travel and work. • Interventions should be into firm strategy, organisation and their relationships to travel and ICTs
IHRM (Mayerhofer et al., 2004; Tahvanainen et al., 2005; Welch et al., 2007)	• The nature of and ways to offset the negative effects on workers of travel. • Ways to prevent all but 'essential' travel through travel management	• How can IHRM not just treat symptoms (e.g. stress due to travel) but address causes (invoke strategies that reduce the need for travel in the first place)? • How can the unavoidability of travel be challenged?			

characteristics of the practice of work at the firm. Finally, Dixon and Panteli (2010: 1178) argue that when studying the operation of virtual teams, the concept of 'virtuality' advances understanding of the effects that 'technology-mediated interactions have by not simply substituting for, but complementing face-to-face interactions'. Dixon and Panteli (2010) suggest that 'virtuality' involves hybrid situations in which socio-technical discontinuities are resolved through combinations of ICT and travel enabled interactions. As a result, the role of digital and face-to-face interactions in virtual teams cannot be separated; rather, the two are together generative of the synthetic situation of 'virtuality' that is fundamental to work in such teams.

These examples highlight, then, that a sociomaterial perspective provides a valuable way of taking account of how interdependent elements (in our case work, ICT and travel) are fused to produce synthetic organisational situations in which the effects of the constituent elements cannot be disentangled. The demand for travel in MNCs is, then, from a sociomaterial perspective inscribed into the organisational form of the MNC and thus not substitutable or discretionary. Travel nor ICT nor work should not be thought about on their own as ontologically independent elements. Instead, focus shifts to understanding when and how these elements fuse into a *synthetic work mobility situation* which constitutes the organisation of an MNC. In turn, for travel to be reduced the synthetic situation must change, implying the interdependencies between work, ICT and travel must also change so as to produce a different organisational form. Indeed, we deliberately use the term *mobility situation* following the social science literature (Urry, 2003; Elliott and Urry, 2010) to highlight the way people and ideas move not only through embodied travel but also simultaneously through digital connections that allow virtual presence and experience. This perspective aligns with our view that relationships between work, ICT and travel need examining to reveal crucial interdependencies that are constitutive of current and potential future MNC organisational forms. We apply such a perspective below to analyse an original empirical case study of travel, ICT and work interdependencies in a MNC.

Case study and methods

In adopting a sociomaterial perspective, we analyse an original empirical case study of the *synthetic work mobility situation* in engineering and design consultancy MNCs. Our analysis is based on insights from two case study multinational engineering and design consulting business service firms headquartered in the UK. Similar to the legal, finance and IT sectors, the engineering and design consulting business services sector provides professional and expert advice to clients relating to their project needs. The core business of this sector is to apply specialist technical knowledge such as engineering, architecture and planning to the design and construction of a range of projects, including but not limited to waste, transport and energy. We chose engineering and design consulting firms as our case studies because previous research has documented that such firms have some of the highest rates of business travel. In particular, engineering and design consulting business service firms have an additional spatial constraint which is related to ways of working using ICT and travel demand compared to other business services. As well as the location of the offices of the firm and their clients, the location of a specific project (e.g. a new building) also matters. The project is often not located at the same site as the client's staff, creating an extra consideration in terms of ICT use and travel demand. The engineering and design consulting business services sector is also one in which rapid developments in ICT have been important—not least computer-aided design (CAD). Together, these factors mean that relationships between work, ICT and travel are especially significant in this sector.

The case study firms were drawn from a list of candidates identified as being in the top 10 civil engineering and design consulting firms over the 2010–2014 period, as defined in the Guardian's annual UK 300 survey (Guardian, 2016). We focussed on top 10 to gain insights into MNCs that had a scale which necessitated effective management of interactions between work, ICT and travel. Indeed, the case study firms have a

strong UK presence, but have developed a significant global reach over the past several decades. This evolutionary development of global reach makes them interesting case studies to understand the role of interactions between work, ICT and travel. As Table 2 reveals, the number of offices, countries and employees in the case study firms creates a significant need to consider how travel is managed as part of global operations. We also chose our two case study firms because both had sustainability priorities which emphasised the need for a reduction in business travel. This makes the two firms exemplary cases of the challenge of managing travel demand and its environmental and social effects.

Data were collected using a series of 20 interviews (see Table 2) designed to reveal both the current relationships in the firm between work, ICT and travel and how these relationships had changed in recent years. Initial introduction into each firm was facilitated by pre-existing professional contacts, after which subsequent participants were identified by snowballing (i.e. feedback from interview participants) (Bryman, 2008) in combination with criteria-specific identification (i.e. from review of corporate documents). This approach ensured employees interviewed worked across a range of projects (e.g.: rail, energy, transport), as well as ranged in seniority (e.g.: consultants, senior consultants, team leaders, directors). Interviewees also have a range of years of professional experience (i.e.: minimum was 3 years and maximum was 33 years) and tenure with their respective firm (i.e.: minimum was less than 3 years and maximum was greater than 20 years). Given the need to understand change over time in the case study firms, we did not interview very early career staff as they would not have been able to comment on change.

