A critical view on the mobility need in high-competence organisations

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Introduction

The amount of mobility in the Scandinavian countries has increased during the last decades, and is expected to continue growing during the coming years. This development is putting pressure as well on the transportation systems, i.e. roads, railway lines, plane capacity, and so on, and the environment both locally and globally through increasing amounts of pollution. Consequences of these impacts are among others traffic accidents, high level of investments in infrastructure and reduced quality of life for influenced people.

The amount of international mobility is increasing both for private issues and not least within trade and industry. The statistic shows that air-traffic between Denmark and foreign countries has increased markedly within the past decade in both numbers of flights and passengers. The number of passengers on international flights has increased with 78 % and international starts and landings with over 100% from 1990 to 2001 (Transport 2000, 2002). According to a Danish Survey from 2001 40% of all air-traffic has a business purpose (Transportrådet 2001). There has been a similar development in Norway and Sweden in the same period (see TØI 1999, Frändberg 1998).

The large amount of work-related travelling is, among other reasons, due to increased internationalisation among companies, and that companies to a higher extent are considering value adding in the whole supply chain and not only in the individual companies. In this context, networks and alliances are important to establish, and among most companies this is an essential part of the strategic priorities. In many cases, increased amount of mobility is a result of a need for network building among firms. For many workers long-distance mobility is needed in connection to meetings with partners, training, marketing, network building, conferences, and so on.

However, simultaneously there is a rapid development within ICT, and Internet is to a larger extent being used for communication, collaboration and e-commerce. The development both relates to the management of the information flow/human resources and learning, e.g. equipment for videoconferencing, Learning Management Systems (LMS), and to support the material flow in the company/supply chain, e.g. Enterprise Resource Planning (ERP) systems, Electronic Data Interchange (EDI), and so on. In this paper only technology related to the human aspects are considered.

Recently, in a Danish magazine, a Scandinavian aviation company proclaimed "war" against videoconferencing, after a decrease of 20 % in sale of business-class tickets during the last year. The

aviation company encourage companies to end the use of videoconferencing, due to, the aviation company argues, that videoconferences cannot replace or supplement the physical meetings between people, and that physical meeting between people is the only way to successful business and decision making.

In this paper we will try to balance this debate, because we think that the nature of work-related mobility is more complex than what seems to be the case in the paragraph above.

Our objective in this paper is to investigate the relationship between mobility need in Danish high competence organisations and ICT. To do so the paper is structured as follows: In *section 1* we begin by introducing different theoretical perspectives on mobility and ICT. In *section 2* we will explore the amount and characteristics of long-distance work-related mobility among the employees in two Danish high competence organisations. This section will methodologically be based on a multiple-case study design, which involves a survey and in-depth interviews considering transport work for the employees in the two selected cases. Finally, in *section 3* we will analyse the potential for reduction of mobility needs in companies through increased use of ICT. This section will partly be based on the results from the multiple-case study and partly on the experiences from the research project Nettlaer, which focuses on how effective training and learning can be carried out supported by ICT tools. We end the paper by reflecting on the limitations and possibilities of using ICT as a tool for transport reductions in Danish high competence organisations.

Theoretical background

In this section we will try to develop a theoretical framework which can be used to understand the amount and characteristics of long-distance work-related mobility. Let us start by emphasising that this paper is placed in the field of a current research interest in the sociological meaning of mobility (Backmann 2001, Fotel 2003, Jensen, M. 2001, Lassen & Jensen 2003, Oldrup 2000, Urry 2000). Our starting point is that it is necessary to establish another and more comprehensive view of transport than what seems to be the case in a lot of traditional transport theory. The transport research has traditional focus on solving clearly defined societal problems as securing the highest possible mobility and reduction of various risks from transport such as noise, accidents, pollution etc. There is a tendency in our late-modern society and especially in traditional transport research to look at mobility as something granted and as a favourable good. Oppositely, there has not been much focus on developing an understanding of the background for and the consequences of the increasing mobility that we are facing today.

The sociologist Zygmunt Bauman (1998) has proclaimed that mobility climbs to the rank of the uppermost among the coveted values and the freedom to move perpetually in a scarce and unequally distributed community rapidly becomes the main stratifying factor of our late-modern times. Ulrich Beck (1997) argued as well that the social mobility, the geographical mobility and the daily mobility is changing the run of life and the conditions of life for human beings. John Urry (2000) has taken one more step and put forward that it is necessary to understand that diverse mobilities are materially reconstructing the "social as society" into the "social as mobility". We therefore, he says, have to develop a new agenda for sociology (and transport research), namely "sociology of mobility". This diverse mobility as Urry refers to is multiple senses, imaginative travel, movements of images and information, virtual and physical movement. A central point in Urry's work is that there are complex interrelations between the flows of electronic messages and of people. New virtual communities may presuppose an enhanced corporeal mobility of people rather than the elimination of such flows. Virtual mobility has to be understood in relationship with corporeal travel and the ways in which face-to-face conversation is crucial for the development of trustful relationships within cyberspace (Urry 2000:75).

In this paper we will therefore theoretically take a starting point within the sociology of mobility. We argue, as Urry, that such kind of sociology must focus upon examining the extent, range and diverse effects of the corporeal, imagined and virtual mobility. In addition, we argue that the sociology of mobility must contain studies of incentives behind the diverse forms of mobility. Our understanding of

sociology of mobility is therefore taking the following quotation as our point of departure (Lassen and Jensen, 2003):

"The object area for The Sociology of Mobility is an analysis of the driving forces behind the physical and virtual mobility and also the possibilities and limitations which these different forms of mobility create for social actions and patterns of meaning".

