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The Practices of Technology: *putting society and technology in their rightful place*

Abstract

Technology is all pervasive in modern society transforming people's everyday lives and work environments. Societal change is coinciding with the ever increasing availability of small, light, and affordable tools for communication and consumption, most notably the mobile phone. Dominant views of the relationship between society and technology among policymakers and business leaders, however, are frequently production-focussed and pay limited attention to end-users and wider issues of consumption. This theoretical paper argues for a practice theory approach to allow for the greater integration of social factors into technology development and adoption processes, in particular that of telework. An initial critical review of key sociological approaches to society technology interactions will serve to highlight gaps in the existing body of literature, the limitations of many of these approaches, and help demonstrate the need for a practice approach that incorporates aspects of structure, agency, and context. The paper questions the role technologies are likely to play in promoting more sustainable forms of (over)consumption and how these relate to people's everyday social practices. Drawing on qualitative data collected from sixteen structured interviews as part of the EPA-funded ConsEnSus Project, *Consumption, Environment and Sustainability* (www.consensus.ie), key components and interactions that influence people's practice with regard to telework were identified. These was then used to develop an appropriate framework for further analysis in an attempt to more clearly define and understand the interconnectivity and conflicts between the various elements that go to make up the practice of telework.

Keywords:

Society, Technology, Telework, Practice Theory, Consumption, Environment, Sustainability

Author:

Michael Hynes

School of Political Science and Sociology

Room 331, 2^(nd) Floor, Áras Moyola,

National University of Ireland, Galway

Ireland

m.hynes5@nuigalway.ie

Introduction

Technology matters and its development and adoption are basic fundamental features of modern societies, and from within sociology there has always been recognition of this implication. Marx (1955: 127) famously wrote "the hand-mill gives you society with the feudal lord; the steam-mill society with the industrial capitalist", an implicit assumption that certain types of societal arrangements were required for particular types of technology development, and vice-versa. Technology has been a force for much good in the world; feeding us, providing shelter, entertainment, transport, and helping to heal us in times of personal distress. But it has also been a powerfully destructive force; providing armaments to kill and maim, and the means to pollute, harm, and destroy the very environment in which we live. Indeed, new technologies themselves often serve as drivers of consumption growth and have contributed to increasingly negative environmental consequences (Røpke, 2001, 2003). It is a global phenomenon eliciting both love and repulsion with some people convinced technology is taking over our very lives, at least to some degree. There is a belief that technology is evolving in a manner that is not controlled by the very humans it is intended to serve. This paper explores the main sociological theoretical positions employed to interpret technology and society interactions, paying particular attention to recent developments in environmental sociology. It argues for an alternative approach which places stronger emphasis on social practices and the roles of structure, human agency, and context. Recognition of the impacts practice and society has on technology development and adoption processes will allow sociology to re-position itself in a domain, heretofore, largely neglected by the discipline. Whilst particular structure is embedded in technology at the developmental stage interaction with human agency helps shape the trajectory of its further development and adoption, for better or worst. This relationship between structure and agency is strongly influenced by social and political issues, and by the environment in which technology is used. A practice theory approach to understanding these significant elements allow for more pragmatic considerations of the interconnectivity between society and technology and, in the case of telework, how this method of working can be better understood and implemented to enhance the promote of the sustainable consumption of distance.

Key Debates

Ecological Modernisation Theory: *technology will save us?*

Ecological Modernisation (EM) theory is often described as an optimistic reform-oriented school of environmental social science, and has gained increasing global attention amongst scholars and policymakers for several decades now (Mol, Sonnenfeld, & Spaargaren, 2009; Redclift & Woodgate, 2005; Spaargaren, Mol, & Buttel, 2000). Central to the theory is that industrialisation, technology development, economic growth, and capitalism are not only compatible with ecological sustainability they are key drivers of environmental reform (Cohen, 1997; Mol, 2001; Mol & Sonnenfeld, 2000; Spaargaren, 2000). Although the frontier of EM has broadened theoretically since the 1980s, most notably to include consumption (see Spaargaren, 1997), many studies retain similar broad fundamentals. Technology is considered not only for its role in the emergence of environmental problems and concerns but also for its potential in preventing and curing many of these issues. Spaargaren (2000: 324) maintained that the development from "compartmentally organised end-of-pipe technologies in the early 1970s to integrated preventative technologies in the late 1980s" was one of the essential principles of EM. This was of critical importance for what Huber (1985: 20) referred to as the "switch-over into more sustainable modernity". It was argued that growing uncertainties, with

