Information and Communication Technology and International Business Travel: Mobility Allies?

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Abstract

Like forecasts about the paperless office, technological solutions to the problem of international business travel continue to be deferred. As with the increased use of office paper, international business travel is defying predictions of its decline. There is growing evidence to suggest that business sectors which seem ideally placed to substitute information and communication technology (ICT) for travel are actually generating *more* physical travel than other sectors. The paper develops a case study of the Irish software industry to exemplify why international travel is not diminishing in importance, and how the ICT and business travel relationship is changing in this sector. The paper presents research findings that suggest that a cycle of substitution, generation and modification relationships have occurred as mobility interdependencies have developed.

1 Introduction

There are considerable attractions towards substituting international business travel with technologically mediated communication and yet examining the statistics on both business travel and ICT use seems to indicate that remote, technologically mediated communication and face to face communication are neither simple substitutes nor independent communication methods. It is not just that place matters and communication style makes a difference, but also that the nature of work itself is

changing as new technology and physical mobility become ever more prominent in established and emerging business sectors, i.e. the worker is expected to be more agile, responsive, flexible, accountable and action oriented, while work becomes more volatile, insecure, provisional and intrusive. Analysing the relationship between mobility, ICT and changing work patterns is somewhat complex, involving features from a range of academic disciplines and, as such, is an area which has until recently received very little critical attention in empirical research, as Donald Hislop and Carolyn Axtell suggest in their recent paper on telework (Hislop and Axtell 2007).

In this paper I will examine ways in which physical travel and ICT use are mobility allies: interdependencies that modify each other and change the conditions in which working practices occur, rather than being communication substitutes. Using examples from the Irish software industry this paper will examine the possibility of a cycle effect as the interdependencies of communication, technology, work and travel emerge within this sector. The way in which physical mobility and ICT continue to modify working patterns mean that new concepts, such as hybrid workspace and fluid coordination might become useful way of conceptualising these new practices.

2 Business Travel and ICT: Facts and Figures?

Work related travel takes many forms and serves many purposes; however, for the purposes of this paper, I will limit my discussion to international business travel that requires air travel. While this eliminates some problems of definition, comparison and unit of analysis, there are no official internationally recognised categories for which data is compiled with which to make comparisons between different countries, with

different economic indicators or over time. Kenneth Button outlines some of the problems in using air transport statistics:

> There are a variety of statistics available on different aspects of international air transport. Many are simply repetitive and others derivative. In addition, the data are reduced to the lowest common denominator for comparative analysis. Methods of collection can vary between countries, and data reliability is sometimes suspect…requirements differ between countries, comparability is often lacking (Button 1999: 80).

While the limitations on the statistics must be noted, there is general agreement that business travel contributes considerably to the air travel statistics. Keith Mason notes that "32 percent of passengers at the London airports are business passengers [and] overall, 48 percent of all passengers are travelling on business" (Mason 2000: 109) while in the EU, "business travel accounts for 48 percent of all air travel" (Mason 2002: 48). Kenneth Button, support this order of magnitude: "business travel accounts for somewhat over 40 percent [of flights]" (Button 2004: 5). Further, Newton Osborne states that "business travel accounts for approximately one third of all international travel" (Osborne 2003: 103); in Germany business travel accounted for 28 percent of international flights (Wilken et.al. 2007), while UK research shows "business visits" are 27 percent of international travel (see Office for National Statistics 2006). If such business travel figures of between a quarter and a half of all flights are correct, then this would mean that between 0.5 billion to 0.9 billion international business trips were made in 2008.

Business travel is certainly significant, then, even if there is no global census of business travel nor are there consistent and uncontested figures to measure annual global trends in business travel to demonstrate exactly *how* significant. Strong claims that global business travel is increasing or decreasing by a specific percentage point are not therefore possible. There are, though, surveys, estimates and projections which suggest that the amount of international business travel is increasing (see, for example Civil Aviation Authority 2006; Barclaycard 2007; American Express 1999 and 2005; Office for National Statistics 2006; International Air Transport Association 2007). Even taking such research at face value, the complex economics and motivation behind international business travel decision making cannot be analysed from such agglomerated data in order to draw conclusions about the contribution of business travel to growth, business performance, innovation and networking. While work related travel is undoubtedly a fundamental part of international business and the mobility of people is one of the characteristic features of the information age (Urry 2000), estimating exactly *how* fundamental such mobility is has been a very marginal area of research. Indeed, the three volume work of Manual Castells (1996; 1997; 1998), arguably the most influential work on the economic, social and cultural impact of the information society, says virtually nothing about the role of physical mobility as part of this process (see also Castells and Hall 1994). Attempts to address such research gaps concerning the relationships between mobility and ICT are also not helped by the difficulty of cross tabulating travel data with other metrics and measures and the difficulty of asserting specific cause and effect relationships between specific means of communication and travel patterns.