This definition shall be seen as a work in progress because there is a need of developing and revising central theoretical concepts in this new upcoming research field further in the future (see Lassen and Jensen, 2003, for further elaboration). In the following we will look into different theoretical perspectives on the long-distance work-related mobility. *First* we will explore how the restructuring of the global economy has created new conditions for modern companies and their mobility behaviour. *Secondly*, we will focus on how various transformation processes effect the employees and their working life on the individual level.

Restructuring of capitalism and the globalisation of companies

A central element in relation to the increasing work mobility is that economies have become globally interdependent, introducing a new form of relationship between economy, state and society. David Harvay has used the term "time/space compression" to describe the ongoing transforming processes. Manuel Castells speaks of the rise of the network society in the light of the information technology revolution and the restructuring of capitalism. He says that it can be asserted that today it exists a global economy, distinct from world economy, because economies around the world depend on the performance of their globalised core (Castells 1996:101). This globalised core includes financial markets, international trade, trans-national production and, to some extent, science and technology, and especially labour (Castelles 1997:1). Castells point out that networks are the fundamental stuff of which new organisations in the global informational economy are and will be made.

One of the trends within networking among manufacturing companies is outsourcing of parts of the production. This is, among other reasons, due to the fact that many manufacturers want to focus on core activities, and that *focused factories* are more efficient than factories with a large range of products and processes (Skinner 1994). As a result of this development, there is a need for close and frequent contact with suppliers to manage to deliver the products according to the requirements in the market place. Therefore, the issue of Supply Chain Management (SCM) has gained increased importance during the last years. The increasing amount of outsourcing activities leads to an increased need for transportation of *goods* and *products*.

Also, the usefulness of using partnerships, networks or alliances in the New Product Development (NPD) process is generally recognised (Pilkington 1999, Ozer 1999, Rothwell 1994, Veryzer 1998). The alliances are valuable to get relevant information about customer needs and capability in manufacturing. NPD processes in networks generate the need for coordination activities among the partners and departments, which generate an increased need for transportation of *people*.

Individuality and the transformation of working life

Another perspective on the increased work mobility is related to the change in working life and social identity. The Norwegian anthropologist Thomas Hylland Eriksen (2001) has described the modern worker as liberated from check-in watches, production lines and monotonous routines (Eriksen 2001:161). She is a part of the information society and the new economy's labour markets that is characterised of a flexible behaviour. She is often travelling, daily sending and receiving numbers of e-mails and her mobile phone is expected to be "always on". Such mobilised working life means that ability to be mobile both physical and virtual is fundamental.

Giddens (1996) stresses that in modernity's post-traditional order self-identity becomes a reflexive organised ambition. The more tradition loses its hold and the more everyday life reconstructs the more individuals are forced to make decisions about lifestyle. Reflexive life planning becomes an important element in structuring the self-identity (Giddens 1996:14). Giddens argues that lifestyle does not only

refer to activities outside work. Working life is not completely split from the scene where multifarious choices are made. Choice of work and work milieu forms a fundamental element in lifestyle orientations in the extremely complex modern division of labour. From our point of view, this means that individuals' mobility behaviour in a very complex way can be related to concrete life style and self-identity.

As mentioned above, Bauman has localised mobility as a main stratifying factor in today's society. A key explanation to this is according to Baumann that globalisation is changing all aspects of the human condition. Globalisation and other transforming processes have metaphorically speaking caused the modernity to become "liquid". This means that powers have moved from "system" to "society", from "politics" to "life-politics" and from "macro" to the "micro" level of social cohabitation (Bauman 2000:7). In relation to this, Bauman sees the rise of a hierarchy of mobility as the structuring element in modern life. It is the self's "degree of mobility" (freedom to choose where to be) which decides its position in this hierarchy.

To describe the different conditions for the self in the top and the bottom of the hierarchy of mobility Bauman uses the metaphor of *vagabonds* and *tourists*. The tourist is cosmopolitan and stays and moves at their hearts' desire and they are travelling light. For the tourist it does not matter whether the purpose of trip is business or pleasure. The tourist group includes global businessmen, global culture manager's mangers or global academics. Tourists' preferred means of transport is air travel because it is the quintessential mode of dwelling within the contemporary globalised world (Urry 2001:63). Vagabonds stand in contrast to the tourists and cannot travel as they feel like. The vagabonds are travellers refused the right to turn into tourists. Tourists travel because they want to, the vagabonds because they have no other bearable choice. A vagabond can for example be a refugee or a person locally tied. It is the freedom to choose that creates the inequalities between the vagabond and the tourist.

It is important to notice the complex link between modern working life, diverse mobilities and the social identity. A high-mobility cosmopolitan identity becomes a possibility for workers in a high-skilled work force but it is also notable that the "mobility society" has a structuring influence on the working life and the rest of everyday life. The description above illustrates in our point of view that there is a complex and interesting connection between diverse mobilities and the question about the social identity in late-modern society. We will therefore in this paper argue that it is necessary to face long-distance work-related mobility as something more than simply physical acts. Analysis of this kind of mobility behaviour must also include an individual perspective on mobility in relation to social identity and working life.

