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Kari Dyb and Susan Halford

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Placing Globalizing Technologies: Telemedicine and the Making of Difference

Kari Dyb
University Hospital of Northern Norway

Susan Halford
School of Social Sciences, University of Southampton

ABSTRACT
The development and proliferation of new information and communication technologies has generated some profound claims about the erasure of place. Whilst these claims have continued political and policy resonance, they are increasingly challenged in sociological debate, which emphasizes the persistence of the local. Following this lead, our article explores relations between technology and place. We develop our understanding through engagement with Science and Technology Studies, Actor Network Theory and geographical conceptualizations of place. Our argument is worked through a new empirical study of telemedicine, where new technologies are applied precisely to overcome place. Our analysis is that, on the contrary, empirical outcomes are legible only through the lens of place. This has important policy implications and broader implications for thinking about technology in contemporary debates about globalization.

KEY WORDS
globalization / information and communication technologies / midwifery / Norway / place

Introduction

The recent development and proliferation of new information and communication technologies has renewed sociological concern with the decline of place. Specifically, it has been argued that the rapid multiplication of possibilities

for instantaneous, mass communication over distance saturates the local with global flows of finance, information and people (Sassen, 2000), reconfiguring relations between places, whether a few hundred or many thousands of miles apart. Indeed, such measures of distance have, supposedly, increasingly little significance in the contemporary world (Robins, 2007). As relations between places are transformed, it is suggested that the nature and significance of place as we have understood it – material, geographical, 'real' place – are diminished, replaced by new forms of social interaction 'across indefinite spans of time-space' (Giddens, 1990: 21).

While academic debate increasingly challenges such claims, they remain powerful in political and policy discourse. Governments are actively promoting information and communication technology (ICT) in the public sector and the notion of technologically enabled place-less-ness is significant in the visualization of public policy, largely (although not only) at the level of national states. In healthcare, the use of telemedicine – linking clinicians with each other and/or with patients – has been promoted in political strategies and policy documents worldwide (MacFarlane et al., 2006; NHS Executive, 1998; Rigby, 1999). The technological possibilities for eliminating distance permit the rationalization and abstraction of healthcare from the constraints of space and place, promising efficiency and equality in a modernized healthcare system (May and Ellis, 2001). In short, echoing hyper-globalist sociological claims, this policy rhetoric suggests that new technologies can be applied to neutralize the iniquitous effects of place on healthcare services.

What then are the implications for such initiatives of recent sociological debates, which challenge this hyper-globalist vision? This article follows the lead of revisionist sociological accounts, which emphasize that whatever the technologically enabled flows and inter-connections, lives are still lived in place (Appadurai, 1996; Robertson, 1995; Savage et al., 2005). However, the implications of debate to date for thinking about technology and the local are unclear. Indeed, in moving from earlier understandings of technologically driven globalization, and emphasizing the persistence of the local, newer accounts have had little to say about relations between technology and place.

The aim of this article is to develop our understanding of relations between technology and place and – in doing so – to explore the implications for policy initiatives that intend to use technology to overcome the constraints of place. Our article begins with Science and Technology Studies (STS) and Actor Network Theory (ANT), which both propose that technology, and the science that underpins it, is always done in particular locales, by distinctive assemblages of people, objects and processes. However, we suggest that the STS emphasis on located-ness serves as a metaphor for particularity and performativity rather than engaging with place, whilst ANT's focus on the objects of technology tends to obscure embodied and human makings of place though emotions, politics, identities and histories. In developing our understanding of relations between technology and place recent geographical debates are helpful, admitting the simultaneous social, cultural, economic,

historical and political makings of places through materialities, processes and meanings (Lefebvre, 1991; Massey, 2005; Soja, 1996).

We work our argument through a new empirical study of one telemedicine project. While telemedicine promises place-less-ness through applications of ICT, it is characterized by low levels of routine use (May et al., 2005). Drawing on STS, ANT and geographical conceptions of place to explore a telemedical ante-natal facility, we suggest that the outcomes are legible only in terms of technologies that are done in place. Our conclusions draw together the implications of our approach and analysis for policy and, more broadly, for thinking about technology, place and globalization.