The resulting claims that can be derived from existing data sets alone are therefore weak: international travel is growing and business travel is a significant proportion of international travel, with more international business travel today than the total amount of international travel in 1980 (see Civil Aviation Authority 2006). Due to these limitations, much of the research on business travel is supplemented with annual survey data by American Express, Barclaycard and the International Air Transport Association, though the research findings often remain largely speculative (see, for example, Roy and Filiatrault 1998; Grayling and Bishop 2001; Collins and Tisdell, 2002; Choo and Mokhtarian 2007). The claims that can be made on the basis of such evidence are weak, but indicate a significant trend that needs to be explained, while the suggestion of strong interdependencies with ICT use is credible, it is not demonstrated by these samples or data sets.

Parallel with the increase in the absolute number of international business trips that has been observed in the last thirty years from such aggregate figures, the use of technologically mediated communication has also increased during this period. While the price of ICT relative to performance has been falling annually for the last half century, the expenditure by businesses on ICT, and its support, has also been growing for a considerable time:

> There has been significant substitution of ICT capital for other types of capital and labour inputs – witness the sustained growth in volume investment in ICTs that has outpaced investment in other types of capital goods. In their role as capital goods and providers of capital services, ICTs have increasingly contributed to output and therefore to labour productivity growth (Schreyer 2000: 5).

The growth of ICT capability relative to cost and the average absolute expenditure by firms on ICT have both increased (see Schreyer 2000: 6) which seems to imply that firms are using ICT mediated communication more effectively each year, though this too is based upon an agglomeration of statistical data. While there is evidence of constant innovation in both hardware and software to enable long distance communication and collective collaboration to function more satisfactorily, there is very little analysis of how the mobility of data it entails impacts on, or results from, the physical mobility of those responsible for such data. As John Urry argues, these computer mediated interactions remain social spaces in which people meet and interact, though they become spaces in which the conditions of such interaction have altered, though they also imply connections to outside their virtual space (Urry 2000: 74). There is, then, no paradox when contrasting this growth in ICT with the growth of business travel, outlined above; there is a general recognition that the relationship between business travel and use of ICT is complex and intertwined (Davidson 1994), implying a vast number of business decisions involving different relationships between the two factors (see Mokhtarian 2000: 1). Though the nature of such interdependencies remains highly speculative, as recent empirical research on teleworking has indicated (see for example Gillespie and Richardson 2000), the notion of the hybrid workspace might be a useful way of conceptualising the effects of increased physical mobility coupled with ICT in certain business sectors.

A hybrid workspace is, as the name implies, a working environment in which an individual sometimes works in an embodied organisational space and at other times in other locations, such as at home or on the move i.e. sometimes working in close proximity to colleagues, sometimes virtually and sometimes a combination of both.

The research findings of Susan Halford suggest that "spatial hybridity changes the nature of work, organisation and management in domestic space, in cyberspace and in organisation space" (Halford 2005: 20). As a consequence of high levels of work-related travel and the growth in ICT-mediated communication, as indicated above, new elements contributing to new hybrid workspaces are emerging, which are likely to have an important impact on a wide range of characteristics related to work, communication and mobility:

> Combining cyberspaces with organisational spaces…will produce new practices, relationships and managerial challenges that are distinct from those that operate in any one space (Halford 2005: 30)

If new practices and challenges are beginning to emerge from occupations that require hybrid workspaces, and in particular working on the move (see Felstead et.al. 2005: 44-47 and 136-175), coupled with work that is highly ICT intensive, even when it is on the company's premises, such occupations are likely to offer insights into these new practices. This paper is an attempt to empirically identify these new practices from the experience of, among others, remote workers themselves. In particular, to problem that the paper addresses is to explain why travel motives persist, under which circumstances they increase in importance, and to show that the link between business travel and work related ICT-use is not an invariable relationship, as the bulk of the literature suggests, but rather an adjusting pattern that emerges from the social needs and business realities that require and enable remote working. The paper asserts that such a pattern can be detected through detailed narratives of people undertaking remote or highly mobile work and those with whom they coordinate. It is with this consideration that the paper now turns to the case study of the Irish software industry.

3 The Case of the Irish Software Industry

The research findings to be examined in the paper are derived from a case study of the Irish software sector (see also Haynes, Vecchi and Wickham 2006: 21-27). It is a case study that examines the relationship between business travel and ICT over a time period of approximately ten years. The sector, location and time scale were strategically chosen in order to develop a case study in which the decision to use ICT or business travel represented a considered choice. To clarify this, a small number of cursory details need to be outlined.

The Irish software sector has a large foreign presence and is export driven, while the final product is weightless and can be easily transmitted through ICT in almost every case. The sector as a whole makes use of a wide range of advanced ICT, and decision makers would be expected to be knowledgeable about the latest innovations in ICT, and assisted by information, support structures and networks that exist to serve the sector. Additionally, companies are likely to be innovative, unconstrained by older traditions and business practices which might require otherwise unnecessary physical presence. In terms of location, Ireland exports most of its software and being an island, most export destinations require air travel. While there are clusters in other parts of the country (see O'Riain 2004) the majority of the Irish software industry is located in Dublin, a city with good air links to the rest of Europe and the USA, and approximately an hour away from London and Paris, major hubs for the rest of the world. It is a market with no obvious barriers to substitution, due to its modern transport infrastructure coupled with the availability of low cost airlines offering numerous destinations, but would also not be adverse to substitution when opportunities might be afforded by, and required for, innovation. If there were an industry, market and country combination that might be

expected to indicate the *choice* of specific ICT and business travel relationships, or indeed provide highly varied hybrid workspaces, this would be it.