Research question and research method

Our objective in this paper is to investigate the relationship between mobility need in organisations and ICT. The question is whether the use of Internet and ICT creates a situation where human contacts realised by physical travel are easily replaced by virtual communication and the travel volume easily reduced? Or does the use of virtual communication increase the need for travel because contact is added through access to ICT, which in the long run may increase the need for travel? In relation to this our main purposes are to:

- Identify the amount and characteristics of long-distance work-related mobility among the employees in two Danish high competence organisations
- Identify what is the potential for reduction of mobility need in high competence organisations through increased use of ICT

The analyses in the papers are primarily based on in-depth case studies of two Danish high-competence organisations. To explore the issues above we will draw on different elements. In order to explain some of the driving forces, mechanisms and rationalities behind the long-distance work-related trips we will in section 2 present some of the results from an ongoing PhD-thesis, which focus

on this kind of mobility. The thesis is designed as a multiple-case study, which involves two Danish enterprises: Aalborg University and Hewlett-Packard Denmark. Methodically the case study involves:

1. Web-based questionnaire to all employees in the two Danish cases (a total of 1800 employees)
2. Face to face interview with selected employees in the two cases (a total of 11 employees)

In addition to these two cases, findings and experiences from the Norwegian e-learning research project Nettlaer is included in section 3. These will be used to discuss the findings in the cases and to propose how, and under which conditions, use of ICT seems to influence, and eventually can reduce, the amount of travelling in companies.

Nettlaer was carried out between 1999 and 2002, and was founded by the Norwegian Research Council. The main purpose for the project was to investigate how technology best is implemented in different course contexts in order to maximise the learning results. The experiences are from approximately 30 courses carried out at both secondary school and university level, and for full time and part time students.

This paper is a joint work where two different subject field, mobility management and e-learning/information systems, are brought together in order to try to put forward a more reflective view of mobility in globalised and Danish high competence organisations.

Part 2: The amount and characteristics of international work-related mobility

In this section we will try to explore how and why international work-mobility takes place. In this section both quantitative and qualitative dates will be involved. We will start briefly by pinning down the main characteristics of the work-related international trips respectively at Hewlett-Packard and Aalborg University. Afterwards, we try to describe some of the main rationalities and mechanisms behind this type of mobility in the two cases. In the following section we will use this to estimate the possibility of transforming some of the physical mobility into virtual mobility.

Hewlett-Packard
The first case we will examine in this paper is Hewlett-Packard Denmark. Hewlett-Packard has two Danish departments in Copenhagen and Århus. The company was started in California and today it is a global provider of products, technologies, solutions and services to consumers and businesses. The core areas are IT infrastructure, personal computing and access devices, global services, and imaging and printing.

193 out of 600 employees have responded on the web-based questionnaire, which gives a response rate of 32 %. The answers show that 75 % of the 193 employees at Hewlett-Packard have made a trip abroad within the last year. The employee who has travelled most has been on 43 international trips while 49 employees have not made any international work-related trips. Hewlett-Packard management estimates roughly that half of the employees carry out work-related trips, which means that 50 % of this group has participated in the questionnaire. The average employees of Hewlett-Packard Denmark have 3,8 times gone on an international trip and aeroplanes were the overriding means of transport. The majority of the participants in the questionnaire is male (75 %) and they have on average been on 4,3 work-related trips while the female workers have made 2,7 trips within the last year. It is remarkable that the employees have a significantly higher mobility level, compared with an average Danish citizen's annual use of transport (Danmarks Statistik 2000:173).

Our analysis of work-related trips at Hewlett-Packard Denmark shows how the company is organised and how the employees are travelling on an international scale. If we take a look at where the employees have travelled, 26 % of the total trips have been to Scandinavian countries and 67 % have been to other European countries while 7 % of all trips have gone to a country outside of Europe. Figure 1 shows the different purposes for work-related trips. Trips to foreign departments of the

company are the purpose of 21 % of all trips within the last year. Sale, purchase and negotiation are the second-most frequent purpose including 19 % of all trips. It is interesting to notice that almost one out of five trips have an internal purpose.

The figures above reflect that the company internationally is organised around different pillars each with their own function for example management, sale, consultancy etc. Furthermore, the company is internationally split up in regions on different levels, which mean that most travelling primarily takes place in Scandinavia and Europe. Trips outside Europe are for the same reason less common. Some employees have responsibility to specific fields of activity inside a region and therefore they work across national borders. Likewise, the company functions on autonomy, networking and net-relation between the employees. It is up to the individual employee to find projects and tasks to participate in inside the organisation. To do so, Hewlett-Packard has an internal job-market where it is possible to find relevant projects to enter. The employees are every year committed by a goal for their earning capacity and therefore they are "forced" to go where the job is, nationally as well as internationally. This means that there are institutional "pressures" to be mobile and to establish personal networks and relations to ensure future tasks that are necessary to survive in the job.
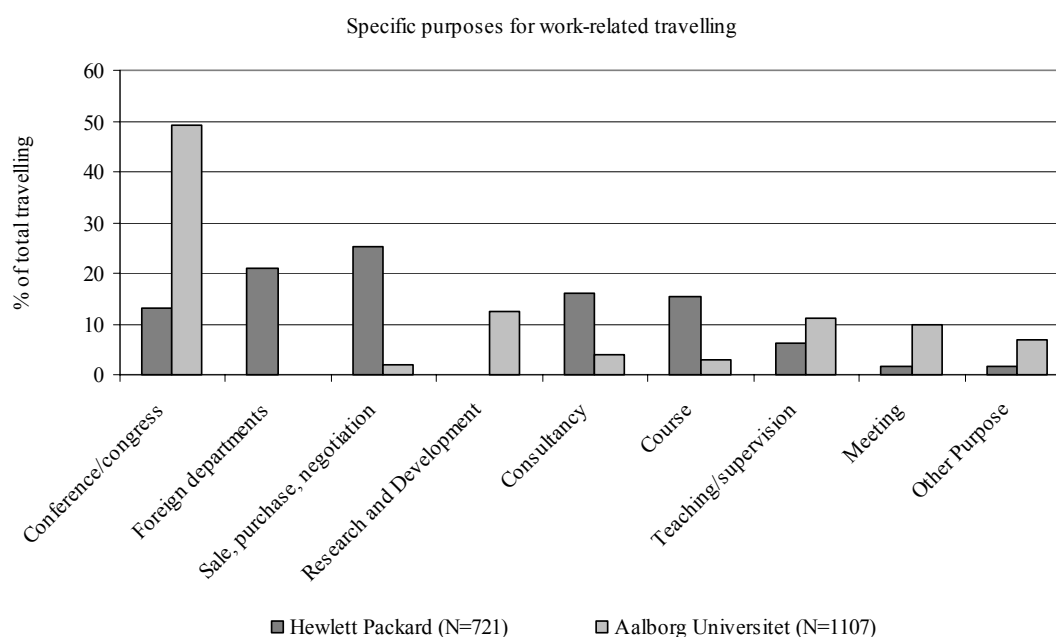