Based on a semi-structured interview protocol, one-to-one interviews, generally lasting one hour, were conducted. Interviewing employees with a range of professional experience, knowledge and responsibilities helped to gain insights into change—revealing that reorganisations in the early 2010s were of particular significance. Rather than ask about the ways in which ICT substitutes for travel and/or why workers travel, the interview protocol specifically focussed on ways of working in the firms, how these had changed, and how this is related to developments in the use of ICT and travel. As such, interviews enquired into past firm restructurings to help participant's recall and discuss how work used to be organised, compared to the current situation, and what enabled and resulted from change.

Interviews were transcribed and then coded and analysed through QSR NVivo software. Themes central to the narrative unfolding from the interviews reflected aspects of change/stability, client management, corporate management and reconfigurations, spatial and temporal aspects important to procuring and conducting work, and technology. Through the process of iterative research team discussions and analysis conducted individually and validated by different research team members, features related to work, travel and ICT, were found to both constitute and suppress demand for travel. As such, it became increasingly clear that demand for travel had evolved with developments in, and growing interdependencies between, work, travel and ICT. The analysis below reports the key themes from the data relating to the causes and effects of those interdependencies.

The synthetic work mobility situation in engineering and design consulting firms

Central to understanding the *synthetic work mobility situation* in engineering and design consultancy MNCs is a set of shifts over time in how our case study firms go about the fundamentals of their business: procuring then delivering projects. The shift post-2009 is associated with the emergence of a new *synthetic work mobility situation* that defines the organisational reality of the firms we studied, with implications for travel demand and its effects.

One of the most notable features was the changing role of ICTs. In our two case study firms ICTs, ranging from email to corporate intranets, screen sharing technologies and videoconferencing have become increasingly embedded in to day-to-day

activities. In addition, and specific to the sector, advances in computer-aided design (CAD) and the way this facilitates data sharing and collaboration across time and space have been significant. The importance of ICT is perhaps best observed in the very strong narrative that emerged from interviews concerning Skype for Business. The capability to instantly connect to a conference call at one's desk and, significantly for engineering and design firms, share screens and files, has come to define day-to-day work practice:

> It's a step change between needing a meeting or not…. Let's say you are trying to talk someone through a spreadsheet that they sent you…. You ring them up and you say, 'Okay, let's go to tab five, cell 69, let's look at the formula…' And then you can get there eventually and you can see it and you can agree it and you can spend a lot of time talking to them on the phone about all these different formulas and sharing screens actually is very useful, sharing your screen…. That probably takes at least half way towards a face to face meeting.

(Interview 7)

Our case study firms invested significant time and effort in embedding such ICTs in everyday practice. One interviewee described how all employees 'get regular emails, we have an intranet website, and the front cover of it today is Skype, we are improving Skype, here are some extra services that will make it easier for you to communicate. So they push it quite well' (Interview 8). At the same time, however, our case study firms also experienced since 2010 the growing institutionalisation of expectations of travel. One interviewee noted how simultaneously with the rise of ICT use there was '*a marked increase in travel…it's also almost like sucked people there as well, you know, to want to travel there and have meetings and conversations and stuff' (Interview 15)*. Another interviewee described how:

> it is made explicit to everyone that you might be required to travel to India to work, because we have got a big organisation, bigger office there, they provide support, so it has been made quite clear that not only you might have to travel around the UK, which people don't usually have an issue with, but you would probably have to travel to India as well.

(Interview 8)

The importance of travel was reflected in employment contracts in our case study firms which had been amended to state that travel is expected. Moreover, the culture of the firms increasingly promoted and rewarded travel. As senior interviewees noted about changes since 2010, '*It's on our, sort of, KPIs at senior management level, so visibility, being mobile, agility, geographical agility is in very much the KPIs of the senior management team, and that's cascaded down to staff of all levels, to be fair' (Interview 2)*. Another interviewee noted that:

Table 2: Case study firms

	Firm A	Firm B
HQ Location	London, England	London, England
Countries located	31	28
Offices	91	173
Employees	11,000	17,000
Number of interviews completed	9	11
Gender of interviewees	Male: 8	Male: 8
	Female: 1	Female: 3
Age of interviewees	30–40: 1	30–40: 1
	40–50: 4	40–50: 8
	50+: 4	50+: 2

> I think there is a more of a need for global mobility, yeah. We need staff, professional experienced staff, as well as graduates, to have that flexibility…. And, you know, we're trying to emphasise that to be mobile is quite a good career development opportunity…. You're experiencing different cultures, different businesses, different projects, it's a good sort of stepping stone for your career.

> (Interview 16)

As such, since 2010 in our case study firms there has been an extended role for both ICT and travel use as part of the completion of work projects. The perspective that dominates in existing literatures (see Table 1) would interpret this as a result of changes in the way the firms in question are structured and organised. Interviews in our case study firms revealed, however, a subtly different set of causations.

The development of a synthetic work mobility situation

Notable about the way interviewees discussed the changing role of ICT and travel was the emphasis they placed on interdependencies. One interviewee captured this well in relation to the use of Skype for Business:

> Skype's brilliant, we rely on it all the time, it's a great tool. But even though technology has increased I think generally, in totality the level of communication on projects has increased in its, sort of, totality, you know….. So even though the use of Skype and everything has increased, the level of face to face meetings is still as significant as it was six, seven, eight years ago because you're still going to get the clients and the project team that need that face to face support as well. So I suppose the total level of communication and interaction has gone up, but the face to face to has also, because the use of Skype's gone up and probably face to face has gone up as well, or least stayed the same over the last five, six, seven years.