To examine the relationship between ICT and physical mobility, the paper will use a typology of four categories – neutrality; substitution; generation and modification – a typology used implicitly within the main literature (see for example Salomon 1985; Saffo 1993; Mokhtarian and Meenakshisundaram 1999; Mokhtarian 2003) but for which this paper will stipulate clearer and explicit definitions. To test for these features and to explain trends over a ten year period, a research team based in Trinity College, Dublin interviewed 30 software companies based in and around Dublin. The sample was chosen from the membership list of the Irish Software Association, a near complete sample frame of the 160 companies that comprise the Irish software sector in Dublin, and a quota sample taken, representative of size, ownership and activity type within the sector as a whole, as indicated by the membership database. Additionally, researchers also interviewed 12 sector experts, including senior members of key industry associations, support organizations, specialist travel agents and academics, in order to provide research triangulation and correct for any bias from the small number of non responses. The research involved interviewing two employees of each company, one self-identified as knowledgeable about company travel policy and practice, and the second, identified by this initial interviewee as one of the employees of the company who undertakes the most international business travel. The 72 interviews were undertaken in 2005 and 2006, using a semi-structured ethnographic format, lasting approximately one hour each. These interviews were supported by documents obtained from companies and the Irish Software Association, in addition to surveys and academic research on the industry and, where possible, with comparable surveys with the sector in

the UK. While a number of findings emerged from these interviews, this paper will focus on the impact of ICT use on international business travel in terms of the four categories listed above. The ethnographic nature of the interviews enabled the perceptions of the interviewees, concerning the role of ICT and business travel, to be explored in detail in order to rationalise and explain policy and practices from their experience. These perceptions were corroborated and probed in relation to findings made in the course of the research, and using company data available from reports and company statistics, where researchers were given access to such material. The triangulation that such corroboration and probing enabled also helped to clarify the types of travel/ICT relationship likely to be found within the sector. The final definition of the relationships termed neutrality, substitution, generation, and modification used by the research can be stipulated and exemplified in the following way:

Neutrality can be conceptualised as the uptake of ICT technology which has no impact on relations with businesses or individuals based overseas or decisions on business travel unrelated to specific ICT use and, as such, each practice is entirely independent of the other. While there is no credible paper in the literature that concludes that travel and communication are entirely independent, this was considered to be a possibility under specific circumstances and should not, therefore, be ruled out *a priori*.

Substitution describes the process of switching from one mode of communication for another. In the present example, it occurs when technology eliminates international business travel or replaces some features or practices in such a way as to reduce the amount of time spent abroad or the frequency of international business trips. The concept of substitution, as discussed in the literature is, though, often ambiguous in that

it is used in a way that implies a zero-sum game, using evidence that merely suggests a net reduction at one instant in time, as illustrated by the following quotation (see also Arthur D. Little Inc 1993; Roy and Filiatrault 1998):

> Most of our corporate travel manager respondents reported that travel substitution was indeed occurring at their firms. When asked whether or not companies were "substituting telecommunications technology for air transportation on a regular basis", 74% said that they were. (Bender and Stephenson 1998: 104).

Other empirical studies of the impact of ICT on business travel argue that net reductions have occurred in the number of trips and the amount of business travelled due to the use of a specific technology *marketed* as a substitute. They estimate future substitution trends based on the estimated growth of such technology, again as a simple zero-sum game. For example, according to Jacques Roy and Pierre Filiatrault "the impact of videoconferencing as a substitute for business air travel could increase from 1.8% to 4.3%" (Roy and Filiatrault 1998: 85-6) and Jon Martin Denstadli argues that "estimates based on survey results and air travel statistics indicate a substitution rate of 2.5–3.5%" (Denstadli, 2004: 375). Much of the research that suggests a substitution effect, also acknowledge the *possibility* of stimulation effects (see Denstadli, 2004: 374).

The other two categories are somewhat more complex, and will require more detail and examples to conceptualise. Generation, sometimes termed "complementarity" in the literature (Mokhtarian 2000: 1), is the process in which ICT use stimulates the growth of business travel or is an enhancing feature in business development, which requires increased international business travel. Improved communication can stimulate international commerce for a firm in a number of ways, including making international

networks and partnerships viable, facilitating a non-domestic market presence, enabling outsourcing to a foreign country, supporting expansion through an office located abroad, reducing the cost of international marketing, enabling online business etc. The use of the internet as a tool for international marketing, obtaining and transferring information, and providing inexpensive and reliable communication, makes possible business opportunities that would not otherwise be possible. These business opportunities require *some* business travel as there is still the need to meeting in person, so, as Paul Saffo (1993) suggests, the net effect of internet use for a company that is wholly internet dependent, for example Amazon, is an increase in the need to travel, irrespective of the travel substituted by its use.