Globalization, Technology and Place

> The digital planet will look and feel like the head of a pin. (Negroponte, 1995: 6)

Sociological concern with the end of place is hardly new (Ray, 2007), but the recent proliferation of new ICTs gave fresh impetus to the debate. The potential for ICT to eliminate distance erodes spatial barriers to social interaction. But, more than this, in dismantling these barriers and enabling new interactions, it is suggested that new technologies undermine the rootedness and distinctiveness that makes place. What makes a place a place is rapidly disappearing. As Levinson (2001) argues, McLuhan's (1964) prophecy of the global village, where space no longer matters, makes most sense in the digital age where new technologies subvert, displace and radically redefine our notions of place (Mitchell, 1995). Such claims have become implicit in broader theoretical accounts of the late 20th century, for example in Giddens' (1990) elaboration of time-space distanciation, Harvey's (1989) time-space compression or Jameson's (1998) post-modern globality (Burawoy et al., 2000). However, here technology becomes an absent presence, central to the social changes explored but not to the analysis itself. This point is most fully redressed in the publication of Castells' trilogy on the information age (1996, 1997, 1998) where, conversely, ICT is the point of departure for analysis of the contemporary world. For Castells, ICT provides the material basis for the emergence of a new economy where the space of flows replaces 'historically rooted spatial organization … the space of places' (Castells, 2000[1996]: 408–9). Here, Castells is more careful about the local than the earlier hyper-globalists were. He does not claim that the world remade through the information paradigm *is actually* placeless. Rather, the places that he writes of exist in terms of the technologically enabled capitalist economy, as hubs and sites of exchange or as leftovers, denied a place in the new economy. This is, nonetheless, place absorbed into the logic of the information paradigm, which is, itself, placeless.

Recently, Savage et al. (2005) have argued that this and other endeavours to reconcile the local within accounts of globalization are problematic. The local cannot simply be explained (away) as an outcome or example of the

global but acts as 'an irritant to the epochal and speculative character of much contemporary social theory' (2005: 6).

Focusing on the example of residential belonging, Savage et al. conclude that we must conceive of *differentiated globalization*: that the 'precise form and nature of global connections' depend on the 'precise field that is being studied' (2005: 207). Thus, whilst some fields, the mass media for example, use new technologies 'to permit considerable spatial extension' (2005: 207), other fields, for example residence, do not. Belonging is embedded in property and bodies, and technology cannot transcend this.

We might assume from this an implication that technology is place-less and that its role is to permit place-less-ness across other fields of action. Alternatively, in the spirit of Savage et al., we suggest that the question remains open: that we need to explore technology and technological practices in their own right, rather than in terms of their impact on other fields, and consider how understanding relations between technology and place might contribute to a more differentiated understanding of globalization.

Technologies and the Local: Bringing in Place

We begin this endeavour with the Science and Technology Studies (STS) insistence that 'technologies … gain sense and significance within everyday activities and ordinary experience' (Heath et al., 2003: 77). Building on Latour's study of *Science in Action* (1987), STS brings prevalent understandings of science as universal 'down to earth' (Law and Mol, 2001: 610). Whilst '… faith in the universality of well established facts depended on never asking where' (2001: 609), STS shows that scientific facts are made in practice and, indeed, in particular locales. Here, increasing attention is given to the part that technological objects, for example the asthma inhaler (Prout, 1996) or the water pump (Law and Mol, 2001), play in the everyday performance of scientific facts. Following the STS logic, these technologies cannot be understood as finished products. Rather, they are brought into being through their use in particular times and places.

However, in practice, this attention to the located-ness of technology refers to matters such as social practice and convention (Pasveer, 1988), practical circumstance (Timmermans, 1998), and inter-professional relations (Dent, 1990), emphasizing how these shape the production of specific technologies. Whilst these assemblages are, of course, in particular places (and times), located-ness here serves as a metaphor for particularity, complexity, inter-relatedness. There is little attempt to engage with the significance of these places *as places*: to see beyond place as a neutral backdrop for socio-technical relations or to recognize its implication in the construction and performance of particular practices, circumstances and relations, through its materiality (whether urban environment or wilderness) and its own emergent history and culture.