> (Interview 2)

As this quotation illustrates, ICT enables practices that would have been previously unimaginable. The quotation above describes how this resulted in more communication using a range of modes, including ICTs *and* travel which are not interchangeable or substitutable but interdependent.

Importantly, though, our research revealed it was not just changes in the use of ICT and travel in isolation that mattered in our case study companies. The organisational structure of the companies and work practices was simultaneously changing. For example, procurement strategies shifted from an overtly geographical focus to a focus on sectors, targeting specific markets like energy:

> I'm charged with power and renewables globally, so the travel, for me, does include getting on a plane to the US, occasionally getting on a plane to the Far East; and then getting on a plane to the UK, the majority of the time, because that's where currently most of the business, and most of the people, are, apart from the Middle East.

> (Interview 11)

The focus on sectors, whilst apparently unremarkable, is an important switch for companies that had previously organised work geographically—around offices or regions within a country. Specifically, the switch involved a second structural change whereby office/regional centric means of organising work and managing people transitioned to national and international structures focussed on skill-based practice groups. These groups are formed irrespective of staff location:

> …so their geographical location made no influence on how we selected individuals. The project will be based in Bristol, so perhaps bar one, the project manager, we thought they were best to be based in Bristol. I think everyone else was based on the merit and the capabilities of the individual, not their location.

> (Interview 8)

Underpinning new procurement and skill-based practice groups and associated organisational restructuring were accounting mechanisms. For example, single office accounting moved to discipline and business areas:

> And of course the profit and loss account is structured, well, they used to be structured by office, they're not any more, they're structure by discipline. So that actually makes it very good for, if you like, offices drawing upon different offices for the right skills, rather than just a P&L [profit and loss] as it used to be focused on a single office basis.

(Interview 2)

At one level, the changes described above can be interpreted as firm responses to global business trends in a knowledge-based economy in which claims of expertise are fundamental to competitive advantage (Jones, 2007; Millar and Salt, 2008). Our case study firms moved to a system in which there is a high degree of interdependency between offices with each office highly embedded in global structures, rather than being more autonomous operating units as was previously the case. We might, then, see this as a simple story of structural change in the MNC towards greater global integration and in turn more demand for travel and ICT use—an interpretation in line with existing literatures (see Table 1). However, we contend that the changes in the case study companies can only be explained by considering how the affordances of ICT and travel both caused these changes and are necessary to deliver the new working practices put in place.

The reorganisation of work happened in conjunction with the development of various technologies, such as CAD and Skype for Business, alongside the rise of more affordable air travel and the normalisation of travel. These developments led to a reimagining of work and its organisation. Specifically, as ICTs like CAD and Skype for Business began to be used, and travel became more expected and commonplace, they became performative in that they enacted new ways of imagining the optimal organisation of the firm. As these new imaginations started to be emerged, firm strategy and structure responded. Illustrative of such developments is the approach to staffing projects in our case study companies. Post-2009, the firms began to staff projects by drawing on individuals across their global office network, whereas previously staffing would have been drawn from one office or offices in a single country. The effects of this change on staffing are captured in the following quotation:

> So South Africa at the minute's quite quiet, so we [in England] can pull people in from other bits, and that again is quite easy to do, I'm talking about getting somebody from South Africa involved in a project in Scarborough [in England], because she's got the right skills and South Africa's quite quiet, and that's relatively easy as long as she wants to do that.

(Interview 3)

The outcome of these changes were described as 'long corridor' working; *rather than walking down your corridor to your CAD technician down the road, down the corner of the office, you've got this big long corridor which takes you all the way to India. So we call it the long corridor to India'* (Interview 15). As such, the use of ICTs became performative and helped create new work practices in our case study companies. The realisation that work could be shared globally via CAD and communications using Skype for Business led senior managers to act in new ways when developing firm strategy. Like the examples of foreign exchange traders (Knorr-Cetina, 2009) and private equity analysts (Orlikowski, 2007), workers in our firms experienced new 'synthetic situations' as interdependencies between their work, ICT and travel produced a different everyday reality of procuring and delivering engineering and design consulting services. The new *synthetic work mobility situation* involved reorganised ways of working and more interdependencies between spatially distributed employees, the creation of these interdependencies being premised on the assumption that travel and the benefits of face-to-face contact is possible when needed.

Table 3 summarises the interdependencies between work, ICT and travel in the *synthetic work mobility situation* and the different forms of coordination need associated with each of the three interdependent elements. This interdependency and the coordination needs outlined in Table 3 have implications for how we think about the current and future role of ICT and the management of travel demand. We consider these implications below.**Managing the *synthetic work mobility situation***

All of our case study companies were aware of and sought to manage the impacts of their *synthetic work mobility situation* in terms of demand for travel. Compulsory reporting of carbon emissions from travel in annual corporate social responsibility reports was one driver as firms sought to report emissions reductions, but equally important was the impact on employees. As one interviewee observed in terms of the negative effects of travel demands:

> it's [demands for travel] not a nice… it's the dark underbelly I think of the fact we are just a resource….So I would make a good argument around I've got a key client here, I've got this project and that project, sorry, I can't help you. I think people generally got the idea that because I'm a family man I wouldn't go after Abu Dhabi.