Mokhtarian (2000; 2003) supports Saffo's claim, arguing that generation is more likely to be a long-term net effect of ICT use:

> researchers have pointed out that the substitution effect is more likely to be short-term and direct and to occur within the boundaries of the process being studied, whereas the complementarity effect is more likely to be long-term and indirect and to occur outside the scope of the studied process (Mokhtarian 2000: 3)

There is also the possibility that such travel generating effects might be found within whole economic sectors as much as for specific businesses, with empirical research suggesting that high growth economic sectors are more ICT intensive and, simultaneously, more travel intensive than other economic sectors (see, for example Denstadli 2004; Oxford Economic Forecasting 1999; 2006).

If the use of ICT gives a company new overseas customers or partners, which need to be met face-to-face, then the use of the internet can be said to be travel generating for that firm or a complementary form of communication. If, however, the use of internet related ICT changes the relationship with customers or other organisations such that it alters the way in which face-to-face interaction takes place, for example regular sales staff visits are replaced with more intensive technical support availability, then the ICT/business travel relationship will be classed under the final category, that of modification. Modification can be conceptualised as the process in which travel patterns alter as a consequence of ICT (or vice versa) and it is the *transformation itself* that is of particular interest. Mokhtarian and Meenakshisundaram (1999) define the process in the following way:

> Modification occurs when the use of one mode alters something about the use of another mode, where the use still takes place (so it is not substituted) and would have taken place anyway (and so is not generated), but is now modified (Mokhtarian and Meenakshisundaram 1999: 34)

Examining business and leisure travel, Ilya Salomon suggests that modification is a key factor in mobility and communication, concluding that the net effect of the interaction between new ICT and transport systems are not changes in the *volume* of travel, but changes in *patterns* of mobility:

> The human being as a "mobile animal" is likely to generate new travel if all conventional needs are satisfied at home. Thus the net effect is a modification of travel patterns rather than a reduction of volumes (Salomon 1985: 232)

14

Salomon argues that the desire to travel will ensure that the relationship between business travel and ICT will neither be substitution nor generation, but that communication as a whole will adapt over time according to the opportunities afforded by new technologies within our daily lives:

> The substitution of telecommunications for travel is of minor importance because, if it happens, it will be offset by the desire to exercise mobility (Salomon 1985: 233)

A second factor suggesting modification is the perceived need (by companies) to adapt to the more complex realities of employment, production, trade and the world economy; changes in ICT or patterns of business travel, or the combination of such changes, are likely to modify networks and relationships in ways that seem trivial at first, but that can redefine supply chains, shift terms of trade and determine the emergence of new economic powers:

> As transportation and communications became better and cheaper, locations formerly foreclosed become economically feasible and activities are freed to relocate according to a field of redefined comparative advantage (Leamer and Storper 2001:655)

Such changes not only impact on contingent features of entrepreneurship, local development or economic geography, but also change the way in which the ecologies of travel and communications are integrated into work practices through changes in perceptions of time and space. Feedback between ICT and business travel create strong interdependencies, while the speed of change associated with such interdependency would suggest the centrality of communication and mobility in a wide range of practices, in particular knowledge transfer:

> Short-term migration plays a dual role in the movement of expertise in the IT sector. Firstly it allows critical knowledge to be injected into firms in receiving countries. Secondly, it helps overseas suppliers to mine such knowledge from client countries (Millar and Salt 2007: 55-56)

Modification can therefore be considered as a relationship between business travel and ICT in which the interdependencies of physical and virtual mobility are very prominent and in which the needs of business travel impact on, and shape, the development and use of ICT. It is within this "modification" context that hybrid workspaces are likely to produce the type of new practices, relationships and challenges that will have a powerful influence on the way in which employment within key sectors of the economy evolve. Recent development in mobility-enabling ICT, such as the Blackberry and the laptop:

> have the potential to free workers from the confines of their workplace and support the geographical dispersal of work colleagues from each other by allowing work-based interactions to be mediated through a bewildering range of technological devices (Hislop and Axtell 2007: 36)

In this way, modification is the category that has the greatest potential for changing the way in which work, leisure, communication and other social relationships are performed, and alter the way in which work related tasks are scheduled and coordinated, blurring the working day with recreation time and the fixed appointment with an office hour.

Using these four categories, the paper will examine some of the changes identified by companies within the Irish software sector that have impacted on their companies since the 1990s. It must be noted, though, that these categories are not necessarily alternative descriptions of how the use of ICT impacts on mobility for business as a whole over the entire period examined, but different tendencies to which businesses and business alliances are inclined to exhibit at specific phases. Section 5 and the conclusion will examine the importance of the relationships these categories describe.