Figure 1: Purposes for travelling among the respondents at Hewlett Packard and Aalborg University. N is the total amount of trips among the respondents at Hewlett Packard and Aalborg University.

A very important question is to what extent the employees at Hewlett-Packard have self-determination in relation to their work-related trips? Is it a question of "individual choice" or "structural force" how often an employee goes on a work-related trip? In the questionnaire the employees is asked on a 5 point Likert-scale *"to what extent do you decide the frequency of your work related trips"* going from "total self-decision" to "no influence at all". The results of this question were that 32% of the employees said that it is "predominantly a self-decision" while 41% said that it is "partly a self-decision" how often they go on a work-related trip. Finally, 22% said that they "only have a little influence" when they travel in relation to their job. The tendency in the answers is that the main workers have an influential influence on when they are going on a work-related trip but it is remarkable that only few on Hewlett-Packard can choose freely. We are here dealing with a very complex connection between the individual behaviour and the institutional expectations and demand from company, collaborator, labour market etc. A specific travelling behaviour is both related to structural forces and the employees' individual choice.

Aalborg University
The second case we will examine in this paper is Aalborg University. Aalborg University is a Danish institution whose primary activities are research, teaching and administration. The university was started in the early 1970s and is placed in the County of Northern Jutland.

The total response rate at Aalborg University was 46 %. 547 out of 1200 employees have responded on the web-based questionnaire and 69 % of the employees who have participated in the analysis have carried out work-related trips within the last year. Aalborg University consists of independent departments without a total travel budget, which means that it is very difficult to decide how many of the travelling employees the analysis captures. On average, employees from Aalborg University have 2,0 times gone on an international trip and aeroplanes have been the overriding means of transport. The employees who have travelled most internationally have carried out 22 trips within the latest year and 168 respondents have not travelled at all. This is fewer trips per. employee compared to Hewlett-Packard but it is still considerably above of the average Danish person's annual use of transport. Like Hewlett-Packard, the majority of the participants is male (76 %) and they have on average been on 2,2 work-related trips while the female workers have made 1,7 trips within the last year.

Organisationally, Aalborg University is split up in three different faculties: The Faculty of Humanities, The Faculty of Social Sciences and The Faculty of Engineering and Science. These faculties consist of a number of departments, which function very autonomously. Of course, there are number of requirements to the specific job description (for example Professor, Associate Professor, Ph.D. Student etc.). For example, an Associate Professor has to carry out research, publish the work internationally and create international relations. But it is up to the employees themselves how they perform. This mean that internationally work-related trips are much more individualised compared to Hewlett-Packard. If we look at the international work-related trips, 22 % of the trips were to Scandinavian countries and 56% were to other European countries while 22 % were to a country outside of Europe. Compared to Hewlett-Packard the international trips at Aalborg University have not the same regional patterns because the trips more often go to a country outside of Europe.

As we can see in figure 1, conference and congress participation is the most common purpose for the employees at Aalborg University. 49 % of all trips were carried out to a conference or congress, as shown in Figure 1. Research and Development (12 %), Teaching and Supervision (11 %) as well as Meetings (10 %) are also an important purpose with the travelling activity at the university. This means that conference and congress participation is an important activity for the employees and they are travelling globally on very long distance to do so.

Compared with Hewlett-Packard the employees at Aalborg University have a higher degree of self-decision in relation to work-related trips. 73 % said that it is a "total self-decision" or "predominantly a self-decision" how often they go on a work-related trip. Furthermore, 22 % said that it is "partly a self-decision" and 6 % said that they "only have a little influence". This means that the employees have a high individual influence on how often they go on a work-related trip. Of course, there are also some structural forces that affect the employee in this case, for example to create an image for oneself internationally, but still it is important to notice a higher degree of self-decisions compared to Hewlett-Packard. The research worker at Aalborg University has a high influence on whether to go on an international conference or not - to travel, or to stay.

The meaning of structure
After this brief introduction we will now try to describe some of the main rationalities and mechanisms behind the work-related mobility in the two cases. We begin by outlining some of the elements of why travelling in high-competence organisations takes place and focus on both similarity and difference between the two cases in relation to this issue.

We will start by focus on the meaning of social structure. This is of course an important question in relation to why international work-related mobility takes place. A social structure can be seen as made

up of a set of internally related objects; a certain social structure may in its turn also be part of a greater social structure. The labour market, marriage, a language and a working team are all examples of a social structure (Danermark et. al. 2002:178). A social structure is emerged from human agency and receives novel properties of their own, different from the properties of people. As we show above, the employees at both Hewlett-Packard and Aalborg University have an individual influence on their travelling behaviour but none of them can choose freely. Several structural conditions set the frames for the employees' individual behaviour, and these conditions are different in the two organisations. We will therefore try to examine both structural and individual explanations on international work-related mobility.