> (Interview 7)

The response of our case study companies was to develop two travel management strategies. The first strategy aligns with the technology substitution literature (Montoya-Weiss *et al.*, 2001; Konradt and Hertel, 2002). Deliberate efforts were made to steer the way ICT was used to mitigate demands for travel. For example, promoting virtual ways of working by actively questioning the need to schedule a physical meeting or advertising to staff the merits of ICT:

> [I]t can't be a dictate that comes down, there are 200-odd people in here, so the team leaders have got a very important role to play, who should be daily saying do you really need to go to that meeting? Do you really need to do that? Is there a better way? Have you picked up the phone? Some of the new people are not good at using the phone.

> (Interview 19)

This strategy represents, then, a deliberate attempt to manage the coordination needs (Table 3) associated with the current *synthetic work mobility situation* and the demand for travel created. This strategy aligns with the IHRM focus on minimising the work–life balance, stress and other impacts on employees of travel (Mayerhofer *et al.*, 2004; Tahvanainen *et al.*, 2005; Welch *et al.*, 2007). However, in our case study firms it was the financial cost of travel that primarily drove the questioning of the need for travel. As one interviewee noted:

> we will just give them a list of names of people involved in the project, how much we charge out for them per hour, and say if you want us to come for a meeting in London, that is half a day say, so here are these people and there is the cost basically.

> (Interview 8)

The questioning of the need for travel led to the formation of new allegiances (Haynes, 2010) between ICT and travel as compromises were made between face-to-face and virtual meeting. For example, one interviewee described how:

> we've just put a bid in now where we're using somebody from [office location] as like an expert in that area, but he doesn't come to meetings, he dials in as an expert because it was a small, I mean this is the issue really. If it's a small commission we could blow the budget just him coming to like four meetings.

> (Interview 3)

This approach deals with the negative externalities of the current *synthetic work mobility situation.* It tries to mitigate the effects of travel demand created by the situation. All of our case study companies reported some successes in terms of greater uptake of

Table3: Key forms of coordination need in the case study companies and the way these relate to the synthetic work mobility situation

Coordination need	Generated by interdependencies between…		
	Work	ICT	Travel
Project working	'Long corridors' (utilising skills, capacity and cost benefits through global staffing rather that staffing from single office)	• *CAD* and *Skype for Business* as enabling changes and being incorporated/adapted in ways interdependent with 'long corridor' ways of working. • Preventing some meetings needing face-to-face encounters, but creating new spatially stretched interdependencies that ICTs alone cannot sustain	• New allegiances as ICT replaces some meetings. But travel institutionalised to ensure moments of risk and complexity in a project can be handled. • 'Long corridor' changes premised on this affordability and cultural normalisation of travel
Staff management	Skill-based practice groups (organising and management of people in global groups rather by office location)	• 'Working remotely but working together—groups premised on being able to do a lot of day-to-day management using ICT, with systems (*Corporate Intranets*; project management such as *Slack*; *Cicso Jabber* for voice communication) and cultures embedded into firm to allow this	• Institutionalised and tied to moments of trust and complexity (e.g. appraisal); • Greater use of 'long corridors' creates more moments when travel needed
Client relationships	Sectoral expertise led procurement (not local office led)	• The potential to handle elements of the relationship virtually through *Skype for Business* (e.g. certain people not needing to attend meetings). But this encourages more spatially stretched relationships • Client extranets (e.g. *Clinckd*) allowing access to up-to-date reports and progress status, this generating a sense that client at a distance is a manageable way of working	• Institutionalised to meet expectations of face-to-face encounter at key moments. • Tendency for key project staff to be located globally and at a distance from client means more need for travel

ICT enabled interactions. However, they also reported, as the discussion in the previous section around Skye for Business highlighted, a tendency for a lot of travel to remain, and ICT enabled interactions to support an overall increase in the level of communication and an unavoidable level of travel. For example, when a senior director was pushed to explain to what extent they advance virtual communication with clients, they immediately replied:

> There are certain clients I would never even dream of suggesting some of the things I have spoken about… There is a certain amount of reverence there, and they are extremely busy people who find it easier to have face to face meetings.

(Interview 19)

As a result, our case study companies recognised the limits of strategies designed to promote ICT use in place of travel. They had begun to recognise that changes to 'long corridor' working described in the previous section inscribed demand for travel into everyday work practices. The companies had, then, begun to recognise that the *synthetic work mobility situation* was dependent on travel in ways that prevented significant reductions in demand being achieved. As a result, the companies had begun to target the work element alongside ICT and travel. Most fundamentally, and tentatively reversing some of the changes towards 'long corridor' working described in the previous section, the second strategy involved reconfiguring the way work was completed in and between offices. In our case study firms, we observed deliberate efforts to locate those most likely to be required to travel—project managers in particular because of their need to meet the client—in proximity to those that demand face-to-face contact—for example the client. This most commonly took the form of ensuring that the designated project management office was the one closest to the client (rather than using the 'long corridor' approach), or selecting a project manager who lived in vicinity to the client. As one interviewee noted, '*being geographically located close to clients despite all the [digital] social networks and so on that's come in, it's better*' (Interview 20). Another noted that:

> We do tend to pick, so I suppose the lead would tend to be that office that's closest to the client, and then that lead office would then decide do we need any other additional resources from other offices.