Directly descended from STS, Actor Network Theory (ANT) is helpful here. Developing the relational perspective on technology, the notion of 'network'[1] is

used to describe how technological objects are produced in configurations of heterogeneous entities, people and things. Nothing that enters into these relations has essential significance or attributes. Rather, a technological object remains stable only as long as the relations between it and its neighbouring entities hold steady (Law, 2000). This poses important questions about the nature of technologies as they move from one place to another. Helpfully, Law and Mol (2001) distinguish Euclidian space from network space. A technology may move from one place to another, according to Euclidian geometrics, but it is an open question whether the network holding the object steady remains stable, whether network space holds firm. As Law and Mol say:

> Facts are only facts if they are actually treated as facts when they arrive at their destinations. In most places the facts of science are not recognised as facts at all. They look like so many meaningless pieces of paper. (2001: 609–10)

Or technologies may look like so many useless pieces of equipment. For stability to be achieved heterogeneous actors must be tied together over space. In this sense there is no global, only networks between locals (Murdoch, 2006). There is no guarantee that the network space that holds the object together will remain stable over Euclidian space. Rather, a technology may be transformed as it moves both geometrically in Euclidian space and also in network space.

This is useful for thinking about technology, place and globalization. Claims about technology and place-less-ness depend on the shared and mass use of new information and communication technologies connecting processes, people and objects over space. This entails two key assumptions: first, that technologies are predetermined, fixed and predictable; and second, that technologically enabled flows of information lift us out of the local, flattening the world so place no longer matters. STS and ANT offer rather a different perspective. However, whilst the point about technology is well made, the conceptualization of place remains elusive. Insistence on the situatedness of technologies refers to the particularity of these technologies as they are brought into use, rather than engaging with the places that they are practised. Place becomes, at worst, a neutral backdrop for the performativity of particular technologies, not implicated itself in producing these technologies, and at best a silent contributor to the performativities of particular technologies, an empty conceptual space.

This silence might be explained in two ways: first, is the concentration on the spaces of objects rather than the spaces of place, on the technological object and how it moves in space, rather than on the place itself. Both STS and particularly ANT *might* say more about place than they have. Their emphasis on particularity and complexity is suggestive and might offer more on the placed-ness of actors in the making of technologies in use. Second, though, there are limits to the capacity of these frameworks to apprehend 'place'. These relate to the human productions of history, identity and meaning and to associated embodied capacities such as experience, intuition or belonging. Insistence on the radical symmetry of human and non-human actants is central to ANT but, as others have argued, this produces a tendency towards an 'obscuring materialism' (Conradson, 2003: 1982),

limiting understandings of the 'immaterial and affective' (2003: 1982), the lived dimensions of place. Whilst ANT transforms our thinking by directing us to the significance of things, it has been less effective at exploring the inter-relational makings of objects and emotions, feelings, memories and identities.

This is not to superimpose an obscuring humanism or to focus *only* on the affective and embodied capacities of human actants in our understanding of technologies in place. But it is to insist that we take embodied and human makings of place into account, and that we need an approach to place that enables us to integrate the material, the affective and wider changes referred to in debates about globalization. In this way, we can explore relations between technology, place and globalization. To take this forward, we draw on geographical conceptions of space and place from Harvey (1969, 1973), Lefebvre (1991) and Massey (2005). This begins with a relative conceptualization of space. The geometric notion of space as an empty container 'into which intrinsically non-spatial things are stuffed' (Castree, 2004: 183) is replaced with the argument that space *arises* as a system of relations between activities and objects which 'define spatial fields of influence' (Harvey, 1969: 208). Whilst Euclidian notions of space and place persist, and indeed exercise a powerful influence on popular understandings, this is *one* rendering of space, amongst others that attend to the social production of space; for example to meanings, experiences, power relations and social actions (Lefebvre, 1991). At the heart of this account lies a dialectical conceptualization of social space (Soja, 1989). Space is socially produced *and* space is implicated in producing social relations. Space is both the effect and cause of social life. Implied in this, space is both multiple and dynamic. Lefebvre (1991) uses the concept of 'lived space' to capture the ongoing complexity and multiplicity of social space. There is, he says, nothing inevitable about lived space, it is constantly produced and subject to change over time.

This approach has reinvigorated debates about place (Cresswell, 2004). The history of the concept is divided between structural and interpretive accounts with a global versus local focus. The concept has a long association with phenomenology, focusing on emotional attachment, belonging, meaning and everyday experience (Tuan, 1977). However, early debates about globalization dismissed 'place' as both limited and limiting in political and theoretical terms (Harvey, 1989). Bridging this gap, Massey reconceptualizes place, integrating the subjective meanings of lived place with an appreciation of other, multiple and diverse relations – national government policies, global finance, the mass media, and so on – that contribute to the making of place. Place comes to be understood as a point of intersection, produced from the interactions of relations 'from the immensity of the global to the intimately tiny' (Massey, 2005: 9).