A significant structure is on the organisational level. There are some organisational expectations to the employees' mobility behaviour. In the interview, the management at Aalborg University is seeing high costs of transport as a picture of success. It was a clear priority to ensure a high level of international trips when the university was established in the early 1970s. From the beginning, the organisation sends a clear signal to the employees that a high level of international activity was expected. This was motivated by the fear of being a province university because of the geographical location in a rural district. International engagement was to the management a way of avoiding this development and therefore a high level of international activity (and international travels) is today an integrated part of the culture at the University.

On Hewlett-Packard there are also organisational expectations. As we show above Hewlett-Packard is a company, which is founded globally which means that the employees work internationally. The international structures in the company mean of course that there are some expectations to the individual employee at Hewlett-Packard about international travelling. As mentioned previously the management has expectations to the individual earnings, which contribute to a high level of international travelling. As one employee said, there are international expectations to one the moment one steps inside the door. It is in the cards that it is difficult to refuse to travel. It is unthinkable that one will stay at home if a European management or a project group wants a meeting. A member of the management at Hewlett-Packard explains that travelling is something that goes hand in hand with the job:

"It can be so much that somebody grows tired of it, but on the other hand, they are aware of that when they accept the job it involves a certain degree of travelling. So I might hear somebody say: "arhh, I have to travel again, I am never at home", but one can also say: arhh, it rains today. You can't do anything about it, it's about the same" (55-year-old male secretary to the managements at Hewlett-Packard).

A global organisation means that work-mobility is seen as something natural in line with a rainy day and one can't do anything about it as an employee apart from accepting it. Even though international work-related mobility plays an important role to Aalborg University, it differs from Hewlett-Packard. On Hewlett-Packard the mobility is a total integrated part of the working life. The employees are carrying their office in a briefcase. They have no permanent offices and are capable of working all over the globe with their portable-PC and mobile telephone. This means that a traditional working life where the employee sometime goes on an international work-related trip and comes back to the office no longer exists on Hewlett-Packard. On Aalborg University, there is also a high level of work-related mobility compared with the average of a Danish employee, but it is carried out in a traditional way where the employee goes on a trip for a period of time and then comes back to the office.

A cosmopolitan identity
Another aspect in relation to understanding international work-related mobility is the question about the employees' rationality, identity and desires. A number of employees said that a job with an international dimension is important in their self-conception or identity. Identity can in simple terms be seen as the answers to the question of who you are (Uth 2001:247). International work-mobility can be seen as a marker of identity (see Lassen and Jensen 2003). In the web-based questionnaire 48 % at Aalborg University and 44 % at Hewlett-Packard declare that international work-related travelling is

an important part of their identity. Likewise a number of the employees point out in the qualitative interviews that they will resign from their job if the international dimension disappeared. To be mobile on an international scale is important for a great part of the employees' self-conception both at Hewlett-Packard and Aalborg University. A female employee expresses the meaning of the international:

"[...] it is enormously important, it depends on how one means the international. I am not thinking much in national terms and when I open the newspaper I am not reading much about the hospital sector or what might be, I go straight to the international news, I am focused on the international. I don't consider myself Danish through and through either, if one can put it that way, even though I am so by birth, but I think that I have more of an international self-conception than a national self-conception" (40 years old female associate professor at Aalborg University).

As the quotation above illustrates, an international self-conception is important to the employee and the international work-mobility is a way to materialise this identity in practise. Work-related mobility can be seen as a praxis which is followed by the employee, not only because such praxis fulfils utility values but also because it gives a material form to a special narrative of self-conception (Giddens 1996:100). This is likely to be the case for many of the employees at both Aalborg University and Hewlett-Packard. The self-conception varies among the employees form what Bauman has described as a cosmopolitan identity to a self-conception where the international dimension in the job is playing an important part. As mentioned above, there is a difference between the degrees of self-decision between the two cases, but in either case the international has an important meaning, one way or the other, for the employees. The question about international self-conception is important when one wants to evaluate the potential of virtual communication to reduce physical work mobility. The motivation to be reflexive about when to go on a work-related trip is limited if an internationalised and mobilised working life is central to the question of identity. Then it can be difficult to motivate a different behaviour.

The need for physical proximity
In both cases the ability to network and to make relations is fundamental to handling the employees' job. As a female worker from Hewlett-Packard said, *"without relations one is dead"*. The employees describe the physical meeting as important in relation to being a part of a network. A physical meeting with a customer to end a deal or a conference dinner can be important to manage the job. Maybe it is the conference dinner that gives you contacts to new project partners or new collaborators. The physical meeting offers, due to the employees, something that virtual communication does not contribute, for example eye contact, body language, small talk, socialising etc. A male employee from Hewlett-Packard elaborates on the issues of face-to-face meeting:

"[...] we humans are social animals, remember, and given that we are social animals, a much better connection is established when you talk to a person in person. Talking to a person over a phone becomes very impersonal, and you can never be one hundred percent sure what happens afterwards, so in that way you establish a personal guarantee that some things are carried through and that you have a possibility of following things through afterwards" (51-year-old male manager at Hewlett-Packard).