(Interview 2)

In this second strategy, attempts were made to mitigate the coordination effects of skill-based teams and 'long corridors' (see Table 3) by intervening to limit the spatial disconnect between key actors. As such, one of the key sources of demand for travel is tackled by changing ways of working to disentangle them from travel. This is particularly important because it signals the beginning of the development of a new *synthetic work mobility situation*. The second strategy offers insights, then, into how demand for travel might be most effectively managed not through responses that try to mitigate negative effects of already existing demand but through the reworking of the interdependencies between work, ICT and travel.

Sociomaterial approaches encourage us to think about managing the demand for and effects of travel in MNCs through the generation of entirely different 'synthetic situations', as the Blackberry mobile phone did for the private equity professionals that Orlikowski (2007) studied. In addition to the approaches documented above, this suggests a need to think about the potential for ongoing changes in the *synthetic work mobility situation* as new technologies emerge. New interdependencies might develop that change how project work is organised, ICT used and travel deployed. Indeed, evidence of the potential for future intervention can be found in other domains. Outside of the corporate world, the way Facebook has reconfigured socialising for the young, not replacing getting together in a substitution fashion but producing new configurations of sociality, in conjunction with mobile phones, other technologies (Twitter, SnapChat etc) and a new role for the car (Cohen, 2012). This example is indicative of

the continuous evolution of interdependencies between travel, ICTs and social activities such as work. In MNCs, the growing popularity of project forums such as Microsoft Teams, Slack and Trello is perhaps the closest comparisons. In the future, as such forums begin to allow new forms of coordination, the *synthetic work mobility situation* will evolve, with currently unfamiliar technologies also emerging to further change work, ICT and travel interdependencies. As part of this, it may be possible to think about the sorts of KPIs which are set for mangers, so that they reward good networking within teams without encouraging travel and career profiles which demand high levels of travel. This is all necessarily speculative, but the approach to managing travel demand opened-up by the *synthetic work mobility situation* perspective has the potential to overcome the limitations faced when assuming travel demand is an unavoidable output of ways of organising MNCs or should be managed as a substitutable component of current working practices.

Conclusion

This paper was motivated by two questions. First, *how do the sociomaterial relations between work, ICT and travel constitute the organisational form of MNCs?* The findings of this paper suggest that a *synthetic work mobility situation* exists that is a result of the way the affordances of ICT and travel together help generate ways of working and organisational forms that have spatially stretched, international characteristics. This *synthetic work mobility situation,* and the organisational form associated with it, has ICT and travel ingrained, as coordination devices, into the sociomaterial fabric of the MNC (Table 3). The way in our case study firms that technologies such as CAD and Skye for Business, alongside a culture of travel and supporting reward structures, helped drive the reconfiguration of work towards spatially stretched teams and processes illustrates this idea well. ICTs were not found to substitute for previous practices. Instead, they cooperated with expectations of and easy access to travel to co-constitute a set of new work practices and organisational structures.

The paper, secondly, asked *how might changes in sociomaterial relations allow new forms of organising that reduce demand for travel?* In our case study firms, some benefits were gained through strategies that sought to ensure travel only occurred when absolutely essential, this in part made possible by a general dislike of high levels of travel for work. However, significant change was elusive because of the role of travel alongside ICTs in the sociomaterial constitution of the *synthetic work mobility situation*. This implies that a significant reduction in demand for travel requires approaches that conceptualise travel's agency in different ways compared to most existing literatures (Table 1). Rather than seeing travel as a tool, alongside ICTs, that serves already existing modes of working and organising, a perspective is needed that recognises travel's performative agency in the constitution of current and therefore also future ways of working and organising. Specifically, the sociomaterial perspective brings into view the need for a different *synthetic work mobility situation* if travel demand is to be radically reduced, given that it is not possible to radically reduce travel and maintain current ways of working and organising. Hence the elusiveness of demand reduction, despite overt efforts by firms. The implications of this proposition for existing literatures concerned with work, ICT and travel are significant.

Approaches such as business travel demand management (Roby, 2010; Gustafson, 2012), and IHRM more broadly (Mayerhofer, Hartmann, Michelitsch-Riedl, and Kollinger, 2004; Tahvanainen *et al.*, 2005; Welch *et al.*, 2007; Mayerhofer, Schmidt, Hartmann, and Bendl, 2011), are shown to be always limited in their potential because they are seeking to disentangle an element—travel—that is constitutive of the *synthetic work mobility situation*. An analogy would be an attempt to extract the eggs from a cake after it has been baked. The task is impossible because the eggs and the flour have co-constituted the 'situation' that is the cake. A sociomaterial perspective also highlights that the limited insights into further and radical reductions in travel demand offered by studies of ICT substitution (Montoya-Weiss *et al.*, 2001; Konradt and Hertel,

2002) and virtual teams (Maznevski and Chudoba, 2000; Montoya-Weiss *et al.*, 2001; Konradt and Hertel, 2002; Gibson and Cohen, 2003; Piccoli *et al.*, 2004) can only be addressed through greater consideration of the interdependent roles of travel and ICT. This involves *replacing questions of substitution with questions of reconstitution* so as to take seriously the agency of ICTs in (re)shaping ways of working and organisational forms. Literature also needs to move beyond the current tendency to consider what travel enables that ICTs cannot (Millar and Salt, 2008; Wickham and Vecchi, 2009; Lyons, 2013; Strengers, 2015; Wheatley and Bickerton, 2016; Storme *et al.*, 2017) to consider how the role of travel can be reconstituted through new relationships between ICT, travel, work and organising.