This relational approach to space and place echoes STS and ANT thinking about technology. Indeed, we do not pose it as an alternative to these traditions but as a shift in focus and an extension of the claims made there. Overall, we are making an argument for the embeddedness of technology in place. We are *not* arguing that this is somehow counter or resistant to the globalizing potentials of new information and communication technologies. It is not that these

technologies are already made, fixed before they reach particular places where they are then reacted to. Rather, our starting point is that these technologies are made in place, in the wider sense enabled by the accounts described above.

These arguments have significant implications for policy initiatives pursuing place-less-ness through the application of ICT. In what follows, we explore these through the detailed analysis of one case study. Indeed, if technologies are performative, and local, and we must take lived place into account, then the logic of our argument insists that we take a case-study approach.

New Technologies, Space and Healthcare

In healthcare, 'telemedicine' enables virtual links between patient and clinician and/or between clinicians. Telemedical projects are designed precisely to enable the de-spatialization of healthcare delivery, transcending space to ensure a uniform and place-less service for all. It is claimed that telemedicine can overcome geographical distances and boundaries (MacFarlane et al., 2006), stabilize practice and knowledge over space (May and Ellis, 2001) and that 'The virtual hospital is set to become a reality, no longer defined by buildings or sites … each can become a virtual global network' (Rigby, 1999: 100). As such, telemedicine has immense policy appeal, described by one advocate as the most important 'revolution in healthcare since the advent of modern medicine, vaccines or even public health measures like sanitation and clear water' (Silber, 2003: vii). Somewhat more cautiously, the British National Health Service Executive described how 'the opportunities in the field of telemedicine will be seized to remove distance from health care' (NHS Executive, 1998: 14).

In the rhetoric of telemedicine, space means distance between entities defined in abstract, formal and functional terms. Place is no more implicated in the organization and delivery of healthcare than the separation of patient from doctor or GP from Clinical Specialist. Overcoming the distance between these functional roles will speed up the system, linking healthcare providers and recipients in de-spatialized virtual networks. However, there is a significant gap between this policy rhetoric and the use of telemedicine. Indeed, there have been major difficulties in the implementation of telemedicine beyond experimental projects (May et al., 2005). It is in this context that we followed the establishment of a new telemedicine project, based in Northern Norway.

Methodology

Norwegian governments have actively promoted ICT in healthcare (ShDIR, 1997, 2001, 2004) and there are high expectations in a country where the right to live in remote areas, and to be supported by state funded infrastructure, is embedded in the national psyche. The Norwegian Centre for Telemedicine (NCT) has government funding to take a pivotal role in the implementation of

telemedicine (Baardseng, 2004) and 'has as its objective to secure a good health service for all, regardless of time and space' (NCT(a)). In 2001 NCT established the 'Broadband Born' project enabling midwives at a community hospital on the Lofoten Islands to transmit real-time digital images to obstetricians at an acute hospital on the mainland. The project was initiated in response to a national shortage of obstetricians and particular retention difficulties in rural areas. The aim of the project was to deliver better care for women in rural areas by enabling local professionals to access specialist knowledge both in day-to-day practice and in cases of complications (NCT(b)). It was hoped that the project would allow the community hospital to offer the same expertise to women on the Lofoten Islands as to those on the mainland, 'bringing specialist knowledge to where the mother is' (NCT(b)). Here we see the embedding of scientific 'facts' (foetal images, foetal heartbeat, digitization, transmission of electronic information) into technologies (the ultrasound scanner, personal computer and broadband connection) brought together in a single project. Through this project, it was assumed, the generation and diagnosis of medical information and the delivery of maternity care could be rendered place-less by instantaneous communication between places.

Our research was underpinned by the STS understanding of the interplay between technologies and users: the dialectical understanding that each makes and re-makes the other through ongoing interaction. Our starting point was to follow the technologies as they were embedded in practice. To this end, our research has been inspired by ethnographic methodology (despite some ethical and temporal limitations). Following Burawoy et al. (2000), this entailed four key elements. First, our approach meant 'the extension of the observer into the world of the participant [where] … the observer leaves the security of the university for the uncertain life of the participant' (2000: 26), and second that there is 'an extension of observations over time and space' (2000: 27). We spent two periods living near the hospital and spending time in the hospital with the midwives. Phase I involved one researcher, for one month. Phase II involved three researchers for one week. During these visits we were present in the maternity unit most days, able to make unstructured observations, take still and moving images and have informal conversations with midwives, healthcare assistants and doctors. We also spent time in the local town and travelled the local area, developing our appreciation of these so that we could discuss the place with our participants. Conversely, when one of us lived locally for a month *we* became a matter of local knowledge, swiftly tied into place by local networks, the owner of our rented house and sightings in the supermarket. Our participants used this knowledge to talk to us about *our* lives.