This illustrates that proximity is important when one is trying to understand why international work-related travelling takes place. A face-to-face meeting is an important element when two people want to be confident with each other and to build trust. Urry has pointed out that co-presence especially offers eye contact with the other, which can establish intimacy and trust (Urry 2000). In face-to-face conversations topics can come and go, he said, misunderstandings can be corrected and commitment and sincerity can be directly assessed. The interviews with the employees in the two cases shows that going to a meeting, course, conference etc. is much more than the act itself. There is a formal and informal agenda. Networking and relations building is a very important element in such activities. When one goes to a meeting, networking in the corridor or an informal "meeting" at the coffee-

machine is a very important activity. A female worker from Hewlett-Packard said that the real meeting is starting when the official meeting is over or during the break. It is here the real deals and agreements are made. In the same way an employee at Aalborg University stresses that conference or congress participation is more than a matter of exchanging scientific results. It is also a question of networking and to create new relations, which can be difficult to do through video-meetings, e-mail, voicemails, telephone and other virtual communication systems. It is difficult to have eye contact, socialise and to build trustful relations on the screen.

Is virtual-mobility an opportunity?

Central to the question on work-related mobility is whether the use of virtual communication creates or reduces the need for physical mobility and face-to-face communication. What is the potential to replace physical mobility with virtual mobility? In the web-based questionnaire the employees at Aalborg University and Hewlett-Packard are asked about their opinions about video-meetings and videoconference and asked to evaluate the opportunity to replace their physical trips with video-meetings etc. The result of this is illustrated in Figure 2.

Almost everybody at Hewlett-Packard and Aalborg University has heard about video-meetings and videoconferences. It is remarkable that 83 % of the employees at Hewlett-Packard has participated in a video-meeting and videoconferences, which is more than twice as much as employees at Aalborg University. 44 % of the employees at Hewlett-Packard think that video-technology can contribute to reduce some of their international work-related trips compared with 17 % of the employees at Aalborg University, as shown in Figure 2. Oppositely, 79 % at Aalborg University says that video-meetings and videoconferences only are a supplement to physical meetings while 47 % at Hewlett-Packard agree to this statement. This result shows that the

Figure 2: Can videoconferences replace travelling?

respondents at Hewlett-Packard, who to a higher extent have tried to participate in video-meetings and videoconferences, are more optimistic about the potential to reduce physical travelling. Another important element is that only a small part of the employees at both Aalborg University and Hewlett-Packard believe that this technology can make a decisive change in their physical mobility.
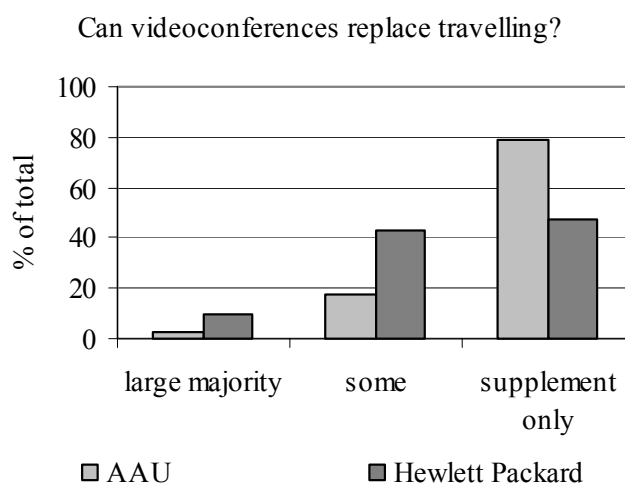
The qualitative interviews show that virtual mobility has affected the level of physical mobility only for a small part of the employees in the two organisations. For example, a male employee at Aalborg University works with ICT in his research. As a result virtual communication is an integrated part of this employee's working life. Correspondingly, a female worker at Hewlett-Packard, who has travelled a lot in the past, has reduced her physical mobility because she is satiated with travelling. Today she uses virtual communication to network and to keep in touch with important network partners. The overall impression in the two cases is, however, that employees travel physically instead of virtually. Of course, they have very various reasons to travel physically, for example excitement, variety from the job, demands from partners, the need for proximity, exchange of knowledge, networking etc.

The employees in the two cases are asked to elaborate on the meaning of virtual mobility vs. physical mobility. It is not evident whether the use of ICT supports an increased travelling activity, because it is easy to get in touch, or if it means that one will use communication instead of a face-to-face meeting. Some of the employees point out that modern ways of communication do both. Having modern communication, an employee said, brings you in contact with a huge number of people, together with whom you must do something and some things are best solved by starting with a meeting or the like,

but once you have started the need for meeting is reduced over time. Other employees point out the opposite situation, where contact starts with virtual communications, for example email, and at one time there arises a need to meet face to face. A meeting is then set up. However, a great part thinks that the possibility to communicate has also caused more travelling activity in relation with their work:

"[...] I do believe that in some situations where I have travelled abroad, it isn't certain that that situation would have been there if people hadn't had the more modern ways of finding each other. In this way, coming to think about it, I don't believe that these technologies make us travel less, they might provide us with, how should one put it, more communication and more contact to others with the same travelling frequency" (28-year-old male Ph.D. Student at Aalborg University).

This illustrates that there is a complex connection between virtual and physical work-related mobility. In some situations, virtual communications reduces the necessity to travel while in others it creates a need for meeting one another face to face. It is important to point out that there are a number of structural and individual mechanisms, rationalities and patterns of meaning that effect a specific behaviour. These effects are there regardless of whether a trip is carried out virtually or physically. In figure 3 we have tried to sum up some of the main points from our analysis in this section. In the last next section we will use this and some other experiences from ICT to discuss the potential of reducing the work-related mobility.