Fundamentally, an approach that *replaces questions of substitution with questions of reconstitution* takes seriously the way that 'synthetic situations' (Knorr-Cetina, 2009) arise, that is the way that new everyday practices develop as new combinations of work, ICT and travel shape one-another. In moving beyond the 'discrete entity' approach (Orlikowski & Scott, 2008), a focus on reconstitution and the production of a new *synthetic work mobility situation* recognise the performativity of ICT and travel as the two co-constitute forms of work and organising. This recognition should drive research to examine how different forms of agency might be generative of different *synthetic work mobility situations*. New forms of ICT, new understandings about the possibility, desirability and acceptability of travel, whether driven by concerns about the environment, cost or employee well-being, and in turn new firm strategies and processes can together generate new *synthetic work mobility situations* that have different levels of demand for travel, but only if recognition of the interdependencies between the elements exists and a holistic perspective is adopted.

The sociomaterial theorisation developed here reveals, therefore, a need for the boundaries between the disciplinary perspectives of various existing literatures (see Table 1) to be dissolved. The role of technology, travel, ways of working in virtual teams and management of people via IHRM need to be considered together and not as 'discrete entities'. This would mean, for example, that researchers interested in the role of travel in virtual teams and IHRM should take account of the strategic decisions made in companies about the way work is to be structured, measured and rewarded, and how strategy informs organisational form. Such considerations, and in turn the potential for interventions into such matters, would create the opportunity to explore what is involved in steering the emergence of *synthetic work mobility situations* that reduce demand for travel. This would replace, as is commonly the case, attempts to manage travel demand as a discrete entity, after synthetic situations have emerged that inscribe travel into the sociomaterial fabric of the MNC.

A more holistic approach informed by a sociomaterial perspective is in line with the move towards strategic IHRM (Becker and Huselid, 2006; Collings, 2014), in which human resource managers shape high-level corporate decision-making rather than just addressing the human resource issues that arise from decisions made. Similarly, the work on virtual teams highlights 'virtuality' (Dixon and Panteli, 2010) and the need to organise teams in ways that minimise the discontinuities that have to be managed through travel and face-to-face meetings. In our case study firms, the shift to locate project managers in proximity to clients illustrates a small example of such thinking.

The insights developed here suggest, therefore, that future questions for research should focus on sociomaterial interdependencies that are generative of ways of working and organising in MNCs. The focus on the *synthetic work mobility situation* developed in this paper raises questions about how changes in coordination needs (Table 3) might arise and, for example, how the ongoing enhancement and intensification of ICT in the workplace through new platforms, such as artificial intelligence, might intersect with an ever greater focus on the need to reduce demand for travel. How can ICT provide new means of coordination in the future? How will this intersect with an ever greater focus on the carbon and well-being effects of travel? What will such interdependencies mean for ways of working and organisational forms in MNCs in the future? The coordination affordances of new technologies can and will produce new *synthetic situations of work mobility* but must also be steered to ensure they do not

generate new demands for travel, as proved the case with the rise of Skype and related videoconferencing. A sociomaterial perspective underscores the need to reimagine co-ordination, facilitated by ICTs, in ways that does not seek to substitute travel, nor creates new coordination needs that must be served by travel. This means recognising the need to understand the inextricably entangled relationships between work, ICT, travel and the organisation of MNCs.

Acknowledgments

References

Aguiléra, A. (2008), 'Business Travel and Mobile Workers', *Transportation Research Part A: Policy and Practice* **42**, 8, 1109–1116. https://doi.org/10.1016/j.tra.2008.03.005

Aguiléra, A., C. Guillot and A. Rallet (2012), 'Mobile ICTs and Physical Mobility: Review and Research Agenda', *Transportation Research Part A: Policy and Practice* **46**, 4, 664–672. https://doi.org/10.1016/j.tra.2012.01.005

Becker, B.E. and M.A. Huselid (2006), 'Strategic Human Resources Management: Where Do We Go From Here?', *Journal of Management* **32**, 6, 898–925. https://doi.org/10.1177/0149206306293668

Bryman, A. (2008), *Social Research Methods* (New York, NY: Oxford University Press).

Budd, L., S. Griggs, D. Howarth and S. Ison (2011), 'A Fiasco of Volcanic Proportions? Eyjafjallajökull and the Closure of European Airspace', *Mobilities* **6**, 31–40.

Clover, J. (2019), *Apple Buys 50 Business Class Seats From San Francisco to Shanghai Every Day*, https://www.macrumors.com/2019/01/11/apple-united-airline-purchases-sfo/ (accessed 02 May 2019).