We conducted 15 semi-structured interviews, including all the midwives, one doctor and a nurse from Accident and Emergency involved in the transfer of women in labour to the acute hospital. We *did not* observe or talk with clinicians when they were with patients, so our material contains accounts of the technologies in use, rather than our observations of this. However, our intensive and ongoing engagement with the participants has allowed us to build

detailed and complex accounts of the broadband technologies in the daily work of the maternity unit and the practices and meanings of these technologies in place. As we show shortly, the maternity unit, the hospital, the local town and the Lofoten Islands were constructed as highly distinctive and particular places and this is critical to any understanding of these technologies in use.

All the interviews were recorded and transcribed and we were able to undertake close textual analysis. In this we were attentive to the third and fourth principles of ethnography outlined by Burawoy et al. (2000): namely the extension of analysis from 'the time-space rhythms of the site to the geographical and historical context of the field' (2000: 27) and 'the extension of theory' (2000: 27) into the field, in an explicit way as we 'constitute the field as a challenge to … theory we want to improve' (2000: 27). Of course, in this case the theoretical lacunae that we have outlined above lie within a framework that insists on the importance of contingency and particularity in place. It is not that we knew in advance exactly what we hoped to find but rather that we began with an approach that tied an STS understanding of technology to spatial theories of space and place.

Technologies in Use in Place

Broadband Born incorporated two technologies already in use on the maternity ward, ultrasound and cardiotocograph (CTG). The innovation was the introduction of a dedicated secure broadband connection between Lofoten and an acute hospital on the mainland. Midwives use ultrasound for routine scans during pregnancy. Prior to Broadband Born, if the ultrasound indicated anything unusual the pregnant woman was sent by ferry and/or plane to the mainland hospital or to the National Centre for Foetal Medicine over 400 miles away. Broadband Born promised the same service without the pregnant woman leaving Lofoten. The CTG is used in labour to monitor the foetus' heartbeat and the mother's contractions. Prior to Broadband Born, a clumsy process of faxing CTG readouts to the acute hospital was occasionally used, but now these images can be viewed 'live'.

We now explore how we can understand the Broadband Born technologies '… with regard to the conduct and practical experience of those using the tools' (Heath et al., 2003: 78). We show that this cannot be accomplished without understanding the place in which they are used, or not used. Our analysis is in three sections, not discrete from one another, but in which we emphasize distinctive ways that place produced particular uses of these technologies.

Knowledge in Place

The Broadband Born project applied technology to abstract knowledge away from the point of its production. Through digitized scanning devices and high speed data transmission, images of the foetus, the placenta and the mother's contractions were rendered as place-less facts. This supported the government's commitment to rationalize healthcare services across the country, policy

commitments to use ICT and NCT's mission to apply ICT in ways that would equalize healthcare delivery over time and space.

However, as we suggested earlier, facts operate as facts only if they are treated as facts. In this case, these 'facts' – the images of the foetus and so on – are not treated as unambiguous or even relevant in assessing a pregnancy or labour. These images are, critically, just images. They are not the foetus itself or the pregnant woman (Haraway, 1997; Mitchell and Georges, 2000). Understanding this is central to understanding why the technologies are so little used. Describing her use of ultrasound by broadband Trine explains:[2]

Trine: … when you are sending pictures and the doctor is looking at the screen … it's very difficult to get the right image to, to be the doctor's hand so to speak. Because we are driving with this probe and the doctor is demanding certain pictures and it's difficult … it's like a bicycle, you do not think about it, you're just driving with the scanner and to get the picture you want. And maybe the doctor wants another picture

Interviewer: And is it hard for the doctor to put that into words?

Trine: Yes

The capacity for the ultrasound to generate images, and for broadband to transmit them, is only part of the knowledge that is produced during a scan. In practice, these technologies are combined with embodied knowledge – knowledge that is vested not only in the formal expertise of the operator, but in tacit, unarticulated skills and in senses of touch and movement.