	Hewlett-Packard	Aalborg University
Degree of self-determination	A medium degree of self-determination	A high degree of self-determination
Type of main travelling purpose	1) Sale, Purchase and negotiation 2) Foreign Departments	1) Conference/congress 2) Research and Development
Characterisation of mobility	The employees have no fast office but carry their office in briefcase. Liquid lines between home and abroad.	The employees have a permanent office where they travel out from and come back to.
Organisational structure	Internationally organised company – represented in many countries	Strong demand for international profiling and involvement
Individual factors	The employees has a high degree of international orientation	The employees has a high degree of international orientation
Evaluation of virtual mobility	A high level of the employees has tried to participate in video meetings and a higher level of employees think it can replace physical travelling compared with Aalborg University.	A lower level has tried to participate in video meetings, but only a few thinks it can replace physical travelling.

Figure 3: *Sum up the main result of the case study.*

Part 3: Is it possible to reduce long-distance work-related mobility?

We will end this paper with a discussion of the possibilities and limitations of reducing long-distance work-related mobility. As we mentioned above, there is serious environmental effects related to long-distance work-related mobility carried out by airline. Air-mobility is related to serious environmental impacts because of the more aggressive impact of CO_2 emissions in the higher strata of the atmosphere, and their threat to the global climate is more serious than is the case for similar trip distances at surface level. Another perspective is that work-related travelling is related to high costs for an organisation. It therefore seems that there are a number of reasons to reduce the international work-related mobility.

As shown above, there are very different mechanisms and rationalities behind work-related mobility and the trips are carried out with different purpose. From our point of view it is therefore necessary to discuss the potential for reduction in relation to different tools. We will therefore carry out the

discussion with a starting point in two different technologies: Video-meetings/videoconferences and E-learning.

Videoconferences and video-meetings
We will start by discussing video-meetings and videoconferences as a tool to reduce work-related mobility. The video-technology gives the opportunity to meet virtually instead of physically. It gives the employees the opportunity to show each other documents, slides, videotapes, and notes from a blackboard etc. A video-meeting can either include only two persons sitting in two different places or be a firm-meeting with many participants in different locations.

Respondents at Hewlett Packard imply that the videoconferencing equipment available is not satisfactory for frequent use, due to bad quality of voice and picture. The development within technology related to videoconferencing has been rapid during the last years, and much of the equipment at Hewlett Packard is recognised as old, and with less functionality and lower quality than state of the art technology today.

At Aalborg University another technological barrier makes videoconferencing laboriously. Most of the IP addresses in the offices are protected through firewalls that do not allow communication outside the university with equipment for videoconferencing. This means that the employees cannot run videoconferences from their own office, but have to access another room with proper equipment and "open" IP addresses.

Experiences from Nettlaer indicate that excellent quality of the voices is the most important factor for a successful videoconference. This is because it is of critical importance that the voices are perceived correctly to avoid misunderstandings to occur. Good quality of the picture seems to be of less importance for the success of a videoconference.

In other words, there seem to be several technological barriers for videoconferences to be carried out successfully. These have to be considered and solved for videoconferences to be an alternative to physical meetings.

As illustrated above there was a tendency that the support to use video-technology increased in line with the experience of using the technology. This indicates from our point of view that there is a connection between knowledge of the technology and the willingness to use it. But there are barriers that prevent the technology to be used. To estimate the potential for using video-meetings as a tool to reduce work-related trips it is in our point of view necessary, when one asks such a question, to separate between different purposes. As we saw above work-related mobility has very different purposes. There is a big difference between using video-meetings as a replacement for a conference with more than a hundred participants and in using it to replace a meeting with only a few people. The employees express in the interviews that it is difficult to have the same benefit from a video-meeting with for example 8 or 10 persons than a smaller meeting with 2 or 3 persons, because it is difficult to communicate on a large video meeting. It is also necessary to separate between work-related trips' formal and informal purpose. A formal purpose is, as we saw above, an employee who is going to a conference to exchange research results. Opposite is an informal purpose with a work-related trip by an employee who is going to a conference to establish networks during the break or at the conference dinner. If a work-related trip have a high degree of informality it can be difficult to replace it with a video-meeting because the employees have little motivation to use the technology. Likewise some of the employees consider work-related trips as an important part of the self-identity – a tourist or cosmopolitan that likes to be on the move. Here there is very little motivation to use a video-meeting instead. Another perspective is that it can be very difficult to establish a trustful relationship with a person over a video meeting. This can be problematic if one is doing business with a person and one needs to know if one can trust him (or her), which can be very difficult to decide on a screen.

If we look at the different purposes with the work-related trips above every two trips at Aalborg University have conference/congress as the main purpose. This type of trips has a high degree of

informal substance and therefore it may be difficult to replace physical meeting. Other purposes at the university are for example meetings in a project group where the employees are familiar with the participants and where the meetings often have a formal agenda. Here video-meetings in our opinion will have a better chance to succeed. At Hewlett-Packard the most important purpose with work-related trip is sale, purchase and negotiation. As mentioned, sale involved a greet deal of trust and informal elements and therefore it can be difficult to handle this over a screen. The second-most frequent purpose is trips to Foreign Departments. Due to the interviews with the employees in the organisation some of these meetings have a practical substance, which perhaps will mean that it is attractive to use video-meetings. The employees will then be released from a long trip just to solve a practical problem. To sum up one cannot assume that video-meetings can reduce work-related travel at Aalborg University or Hewlett-Packard. Another perspective is that virtual communication in a very complex way, like other communications systems, may cause more physical travelling because it is a tool to get in touch with new people. We will get back to this issue in the end of this paper.