Collings, D.G. (2014), 'Integrating Global Mobility and Global Talent Management: Exploring the Challenges and Strategic Opportunities', *Journal of World Business* **49**, 253–261.

Dicken, P. (2011), *Global Shift: Mapping the Changing Contours of the World Economy* (New York, NY: Guilford Press).

Dixon, K.R. and N. Panteli (2010), 'From Virtual Teams to Virtuality in Teams', *Human Relations* **63**, 1177–1197.

Elliott, A. and J. Urry (2010), *Mobile Lives* (Oxon: Routledge).

Faulconbridge, J.R. (2006), 'Stretching Tacit Knowledge Beyond a Local Fix? Global Spaces of Learning in Advertising Professional Service Firms', *Journal of Economic Geography* **6**, 4, 517–540. https://doi.org/10.1093/jeg/lbi023

Faulconbridge, J.R., J.V. Beaverstock, B. Derudder and F. Witlox (2009), 'Corporate Ecologies of Business Travel in Professional Service Firms: Working Towards a Research Agenda', *European Urban and Regional Studies* **16**, 3, 295–308.

Felstead, A. (2012), 'Rapid Change or Slow Evolution? Changing Places of Work and Their Consequences in the UK', *Journal of Transport Geography* **21**, 31–38. https://doi.org/10.1016/j.jtrangeo.2011.10.002

Gallié, E.-P. and R. Guichard (2005), 'Do Collaboratories Mean the End of Face-to-Face Interactions? An Evidence from the ISEE Project', *Economics of Innovation and New Technology* **14**, 6, 517–532. https://doi.org/10.1080/1043859042000304052

Gibson, C.B. and S.G. Cohen (2003), *Virtual Teams that Work: Creating Conditions for Virtual Team Effectiveness* (San Francisco, CA: Jossey Bass).

Gilson, L.L., M.T. Maynard, N.C. Jones Young, M. Vartiainen and M. Hakonen (2015), 'Virtual Teams Research: 10 Years, 10 Themes, and 10 Opportunities', *Journal of Management* **41**, 1313–1337.

Guardian. (2016), *Guardian's annual*, UK 300.

Gustafson, P. (2006), 'Work-Related Travel, Gender and Family Obligations', *Work, Employment and Society* **20**, 513–530.

Gustafson, P. (2012), 'Managing Business Travel: Developments and Dilemmas in Corporate Travel Management', *Tourism Management* **33**, 276–284.

Harvey, D. (1999), *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change*

(Cambridge: Blackwell).

Haynes, P. (2010), 'Information and Communication Technology and International Business Travel: Mobility Allies?', *Mobilities* **5**, 4, 547–564.

Hertel, G., S. Geister and U. Konradt (2005), 'Managing Virtual Teams: A Review of Current Empirical Research', *Human Resource Management Review* **15**, 69–95.

Hislop, D. and C. Axtell (2009), 'To Infinity and Beyond?: Workspace and the Multi-location Worker', *New Technology, Work and Employment* **24**, 1, 60–75. https://doi.org/10.1111/j.1468-005X.2008.00218.x

Jones, A. (2007), 'More than 'Managing Across Borders?' The Complex Role of Face-to-face Interaction in Globalizing Law Firms', *Journal of Economic Geography* **7**, 3, 223–246. https://doi.org/10.1093/jeg/lbm003

Jones, I., J.R. Faulconbridge, G. Marsden and J. Anable (2018), 'Demanding Business Travel: The Evolution of the Timespaces of Business Practice', in A. Hui, R. Day, and G. Walker (eds), *Demanding Energy. Space, Time and Change* (Switzerland: Palgrave Macmillan), pp. 257–278.

Knorr-Cetina, K. (2009), 'The Synthetic Situation: Interactionism for a Global World', *Symbolic Interaction* **32**, 1, 61–87. https://doi.org/10.1525/si.2009.32.1.61

Konradt, U. and G. Hertel (2002), *Management virtueller Teams. Von der Telearbeit zum virtuellen Unternehmen [Managing virtual teams]/* (Weinheim: Beltz Verlag).

Ladkin, A., C. Willis, J. Jain, W. Clayton and M. Marouda (2016), 'Business Travellers' Connections to Home: ICTs Supporting Work-life Balance', *New Technology, Work and Employment* **31**, 3, 255–270. https://doi.org/10.1111/ntwe.12071

Latour, B. (1987), *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge: Harvard University Press).

Lu, J.-L. and S. Peeta (2009), 'Analysis of the Factors that Influence the Relationship Between Business Air Travel and Videoconferencing', *Transportation Research Part A: Policy and Practice* **43**, 709–721.

Lyons, G. (2013), 'Business Travel — The Social Practices Surrounding Meetings', *Research in Transportation Business & Management* **9**, 50–57. https://doi.org/10.1016/j.rtbm.2013.03.001

Mayerhofer, H., L.C. Hartmann, G. Michelitsch-Riedl and I. Kollinger (2004), 'Flexpatriate Assignments: A Neglected Issue in Global Staffing', *The International Journal of Human Resource Management* **15**, 1371–1389.