These knowledges are sensual and embodied and here, at least, not abstractable from place. Indeed these midwives' knowledge practices can be accounted for *only* in place. The midwives do not use CTG routinely on admission or in the progression of labour, even for women already screened for transfer who must check-in at the hospital for transfer after labour has started. A much broader range of information is taken into account here. This is a small, remote community. That is why the telemedicine project is here. But it also means that there are close working, family and social connections. All the midwives spoke of the difference that *knowing the women* made to their use of technology during labour. Mari, a new young midwife in the maternity unit explained:

> … you see with the ladies which I know from the pregnancy … I feel that I know those ladies better than the other ones and so I am more likely not to take the CTG of those ladies which I know better.

Here, Mari refers to her role in ante-natal care, which these midwives are also employed to provide. But for those who have worked here for longer, the connections run deeper. Eileen had worked at the hospital for many years. She explained:

> We know them because it's a small population so we know who they are and who they're related to. When you've been here [so many] years *you know*. What they're like, and how they deliver, and the ones that you know are going to be problems and the ones that you know come to deliver normally. (Eileen, emphasis in original)

Pregnancy, birth and midwifery here are done through local knowledges of past labours, family and cultural constructions of birth. Furthermore, what counts as knowledge extends beyond technically derived images, as feminist writers on midwifery have shown us (Henwood, 2001; Oakley, 1984; Saetnan, 2000). The midwives described other forms of knowledge, particularly sensory knowledge based on smell, touch and sound, as well as intuitive knowledge, something that they found hard to put into words, 'the midwife feeling'. This rendered the flat image produced by ultrasound or CTG a rather poor form of knowledge by comparison.

In this place, the Broadband Born facilities are little used. Whilst ultrasound and CTG are used on occasion, they are rarely sent by broadband for a second opinion. The images are not treated as unambiguous facts by the midwives here or by the obstetricians at the acute hospital. Nor, in addition, does the National Centre for Foetal Medicine even accept remote digital images. But the explanation for this lies not only with the construction of knowledge in place, but also with the politics of place to which we now turn.

The Politics of Place

For the Broadband Born project to be used as intended demanded the effective integration of communication between places. This rests on a bureaucratic conceptualization of the different elements in the healthcare system, defined in terms of their functional roles. Whilst these roles – the midwives and the obstetricians – are separated by distance, it was assumed that once distance was overcome the two professions would be in a virtual hospital. But telemedicine is not simply a connection between fixed or formal nodes in a healthcare bureaucracy, in the Weberian sense of bureaucracy. Rather, it entails a connection between entities (organizations, objects, identities) that are composed in place and through dynamic and often contested relations between places.

This is central to understanding the use, or lack of use, of Broadband Born. To begin with, the midwives resented that the project positioned them as technicians. In a Broadband Born consultation, their role became the derivation of facts for experts elsewhere to diagnose. At least, they feared this and resented the implied denial of their embodied knowledge. The wider politics of place in Northern Norway compounded this. The midwives were unconvinced by the expertise at the acute hospital, as Eileen elaborates:

> We don't send them [there] because they don't have any more expertise … than we have here … So if we want a second opinion we send them [in person] to Trondheim … We haven't used it very much, we usually send the patient. (Eileen)

Whilst the acute hospital is larger, with a much higher birth rate, the turnover of doctors is high, as elsewhere in the north. The opportunities to establish expertise in particular fields – including obstetrics – is limited by this, as is the possibility for midwives to establish enduring working relations with particular doctors. Meanwhile, the Centre for Foetal Medicine in Trondheim, where the

undisputed expertise lies, does not currently accept remote images. Trine explains, 'in Trondheim they want to see the patients, if we have any doubts they want to see'. For Trine 'to see' operates as shorthand for the sensory knowledge described above, but this may also reflect the Trondheim centre's status, its power, and a reluctance to decentralize knowledge.

The ultrasound connection has been used only once – in a training session – but the CTG is used more often. In some situations, the midwives might send a broadband CTG to the acute hospital, but, Eileen says, 'more if I wanted my back covered' in making a decision to transfer, rather than in acute situations where 'you'd just get on with it' without seeking a second opinion. When advice is sought, the obstetricians are apparently appreciative of the midwives' expertise and look for other knowledge about the labouring woman beyond the image. Since the midwife is co-present only s/he has access to this information and it seems this is treated with respect in *critical* cases. Indeed, it was suggested that the inter-professional relations between Lofoten and the mainland were *better* in these cases than those between midwives and doctors working together in larger hospitals, as Mari recounted:

Mari:	Yes between us and the doctors [on the mainland] I think it's OK … they listen to us and I think they, they are interested to hear what we say
Interviewer:	Do you feel it's different with the doctors there than the doctors in Oslo?
Mari:	Yes I think they have more respect for our profession

Here we see place making distinctive relations between midwives and obstetricians. The expertise of the midwives acquired in this place combined with the perceived inexperience of the obstetricians in the northern context is compounded by the remote connection forming particular, place-based, technical practices. This difference that place makes is also a reflexive process as we see next.