regard to scientific and expert knowledge, and complex technology systems, did not lead to marginalisation of science and technology in environmental reform, instead they were embedded in new environmental and institutional arrangements (Mol, 2010: 25). However, EM avoids challenging the structures and values of modern society and instead internalises environmental impacts to ensure continued production and output, a position that has led to some criticism in the past (Baker, 2007; O'Connor, 1993; York & Rosa, 2003). Baker (2007: 313) argued that EM did not address "the underlying contradiction in capitalism: a logic of ever-increasing consumption in a world characterised by material resource limitations". This often resulted in "locking organisations into a need for a constant and reliable flow of natural resources to make efficient use of high-cost new technologies" (Pellow, Schnaiberg, & Weinberg, 2000: 132). In much of EM deliberations many features of society and community are simply seen as related to market activity, and are thus reduced to simple market commodities of concern to decision-makers and planners (Zukin, 1995). But as Dauvergne (2010) argued, there is a strong need for international policy processes to tackle head-on the systemic drivers of consumption as the direct impact of thousands of everyday choices by billions of consumers partly explains the escalating environmental crisis.

EM also focuses on the importance and involvement of market dynamics and economic agents such as producers, credit institutions, and utility providers. These, it is maintained, are carriers of ecological restructuring and reform, in addition to the more conventional categories of state agencies and social movements (Mol & Sonnenfeld, 2000). Economic and market institutions reflected environmental concerns through their pricing, demand, products and services, an assumption disputed by some (Hawken, 2001; Richardson, 2002). To secure industry support and cooperation policymakers often become over reliant on industry guidance and regulation, it has been argued (Bailey & Rupp, 2004: 238). Choices regarding technology development and adoption "emerge in an environment where the intentions and relative power of employees, managers, and the owners of enterprises are usually the most important determinants of technological change and its consequences" (Volti, 2006: 178).

A further characteristic of EM is the hypothetical transformation of the role of nation-states. More decentralised, flexible, and consensual styles of government would emerge, often referred to as 'political modernisation' (see Jänicke & Weidner, 1995). "The traditional central role of the nation-state in environmental reform is shifting, leading to new governance arrangements and new political spaces" Mol (2010: 25) maintained. This space was filled by non-state actors who assumed administrative and regulatory functioning, and the emergent 'sub-political arrangements' (Beck, 1997) undermined the nation-state's conventional role in environmental reform. However, the success of mainstream environmental organisations, coupled with the high visibility of radical environmental activists in some countries, has resulted in a 'green backlash' (Rowell, 1996), an organised resistance against the environmental movement and its influence (Mol, 2000: 52). This is a result of what is often perceived as the institutionalisation of environmental interests above the many other concerns currently evident in society.

Because of a dominant emphasis on production and on macro scenarios consumption received little attention in EM until quite recently (Spaargaren, 2000, 2003; Spaargaren *et al.*, 2000). Utilising Giddens (1984) theory of *structuration*, Spaargaren (1997) maintained producer and consumer shaped each other through a production-consumption chain. The EM of domestic consumption centred, he argued, in developing information feedback loops to both consumer and producer to maximise information exchange, thereby increasing efficiency through a process of *co-structuration*. This has led to criticism of "the implicit assumption contained within the conceptual postulates of

Ecological Modernization Theory; that the issue of consumption need not be problematized in its own right, for consumption is indirectly implicated through the problemization of production, thereby rendering consumption itself a nonissue" (Carolan, 2004: 248). For much of EM considerations the matter of consumption has remained largely under conceptualised, and the theory continues to be more concerned with issues of production.

Criticism of production-centric technical-fix solutions highlights that EM lacks the radicalism that characterised early de-modernisation and treadmill perspectives on environmental change, and leads to an association that simply calls for 'green capitalism' (Martell, 1994: 72). It is important to challenge this contemporary thinking amongst policymakers and business leaders; a discourse that stresses the importance of greening consumer choices and lifestyles to mitigate the effects of consumption while sustaining economic growth (Dauvergne, 2010). Green is not automatically better, particularly in terms of sustainability and the environment, and the heavy focus on the promotion of new environmentally-friendly products over existing items may not necessarily be in our best interest, nor that of the planet (Pierre-Louis, 2012). Furthermore, the Jevons paradox is the proposition that technological progress that increases the efficiency with which a resource is used tends to increase, rather than decrease, the rate of consumption of that particular resource, a cautious reminder of the limits of technological efficiency in solving all our ecological problems.