Mayerhofer, H., A. Schmidt, L. Hartmann and R. Bendl (2011), 'Recognising Diversity in Managing Work Life Issues of Flexpatriates', *Equality, Diversity and Inclusion: An International Journal* **30**, 589–609.

Mayrhofer, W., A. Reichel and P. Sparrow (2012), 'Alternative Forms of International Working', in G. Stahl, I. Björkman, and S. Morris (eds), *Handbook of Research in International Human Resource Management* (London: Edward Elgar), pp. 300–327.

Maznevski, M.L. and K.M. Chudoba (2000), 'Bridging Space Over Time: Global Virtual Team Dynamics and Effectiveness', *Organization Science* **11**, 473–492.

Millar, J. and J. Salt (2008), 'Portfolios of Mobility: The Movement of Expertise in Transnational Corporations in Two Sectors — Aerospace and Extractive Industries', *Global Networks* **8**, 1, 25–50. https://doi.org/10.1111/j.1471-0374.2008.00184.x

Montoya-Weiss, M.M., A.P. Massey and M. Song (2001), 'Getting it Together: Temporal Coordination and Conflict Management in Global Virtual Teams', *Academy of Management Journal* **44**, 1251–1262.

Orlikowski, W.J. (2007), 'Sociomaterial Practices: Exploring Technology at Work', *Organization Studies* **28**, 9, 1435–1448. https://doi.org/10.1177/0170840607081138

Orlikowski, W. J. and S. V. Scott (2008), '10 Sociomateriality: Challenging the Separation of Technology', *Work and Organization, The Academy of Management Annals* **2**(1), 433–474. https://doi.org/10.1080/19416520802211644

Piccoli, G., A. Powell and B. Ives (2004), 'Virtual Teams: Team Control Structure, Work Processes, and Team Effectiveness', *Information Technology & People* **17**, 359–379.

Poom, A., K. Orru and R. Ahas (2017), 'The Carbon Footprint of Business Travel in the Knowledge-intensive Service Sector', *Transportation Research Part D: Transport and Environment* **50**, 292–304. https://doi.org/10.1016/j.trd.2016.11.014

Räsänen, M., Å. Moberg, M. Picha and C. Borggren (2010), 'Meeting at a Distance: Experiences of Media Companies in Sweden', *Technology in Society* **32**, 4, 264–273. https://doi.org/10.1016/j.techsoc.2010.10.002

Roby, H. (2010), 'Workplace Travel Plans: Past, Present and Future', *Journal of Transport Geography* **18**, 23–30.

Schatzki, T.R. (2009), 'Timespace and the Organization of Social Life', in E. Shove, F. Trentmann, and R. Wilk (eds), *Time, Consumption and Everyday Practice: Practice, Materiality and Culture* (Oxford: Berg).

Schatzki, T.R. (2013), *The Timespace of Human Activity: On Performance, Society, and History as Indeterminate Teleological Events* (Lanham: Lexington Books), pp. 35–48.

Storme, T., J.V. Beaverstock, B. Derrudder, J.R. Faulconbridge and F. Witlox (2013), 'How to Cope with Mobility Expectations in Academia? Individual Travel Strategies of Tenured Academics at Ghent University, Flanders', *Research in Transportation Business & Management* **9**, 12–20.

Storme, T., J.R. Faulconbridge, J.V. Beaverstock, B. Derudder and F. Witlox (2016), 'Mobility and Professional Networks in Academia: An Exploration of the Obligations of Presence', *Mobilities* **12**, 3, 405–424. https://doi.org/10.1080/17450101.2015.1116884

Strengers, Y. (2015), 'Meeting in the Global Workplace: Air Travel, Telepresence and the Body', *Mobilities* **10**, 4, 592–608.

Tahvanainen, M., D. Welch and V. Worm (2005), 'Implications of Short-term International Assignments', *European Management Journal* **23**, 663–673.

Urry, J. (2003), 'Social Networks, Travel and Talk', *The British Journal of Sociology* **54**, 2, 155–175. https://doi.org/10.1080/0007131032000080186

Vayre, E. and A. Pignault (2014), 'A Systemic Approach to Interpersonal Relationships and Activities among French Teleworkers', *New Technology, Work and Employment* **29**, 2, 177–192. https://doi.org/10.1111/ntwe.12032

Welch, D.E., L.S. Welch and V. Worm (2007), 'The International Business Traveller: A Neglected but Strategic Human Resource', *The International Journal of Human Resource Management* **18**, 173–183.

Wheatley, D. and C. Bickerton (2016), 'Time-use and Well-being Impacts of Travel-to-work and Travel-for-work', *New Technology, Work and Employment* **31**, 3, 238–254. https://doi.org/10.1111/ntwe.12074

Wickham, J. and A. Vecchi (2009), 'The Importance of Business Travel for Industrial Clusters – Making Sense of Nomadic Workers', *Geografiska Annaler: Series B, Human Geography* **91**, 3, 245–255. https://doi.org/10.1111/j.1468-0467.2009.00318.x

Existing literatures	Key insights/ perspectives of existing literatures	Key silences/ gaps of existing literatures	Key sociomaterial literatures	Key insights from sociomaterial perspectives	Implications of sociomaterial perspectives for research
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