4 Research Finding

This section presents an overview of the company documents and interview responses related to ICT use and business travel. As indicated in the previous section, the methodology was designed to examine in detail the reasons behind travel choices made by the companies within the software sector, rather than the general extent of travel choices within the sector, the latter of which a survey would have been more appropriate. While the sample is small compared to that required for a survey, the case study is successful because findings from the interviews and supporting documents on this topic were consistent and relatively clear. Not one of the companies interviewed expected to travel less in the near future, not one of the companies interviewed stated that they were travelling less than before, and not one of the interviewees claimed that business travel was merely marginal or unimportant to the company. The travel budget varied between businesses, but was typically described as the second or third highest expenditure that the business made, even though the travel budgets were generally tightly controlled and economy-class flights were the norm for *most* work-related

international travel. The consensus, then, was that travel is a crucial part of doing business:

> *Building new relationships and nurturing the existing ones needs a fair*
> *amount of travel, and if that means travelling two or three times a week,*
> *we've got to do it. I think it's the same for everyone in this industry*
> (Customer Relations Manager, Firm 17)

The degree to which ICT substituted, increased, or changed travel was far less clear, as might be expected, though there were some issues that complicated the evaluation. One such factor is that while the literature tends to contrast the use of ICT with face-to-face interaction or transactions, meeting face to face is often presented in this context as though it were synonymous with attending face-to-face meetings (Roy and Filiatrault 1998, see, though Hutchby 2001), and indeed, much of the literature about videoconferencing implies that meetings are the main type of travel activity (see Fulk and Dutton 1984). This slippage was found in responses given by interviewees. There was the widespread view that substituting for business travel meant teleconferencing or videoconferencing as a replacement for travelling for a meeting or, to a lesser extent, online collaboration using a specific application instead of doing almost the same type of operation, but while co-present. The perception that many of the interviewees had of their heavy use of e-mail, instant messaging and telephone calls was that it formed part of a package of communication rather than substitution:

> *You speak on the phone or email people you see the most, which is not*
> *really the same as replacing a trip is it?* (Design Manager, Firm 12)

When talking about substitution itself, interviewees typically described their use of teleconferencing and videoconferencing. As a substitute for attending an overseas

meeting, teleconferencing was widely used and deemed more satisfactory, particularly in including one or two people in a main meeting in which the majority were co-present. Interviewees suggested that this was mainly because its limitations were clear from the beginning, that the technology was easy to set up and could function as a part of a conventional meeting. Videoconferencing had been tried by around half of those interviewed and was universally disliked, although it was said to have its uses, specifically, as a substitute for teleconferencing or not having a meeting at all and *not* as a substitute for travel. The effects were unsatisfactory in terms of functioning, and also because it did not live up to expectations – promising the same character as face-to-face contact. One interviewee, who found teleconferencing "extremely useful" and frequently used it, contrasted this with his experience of videoconferencing:

> *It attempts to have the benefits of a phone call with a face-to-face meeting but falls flat because it is distracting and awkward, its,…counterintuitive.* (Commercial Manager, Firm 8)

Equally problematic for videoconferencing was the perception that it had less gravitas than a face-to-face meeting:

> *People are more dismissive to commitments that have been arranged videoconferencing* (Customer Relations Manager, Firm 29)

This was further illustrated by another interviewee in describing a videoconference:

> *I remember once during a videoconference that during a presentation by their CEO, someone just reached over and pressed the mute button and carried on with their own conversation. Can you imagine having a conversation or sending a text message if he was in the room? No, you*

don't do this face to face and therefore it's not the same experience - its

just a person in front of a camera and it's [therefore] *not positive when*

marketing something and trying to get a big contract. (Chief Executive

Officer, Firm 17)

For purposes other than internal meeting, the technology was thought to be very limited,

with the awkwardness and technical problems becoming a genuine hindrance to

communicating relevant information:

Videoconferencing has no use for products with a sophisticated

technical content, when the customer wants to evaluate a product you

have to send people there (Chief Executive Officer, Firm 22)

Other web based tools, such as Net Meetings, Skype, Web-ex, were used extensively by

interviewees, especially those who travelled most frequently within the company, but

such tools were used as substitutes for telephone calls, group emails and supplementary,

rather than essential meetings. Collaborative software and specialist programmer

groupware were, additionally, generally used by those working within the same

location, so while deemed useful and substitutes for co-presence, were not, in these

instances, substitutes for international travel.

When questioned in more detail on the purpose of business travel, other motives were

identified as of equal importance to meetings, such as attending trade shows or events,

prospecting for clients or partners, troubleshooting, networking and product launches.

The differences expressed by firms in their main motive for business travel partly

explains why those undertaking the most travel performed different tasks in different

businesses. For example, firms for which product launches are crucial, senior managers

and marketing staff travel extensively, while firms identifying product development and troubleshooting as key motives for travel, emphasized the need for technical staff to travel. To enable the ICT/physical mobility relationships to be exemplified in different circumstances, the paper considers differences between two of the main travel motives: trade shows and collaboration.