Ecological Modernisation Theory Model: *a Business As Usual model?*
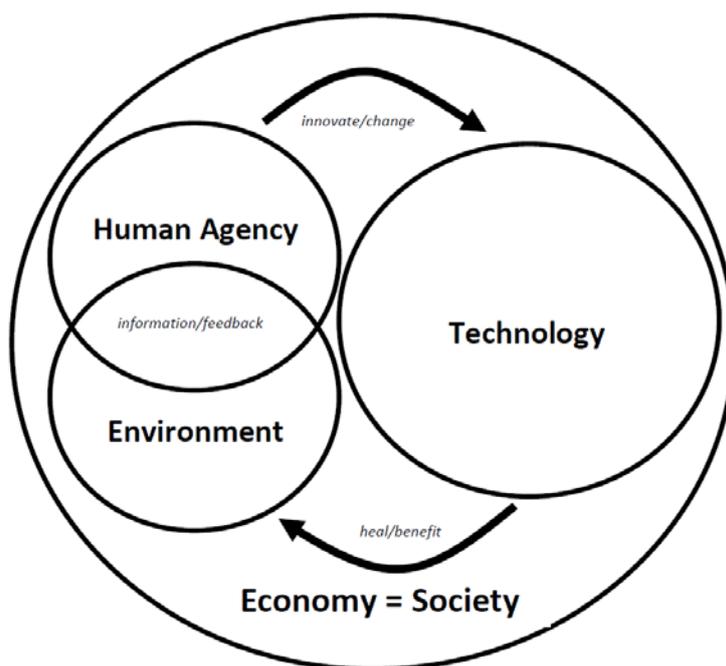
Figure 1 - A Model of Ecological Modernisation Theory

Summary of the Ecological Modernisation Theory Model
▪ The dominent concern is the economy
▪ It focusses heavily on the economy, retaining the rules and existing preconditions of production-centric activity
▪ Technology assumes a pivitol role within the model
▪ The ecomomy benefits from moves towards ecological reform by the adoption of new and innovative technologies
▪ The economy and ecology can be aligned with each other, but economy takes precendence

- Environmental productivity is possible (the productive use of natural resources)
- Innovation and developing new efficient technologies can help reduce emissions and harmful production processes
- It is possible to upgrade the environment's carrying capacity
- human agency has an active role to play in innovating/transforming new and existing technologies
- It is possible/likely ecological modernisation will conflict with nature conservation.

Table 1 - Ecological Modernisation

Determinism: *letting technology have its own way*

Technological determinism is a reductionist theory that maintains technologies drive the development of social structure and cultural values according to its own logic, and this in turn has effects on society (McLuhan, 2003). It is the belief that characteristics inherent in technology manage the direction of its development and set conditions for social change, and is suggested by some to be a widely held view of the relationship between technology and society (Schatzki, Knorr-Cetina, & Von Savigny, 2001). Technology, and technological change, are viewed as autonomous factors impacting on society from outside, and determinism focuses concern on how to *adapt* to technology and not on how to *shape* its development (Davison, 2004; MacKenzie & Wajcman, 1999). In his book *The World is Flat* Friedman (2005), a technological determinist, discussed factors that allowed the world to become 'flat', or globally interconnected, thereby allowing businesses to compete on a more equal playing field. Kevin Kelly (2010) suggested technology created itself using humans to do its bidding, and that it was a global force beyond human control that appeared to have no boundaries. McLuhan (2003) proposal of the global village can be described as determinist in character when he discussed the elimination of time and space barriers in communication processes.