E-learning experiences from Nettlaer
The next theme we will discuss is E-learning. E-learning can be understood as use of different technology to increase the communication between teacher and students in order to make the learning and collaboration less dependent of time and place. Experiences from Nettlaer indicate that successful e-learning primarily is dependent on two different factors. These are: Blended learning and close and frequent follow-up of the participants.

Blended learning utilises the advantages of both classroom or instructor- led training and web-based training. This means that the teaching is presented through use of several technologies and methods, e.g. videoconferencing, e-mails and traditional classroom teaching. To what extent ICT is used in training depends on the context of the course or study. This includes considerations about the content, the learners and the available technology. If the learners are skilled in use of technology and are highly motivated for web-based training, extensive use of ICT is possible. In addition, some types of content are not suitable to present through use of technology, e.g. experiments. However, the use of the multiple delivery methods is required to satisfy the training needs of the participants. In addition, some classroom sessions seem to be very important as a motivation factor for the participants. This seems especially to be the case in the start up of the course, and when important issues are being addressed.

The content of the course can to some extent be compared with formal and informal purposes for work related trips, e.g. that conference trips often are made due to informal reasons as mentioned above, i.e. network building and socialisation. Use of ICT tools can probably replace the formal purpose with the conference trips, like key note speakers and presentation of research, but not the informal discussions and socialisation that take place for example during the breaks. In other words it seem not to be realistic that use of ICT can reduce the amount of conference travelling to any great extent.

It seems like the need for close and frequent follow-up is more required for courses assisted of ICT tools than in ordinary classroom-based courses. This might be due to the fact that in an e-learning context the participants meet the teacher less frequently than in a classroom context, which means that the face – to – face contact is reduced dramatically. To maintain the participants' motivation, frequent follow-up from the teacher seems to be of critical importance. This can be compared to the need for frequent contact between partners in a business context if it is wanted to maintain the contact through ICT and not through regular physical meetings.

There are reasons to believe that knowledge and experiences from Nettlaer can be use to estimate under which conditions use of ICT, e.g. videoconferencing, can be used to reduce the amount of travelling among employees in companies. One of the major benefits with e-learning, or technology enhanced learning, is that the learning becomes independent of place and time, because the learning material is available and accessible without travelling to a certain place.

However, as experiences from Nettlaer indicate that a combination of face-to-face meetings and communication and collaboration through ICT give the best results and highest motivation among the

participants. Physical meetings seem to be important in the early phases, which it is reason to believe is also the case for projects and collaboration in companies from different departments. In the early phase of a project it is important to get close relations to the other participants and important decisions are easier to make when people are gathered together physically. This is related to the establishment of trust as mentioned above, and this is easier to establish through face-to-face contact. However, it is our opinion that established relationships to a large extent can be maintained and developed further through virtual communication.

To what extent can virtual mobility replace physical mobility?
Earlier, we posed the question of whether the use of virtual communication and ICT creates a situation where human contacts realised by physical travel are easily replaced by virtual communication and whether the travel volume is easily reduced. In our opinion, video-meetings and videoconferences will only be a supplement to meet physical. In some situations we believe this to be a real replacement to physical travel but this necessitates a strong motivation from the individual employee. For example, if an employee wants more time with the family or is tired of "being on the road". But from our point of view it is likely that video-meetings and videoconferences in many situations will cause more physical travelling. For example, if you have worked with a partner on the screen you would like to meet the person – or the opposite: you start a work-relation by meeting one another to build trust – to be confidential. In relation with travelling this is like a snowball effect – new ways of finding each other cause more physical travelling. So maybe video-meetings and videoconferences will be a success but this is in our point of view not a guarantee for less travelling. Furthermore, various structures means that it is difficult for the employee to choose not to travel because of international demands from the organization, as well as the fact that many employees look at them self as internationally oriented persons. All factors which means more travelling, not less. Alike to this is, as we mentioned above, the fact that an informal agenda can cause that it is necessary to meet face to face.

In relation to e-learning, and ICT tools developed for communication and collaboration, we believe that there is a potential to reduce some of the different kinds of work related travelling. These are especially *participation in courses*, *teaching* and *supervision*, *meetings* and some of the trips for *sale*, *purchase* and *negotiation*. However, assuming that the purpose for the travelling is primarily formal, the participants are skilled in use of ICT and that the content is suitable for ICT. On the other side, we do not believe that use of ICT can replace conference trips or other to any great extent.

Conclusion

Above we have tried to analyse and discuss the mechanisms and rationalities behind international work-related mobility and to estimate the potential for reducing this type of mobility. The main points in our analysis in this paper are in sum that:

- Both employees and employers have a strong international orientation in the two investigated high competence organisations.
- Informal elements is often very important for a physical work-related trip which means that face to face communication is fundamental.
- More communication, through use of ICT tools, seems to generate the need for physical meetings in addition, which leads to more travelling, not less.
- Greater knowledge of video-technology gives higher beliefs in the application of it.
- IT tools for communication and collaboration can be used to reduce some kinds of work related trips with a formal purpose, e.g. short meetings, courses and teaching/supervision, but is not assumed to replace travels with a more informal purpose, e.g. conference trips.

We therefore conclude that the factors behind work-related mobility are complex and include both personal and institutional factors in addition to more specific purposes for the travelling. There is a need for a balanced and reflective debate to understand the nature of work related travelling. We therefore think that the Scandinavian aviation company, as we mention above, can put their weapons against videoconferencing down, because use of ICT tools not necessarily will lead to less travelling.

To answer this complex question it will, in our point of view, be necessary to carry out much more research on the subject in the further.

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