Trade shows were identified by over half of those interviewed as a significant business travel motive. Such travel requires co-presence and though the notion of temporary clusters (Bathelt, Malmberg, and Maskell 2004) implies a much stronger sense of knowledge creation and exchange than the evidence merits, nevertheless, participation in such events is considered crucial in the software industry: for networking, information, identifying trends, promoting the company profile and establish a presence among strategic individuals and firms. For one firm, preparing for and attending two annual trade shows accounts for the largest concentrations of business travel in the whole year:

> *We wanted to have everyone there, from the receptionist to the CEO, because we wanted to look like a big multinational-corporation. Attending [the Game Developers' Conference in USA] in bulk is critical to establish some key-contacts with publishers and to look credible to their eyes* (Chief Technical Officer, Firm 19)

Such travel had no identifiable ICT substitute as it is the physical interaction/co-presence with others – whether for networking, alliance building or marketing – that is required, "serendipitous handshaking" as Leamer and Storper term it (Leamer and Storper 2001: 656). Such co-presence helps to build relationships and develop a network of contacts, which interviewees regarded as crucial in developing opportunities

and sharing information. Not surprisingly, maintaining networks and contacts, whether local or international, requires a considerable amount of ICT use; however, in addition to using ICT to explore opportunities derived from trade shows the software industry, as a creative *and* technology dependent sector, generates and disseminates information directly related to ICT through these events, networks and interactions. Travel for trade shows was often a way of learning the effectiveness of new ICT and of exchanging ICT best practice with those in similar types of organizations and markets.

The second example of a key travel motive within the sector, as identified by interviewees, is collaboration with overseas partners or between different offices of a multinational company. The need for international travel was not merely a case of attending formal meetings, nor could it be reduced to the exchanges of knowledge. Interviewees expressed that the very complexity, novelty and innovative nature of the products, services and concepts being exchanged meant that it was difficult to know in advance which issues needed to be addressed, even when the problems, range of strategies and themes were clear to each party. In this way, the distinction between explicit knowledge i.e. knowledge that can be codified and stored, and tacit knowledge, i.e. knowledge that is partly inexplicable, was not a particularly fruitful way of explaining why face to face contact was necessary. This is because even assuming such a neat division is plausible or that knowledge is located within an individual, the extensive personal contact that tacit knowledge transfer is said to require (Smith 2001: 314) is itself more likely to be mediated through a series of interactions that would realistically require extensive ICT-mediated contact. This paper will not examine the argument that tacit knowledge requires co-presence, though it will note that Elizabeth Smith's work on tacit knowledge and work observes that multinational companies can

function effectively only if such knowledge is shared through *multiple* communication methods:

> Networks were connected so tacit knowledge could be shared face to face, over the telephone, by e-mail and through video conferences (Smith 2001: 315)

A number of interviews suggested that it is through informal interaction that engagement was more effectively developed, and such interaction was more forthcoming through co-presence. It was engagement rather than distance that was the deemed to be the main barrier to transmitting an understanding of information that otherwise resists articulation.

> *Most jobs require a lot of travel but the Chief Technology Officer travels the most. The technology office is like the hub for the intellectual capital and explaining the technology that explains the product is important. Ideas are important but we're also a technology driven company. The CTO says "have a conversation about the product" and they nail the problem straight away.* (Product Manager, Firm 5)

Interviewees, when pressed on why effective collaboration requires co-present interaction, tended to emphasize the involvedness in the exchange of ideas, as though their incomplete products and services were boundary objects, artefacts able to co-ordinate activity among varied individuals in a specific world (see Starr and Griesemer 1989) but which require some negotiation in person. The limitations of ICT as unnatural or not expressing the full range of communication, was also a common theme, even though the range of collaborative tools actually used within the companies was impressive, in particular those developing application software on a collaborative basis.

> *If you sell a complex thing it needs communication in the fullest sense of the word; white boards to describe things, body language, comfort.* (Chief Executive Officer, Firm 22)

Interviewees expressed the view that their location in Ireland, supported by strong motives, nevertheless required strong links to foreign companies and markets, particularly those based in the UK. Initial stages of forming closer relationships, even between offices of the same company, required meeting face to face, for such reasons as to demonstrate the credibility of the company or office, building personal relationships, even informal engagement to assess general competencies or "*seeing the whites of their eyes*" as one interviewee described it (Chief Executive Officer, Firm 17). Initial contact was generally made through existing networks or structures, or, in the case of alliances or project-based collaboration, though conventional marketing methods. Both networking and alliance building are heavily ICT mediated, though once more concrete discussion needs to be made concerning the practice of collaboration, and this is almost always conducted face to face.

> *after briefly discussing a proposal over the phone, they asked to get someone there straight away and they were very impressed by [the CEO] who immediately flew there the following day; I think that's how we got the deal* (Chief Technical Officer, Firm 19)

In this way, collaboration involves the use of ICT to develop the relationship at a distance, relationships which are travel generating when they become productive, requiring additional ICT use and periodic travel to maintain. The software industry, however, is heavily reliant on individual talent, unique products, skill matching with potential collaborators, and as such requires considerable amount of discussion,

explanation and negotiation to reach agreement. This often means that those with one role within the company are in contact using ICT, while other members of their firm with a different role, travel, in a type of layering effect.