Making Difference

Whilst our theoretical approach insists that places are multiple and dynamic there may be – nonetheless – prevalent and recurrent themes in the recounting of place. Here, this was certainly so. Accounts of this place centred on the isolation and beauty of the Islands and the harshness of earning a living from the sea. This is the only Norwegian hospital with no road connection to the mainland. This hospital exists against the odds, made in a place where pride in making-do and getting-on resonate with wider cultural representations of Norwegian national identity. Here we see rural health made from the dynamics of place: from the assemblages of mountains, sea, fish, fisher*men*, mothers, belonging, pride, cultural heritage and, now, tourists (cf. Kelly, 2003). To the extent that these persistent constructions of place suggest a form of spatial solidarity this must be understood as an accomplishment in the face of flux and uncertainty (Murdoch, 2006). It has taken tremendous effort to keep

the hospital going, in this place, as policy trends towards rationalization, funding uncertainties and staff recruitment and retention difficulties have all posed challenges to its future.

Keeping this place together is something that the midwives and doctors describe repeatedly, and only by seeing this can we understand how the technologies in Broadband Born are done here. We have already described an emphasis on the sensual and the 'midwife feeling' in constructing midwifery at the hospital. This place is made through the repetitive citing of this professional identity, worked through an emphasis on self-sufficiency, the mountains and the sea and – in the dialectic of space – this place makes people, organizations and objects. Recently, two new young midwives joined the team. They both described a conviction held widely here that few midwives would choose, or indeed be able, to work here. But they had made this choice. Lene describes this explicitly in terms of technology. Here, she says, midwives use their brains, their hands and instinct. She continues:

> I have more respect of the midwives working here [than in Oslo] because they are using their whole knowledge and the stomach feeling. [They] have to analyse the woman and here use their hands and fingers... So I am more impressed of the midwives here … I think here we are more like a real midwife, we have to do this. And in Oslo or a bigger hospital you have, you trust more this technology so it's another world here.

It is not, as we have said, that midwives never seek a second opinion. Rather, the midwives have an indeterminate relationship with the technology. On the one hand, Lene says, 'If we hadn't this technology and CTG we could send over broadband it will not be safe to stay here.' Yet she adds, 'I'm afraid of having a dependence because you can't trust the technology always … I always have in my mind you can't trust the technology perhaps.'

This is both evidenced and produced by the practice of calling in off-duty staff as required. Although in bureaucratic terms there is not always on-site specialist medical cover, in practice the doctors live nearby and can be present within minutes, perhaps even quicker than in a large hospital. The surgeon on call for emergency caesareans will in fact come to the hospital to offer a second opinion or even sit out a non-surgical labour just in case s/he is needed. As one specialist explains, even when she is off duty, '… if there is a patient in labour I won't leave home … I've had experiences where they just call and I'm so happy that I have my car outside and I'm here in two or three minutes.'

Such is the commitment to keeping this place together, and to demonstrating the self-reliance, which defines the place, that a map of the effective on-call staff would stretch well beyond the hospital walls and into the local area.

It is through this commitment to place, *how* it is to be in this place, and *who* it is to be in this place that the medical and midwifery work, pregnancy, labour and childbirth are held together here. The Broadband Born PC sits under a desk to one side of the midwives' office, politely ignored for most of the time. The midwives recognize that it was supposed to be an asset for them since they were the first to get the equipment but, as Eileen says, '… It didn't turn out as

they [the project leaders] had expected, probably. I think they probably thought we'd have used it a lot more.'

It is, more or less, a useless piece of equipment. The Broadband Born technologies are brought into use (or not) in ways that are understandable only through attention to this place as a point of intersection between objects, relations and processes including the emotional, cultural and personal articulations of place embedded in the accounts above.