As these two examples illustrate, the importance of co-presence, and thus business travel, is derived not just from the complex nature of information sharing, but is also related to a series of other meanings. The examples suggest that these can range from the need to illustrate the seriousness or credibility of a company, the role co-presence plays in the process of surveillance, creativity or networking, or the perceived need to conform to accepted business standards, conventions which are more comforting than necessary, rather like the digital depiction of mechanical controls found on the latest generation of ICT. The way these specific types of business travel motivations – as opposed to generic "meetings" – relate to ICT use will be the topic of the following section.

5 Analysing the Interdependencies of Travel and ICT

A number of patterns quickly emerged from the large amount of interview data, from which clear conclusions and predictions can be made. The case study gives a clear assessment of the four categories of possible ICT/business travel relationships. Substitution of ICT for business travel is now marginal, even though many firms – and frequent travellers – would like to substitute travel much more. Substitution has already been introduced where feasible, particularly for business meetings, and is at its limit in almost all situations, as illustrated by the trade show and collaboration examples above. In the absence of revolutionary technological breakthroughs, an insurmountable

hindrance to international travel or sudden changes that make users feel more comfortable communicating through ICT, the amount of business travel for individual companies will remain the same for the next ten years, even with an expansion in international outsourcing or the entry and exit of many companies within the sector as a whole. This is because a core of business travel serves a function in which each individual and organisation involved recognises that their collective engagement goes beyond information exchange, as the collaboration and trade show examples confirm. Consensus is quickly built on the need to travel, often due to the complex nature of interaction, the uncertainty of interaction or the interpretation of travel by the company and the overseas individuals they encounter face-to-face. ICT is an excellent substitute for simple face-to-face information exchange, but this forms only a tiny fraction of business travel motivation, at least in the Irish software industry.

The Irish software industry, as portrayed by the majority of interviewees, and as represented by the sector's own strategic vision, has reached its maturity phase in recent years. This is also illustrated by interview findings that the conditions in which ICT could be conceptualised as travel generating no longer exist. There is consensus that the nature of business travel within the sector changed during the 1995-2001 "dot-com bubble" and has modified again since 2001. As Irish software Association records illustrate clearly, during the late 1990s many companies in the sector expanded their overseas networks, developed international collaboration or developed a presence in international markets (and more than half of interviewees stated all three) in a search for growth. This period saw both a simultaneous and substantial growth in international business travel and ICT consumption, as measured by business spending. It was during this period that a large substitution effect occurred, but with travel budgets often

increasing in order to search for new growth opportunities or to manage or supplement the information exchange which were facilitated by ICT-enabled alliances and collaboration. According to interviewees many companies within the Irish sector experienced several years of growth in business travel, much of which was derived from, or enabled and supported by, their ICT infrastructure and pursued in the knowledge that they were sustainable through a combination of ICT and business travel. During this era, ICT was business travel generating and also, though to a lesser degree business travel substituting, though this substitution effect was obscured by net growth in travel.

The start of the deflation of the "dot-com bubble" occurred shortly before the 9/11 World Trade Centre attacks and many of the interviewees found it convenient to use the coincidence of these two events, and the economic climate they represented, to characterise changes experienced by their organisation or the sector as a whole in relation to business travel. Such changes involved attempts to tighten travel budgets, partly due to its size and the ease in which an economy-flight-only policy can bring immediate savings. Additionally, the dash for growth and international visibility gave way to a more strategic consolidation, particularly noted by smaller software companies. While details of the changes to the Irish software industry during this period are complex (see, for example O'Riain 2004; Collins 2007) the consequence for business travel by individual companies was a flattening out of demand, an effect observed even by interviewees who noted a steady increase during this period. Responding in more detail in relation to this stabilisation of travel growth during this period, interviewees suggested that it was a consequence of changing collective expectations of how being away from the office functioned in terms of work, changes

which were often enabled by changes in the use of ICT. One frequently cited example was the expectation that a business traveller would be able to work while on a business trip as though they were in the office: they would be able to receive and respond to emails and telephone calls, write and send reports, arrange or alter their meeting itinerary etc:

> *It [a business trip] isn't even seen as Jolly by those back in the office anymore. I'm doing the same work as I would've done, plus I'm meeting clients, plus I'm stuck in the airport, plus time-zones and that. The work still piles up on my desk for when I get back, though! I'm more on top of it. I used to dread getting back thinking "Christ what disaster am I going to find waiting"* (Acting Chief Executive Officer, Firm 2)

The incursion of ICT on the move and the "work anywhere" ethos facilitated by the integration of ICT (see also Barclaycard 2007) in combination with other identified changes, have dramatically altered the way in which being on the move is perceived by business travellers, colleagues and clients and how this is changing the way in which the objectives of business travel are set. In this regard, hybrid workspaces became more of a common feature across the whole sector, particularly as Wi-Fi became widespread and better laptops and mobile phones became available. Interviewees reported, therefore, a modification effect rather than a generation-type of complementarity, though not as Salomon assumed, driven by a desire to exercise mobility, even though those who travel the most are often managers who make the decision to travel. Instead, the modification was rather more banally for pragmatic motives, such as the ease with which a decision could be checked or a small clarification could be solicited as easily as if the person was in the office, which became more complex decisions and larger clarifications, often

making travel much less pleasant or less distinct from other phases of work: "*It is essentially a necessary evil*" (Managing Director, Firm 20).

The relationship between ICT and business travel within the Irish software industry is not a static relationship. The case study findings suggest that the relationship should be represented as a cycle for the sector as a whole, as derived from the agglomeration of cycles observed within individual companies. Examining Irish Software Association literature, as confirmed by interviewees that had been involved in the sector for since the late 1990s or with smaller and medium sized software companies, a typical ICT/business travel pattern would exhibit the following cycle: The initial purchasing of ICT and early stage business travel were both decided independently (neutral) *and* as part of a general mobility package (modifying). In the early growth stage, business travel expanded (generating) *but* this expansion hides the ways in which, at the same time, ICT was being used, sometimes experimentally, in ways to overcome the inconveniences of travel (substitution). This rapid growth in business travel began to stabilise as factors such as the core competencies and habitual practices became clearer and more established, while networks became more enduring throughout the entire value chain of companies. During this stabilisation period, the role of ICT altered once more, becoming tools with which to ensure that business travel became another form of work time, with distance being no excuse for rescheduling appointments or other forms of fluid coordination, providing those on the move with work related feed-back, and enabling them to be engaged with other projects back at H. Q. (modifying). During this entire period, factors such as networking have remained travel intensive, though seem to involve substitution, generation and modification, depending upon the specific evolution of the individual firm. The emergence of new roles in organisations enabled

by greater integration of work and travel, but derived from other pressures, is beginning to take shape, though interviewees suggest that many employees within the Irish software sector have always, to some degree, operated through hybrid workspaces, though there was no specific expression used to identify such a concept. The important change expressed by interviewees has been that the need for those working within the sector to be within reach *as though these workspaces were the same* a change that has now been afforded by the technology that the company, or indeed the employee, possesses. This makes an impact not just on those working on the move, but on their colleagues and other people they are in contact with while they are switching between workspaces: when one mobile worker switches workspace, their working relationships impact on everyone they are in contact, adding a virtual mobility to even their static co-workers.

6 Conclusion

The paper has shown that the Irish software sector remains both travel intensive and ICT intensive, though the relationship between these two mobility factors has evolved over time. Agglomerating either the travel motives or the decision to use ICT within this sector will, though, conceal the dynamic processes that trigger these choices. The case study developed in this paper, instead, exemplifies a wide range of different motives for different decisions to travel or use ICT, and using four relationship categories, has identified a series of waves that have contributed to the shape in which this relationship has taken. These series of waves, or the relationship cycle that they produce, allow predictions about very general trends in business travel in the Irish software sector to be made, as the sector matures. The amount of business travel will

remain at its current level, with the perception of business travel, even involving once

exotic locations in far off time zones, being further integrated into a normal working

day. This normalisation of working on the move will ensure the multiplication of

patterns that combine to form hybrid workspaces, with new technology adapted to

develop new working and travel practices, which will also impact on non-work time.

One such feature of this increased work mobility combined with an ease of

communication will be the extension of fluid coordination practices, prominent within

recreation patterns, into the work environment (see Larsen, Urry, and Axhausen 2006:

146-149). That is to say that, those undertaking travel, and indeed their contacts, will be

expected to rearrange appointments in order to take advantage of work related

opportunities as they arise, such as fitting in another engagement, or as a chain reaction

from a rearranged appointment. The tendency towards fluid coordination increases

further when *both* parties are working on the move, both as a cause and a consequence

of the need for flexibility.

Travel budgets will continue to be squeezed where possible, but the sector has matured

beyond the prospect of any further substitution. New rounds of product development,

supply chain reorganisation and global strategic alliances will ensure that new travel

motives transpire for individual companies within the sector. The "globalising

tendencies" that social theorists have identified as potentially revolutionising mobility

(Urry 2000), while of key importance to the Irish software sector, will have little impact

on actual travel budgets or number of trips that those within the sector make, though the

emergence of more specialist roles involving greater degrees of working on the move

might have a travel *reducing* effect for other employees, in this sector. How these

different assemblages of mobility will integrate, merge or reconfigure their relationship

beyond this horizon is uncertain, but will certainly depend upon a greater realisation of specific *ways* in which they function as allies. These are not fixed and neither are the uncomfortable sensations of engaging through ICT mediated means, thus, as John Urry argues: "virtual communities, in exchanging vast amounts of information, come to constitute the world rather than simply reporting it" (Urry 2000: 74).

In their paper on IT migration, Millar and Salt (2007) conclude that ways must be found of incorporating the interactions of key institutional actors, in order to grasp the rapid changes occurring within a more interconnected economic environment. The case study of Irish software sector suggests that such interactions must be further broken down into the different types of mediation that such interactions require or benefit from. Analysing the dynamics of the different types of mobilities, their interdependencies and the different roles they play in different types of work practices will be a crucial in explaining the changes they conceive. Nevertheless, even examining the small number of case studies that attempt to interrogate these interdependencies suggests that the step from hybrid workspaces to complex mobile hybrids may be much shorter, and more virtual, than is generally conceived.

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