Discussion and Conclusions

Telemedicine presents us with an explicitly designed rendering of place-less understandings of technology. Following insights from STS and ANT suggests a rather different argument. Through our analysis of one telemedicine project we show precisely:

> The contrast between the supposed effects of cyberspace and the dynamics of its own production – between, that is, the overcoming of space on the one hand and a supremely nuanced making of it on the other … the difference between space understood only as distance and space in a richer meaning. Whatever is happening to the former, the latter is very far from being annihilated. (Massey, 2005: 96)

The spatial and technological connectivity in telemedicine is not between static things or formal relationships, but takes place between *dynamic* entities, that are themselves constituted and reconstituted spatially. Technology, obstetrics, midwifery or pregnant bodies do not have essential, absolute meanings but are rather continually made, dependent – not least – on where they are. Furthermore, to assume that instantaneity means place-less-ness is to ignore the effects of instant communication *itself* on spatial meanings, subjectivities, and so on. Rather than lifting the midwives out of place, the introduction of an instant connection to 'experts' on the mainland politicizes their sense of pride in the practice of midwifery in this place.

The place evoked by the clinicians working in this maternity unit is composed of intersections between the material and the immaterial – sea, mountains, bodies, scanners, computers, cultural identities, midwifery, memories and popular images. It is composed of intersections between the local – hospital politics, familial relationships, fishing practices – and relations beyond the local – health policy, the informational paradigm, professional discourses and legislative and ethical frameworks for practice. These broader relations do not extend seamlessly into context but, rather, are present in uneven and uncertain formations. The way that Broadband Born is done can be understood only through this lens of place.

Of course, this is a particular place. Its location and its economic and cultural history are unusual. And this is a specific case, involving relations between midwives and technology and obstetricians, which are hardly renowned for smooth or uncontested integration (Wajcman, 1991)! So, to be sure, this is a specific example. But that is precisely our point. Telemedicine is supposed to

bring outposts like Lofoten into the placeless virtual hospital, variously conceived at regional, national and global scales. That is its rationale. If these particularities have shaped outcomes in this case, it seems likely that other particularities will shape outcomes in other cases.

If policy makers are to overcome the profound difficulties experienced in implementing telemedicine these particularities must be taken into account.

We cannot persist in assuming that implementation failures will be addressed with a technological fix that will eventually deliver placeless-ness. Rather, more nuanced understandings of place and the spatialities in operation in given contexts are required to understand the way that particular technologies might be brought into practice and the parameters of the transformations that might be possible.

But our argument stretches beyond telemedicine. Its broader implications question assumptions about information and communication technologies and globalization and suggest that technology does not, in any simple way, free us from place. To be sure, these technologies have effects on our lives. But we should not presume that this renders place unimportant, dissolves the local or produces a place-less world. To see this we must explore lived place, conceptualized in anti-essentialist terms drawing together intimate and local particularities with more extensive processes. While we take the ANT point that these wider processes might be seen as more extended networks, in a different vocabulary we can see this conceptualization of place as a point (or points) of suture between the global and the local (Massey, 1994). This suggests a rather different approach to technology within debates about globalization. As we have insisted, technologies should not be seen as fixed, finished or stable. However widespread particular technologies become, they are still performative and located. Instead of equating generalized capacities of homogeneous technologies with practised form and use we should be circumspect in tracing particular devices and their practices, building a contingent account of new information and communication technologies in place.

Notes

1 Although the term been criticized, both from within ANT and without (Law and Hassard, 1999).
2 All the interviews referred to in this article were conducted in English by Norwegian speaking participants and have been quoted directly.

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Kari Dyb

Is a PhD student on the Culture and Society program in the sociology department at the University of Tromsø, and an employee at the Norwegian Centre for Telemedicine, University Hospital of Northern Norway. She is currently working on an international project tracing the organizational, professional and spatial disruptions associated with information and communication technologies in healthcare.
Address: University Hospital of North Norway, Norwegian Centre for Telemedicine
E-mail: kari.dyb@telemed.no

Susan Halford

Is Professor of Sociology at Southampton University. She has long-standing interests in working identities, organizations and space and has published widely in this area. In 2007 she published *Negotiating Gendered Identities at Work: Space, Place and Time* with Pauline Leonard, also from Southampton University. Recently, she has been concentrating her research on the re-spatializations of work and organization linked to the introduction of new information and communication technologies. She is currently working with Norwegian colleagues tracing the organizational, professional and spatial disruptions associated with the ICT and telemedicine in different parts of the healthcare system.
Address: Sociology and Social Policy, School of Social Sciences, University of Southampton SO17 1BJ, UK.
E-mail: susan.halford@soton.ac.uk