Determinism is frequently referred to in a rudimentary manner and it is common to find discussions of *hard* and *soft* technological determinism (Smith & Marx, 1996). Criticism of hard technological determinism rests with the belief that it puts technology in a position of absolute power over society. This conviction leads people to a feeling of helpless towards technological change apparently shaping society, a position strongly disputed by some (Bijker & Law, 1992; Finnegan, 1988; MacKenzie & Wajcman, 1999). Weak technological determinism positions technology in a "more various and complex social, economic, political and cultural matrix" (Smith & Marx, 1996: xii). Both hard and soft technological determinism, it must be said, give some limited scope for human interaction, the disagreement is over how much. Criticisms of the overall viewpoint range from those who take the position technology is fundamentally good for society (Feenberg, 2001; Freeman, 1992) to those who take a middle ground arguing that it is an oversimplification of sociological phenomena that can be attributable to many things including economic, political, cultural, as well as technical (Chandler, 2000). "Technologies may constrain, but they do not determine" Williams (2003: xi) maintained. Leaving little or no room for human agency in technology development and acceptance processes is not a plausible position to adopt given the significant interactivity between society and the technologies that both succeed and fail. Society exerts control over technology through the choices people make, and this concept of choice is inherent in both the design of particular artefacts and systems and the adoption of the technologies we deem necessary or appropriate to our given lifestyles in a particular time and space.
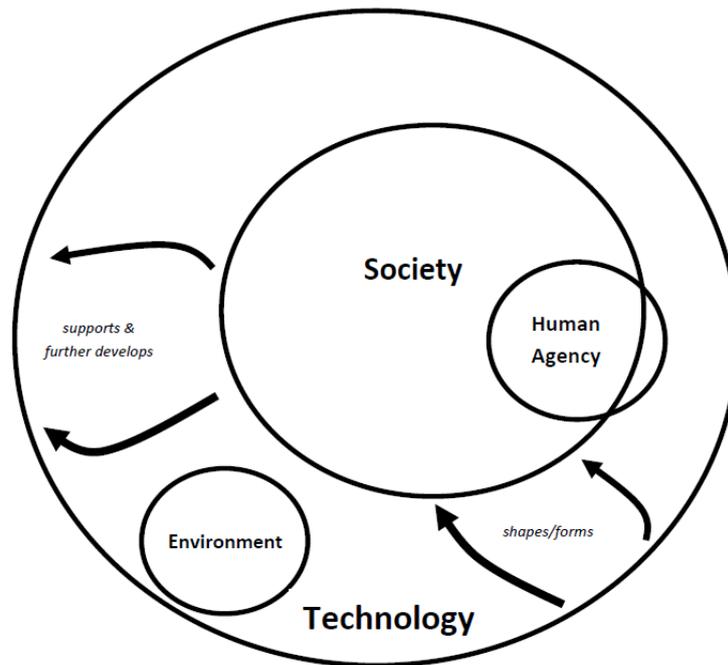
Technological Determinism Model: *letting technology have its own way!*

Figure 2 - A Model of Technological Determinism

Summary of the Technological Determinism Model
▪ Human agency exists within the domain of society which inturn exists within the limitations of technology consent, the dominent concern
▪ Technology determines the shape of society
▪ Technology drives the development of social structure and cultural values.
▪ The spatial overlap between some human agency and technology consists of developers, decision-makers, and other such elites
▪ The development of technology follows a predictable & traceable path largely beyond influence, therefore largely ignores the social and cultural circumstances into which technology is deployed
▪ Society organises itself to support and further develop technology once it has been introduced and adopted
▪ Technology is the basis for all human activity and the environment is an inconsequential unlimited resource to feed technological development.

Table 2 - Technological Determinism

Constructivism: *it's people that matter most!*

The Social Construction of Technology (SCOT) contends that successful theories are as much a product of their social context as unsuccessful ones. Theories do not succeed because they are *true*, but rather because they are socially supported. Similarly, it holds that successful innovations cannot be explained by assuming they *work* better than failed innovations, the analyst must undercover the social context that promotes, or indeed fails to promote, a given innovation (Bijker & Law, 1992; Pinch & Bijker, 1984). Research in this area has largely remained committed to a robust agency approach although there has been some move in the direction of a stronger emphasis on structure, most notably in Bijker (1995) and Klein and Kleinman (2002). Pinch and Bijker (1984) suggested that the framework

for SCOT largely consists of four key components; *interpretive flexibility*, *relevant social groups*, *closure and stabilisation*, and the wider *socio-cultural and political milieu* in which technological development takes place (Klein & Kleinman, 2002). Interpretive flexibility implies that design is an open process that can produce different outcomes depending on particular social circumstances of development (Pickering, 1984; Pinch, 1977). Development and production of large scale projects have been the result of negotiations between various groups of people with different observations and interpretations, and this has been illustrated in research (Law & Callon, 1992; MacKenzie, 1987). Relevant social groups are essential to technology development and their actions manifest the meanings they impart to the artefacts (Pinch & Bijker, 1984). The process can be described as a system in which various relevant social groups, each embodying specific meaning and interpretation, negotiate over its design, with each group seeing quite different objects and outcomes. When the design process closes, and no further modifications occur, the artefact can be said to have stabilised in its final form after interpretative and design flexibility collapsed through this closure mechanism. Closure may not necessarily be permanent, however. New social groups can form and reintroduce new means of interpretative flexibility causing a new round of debate or conflict. The fourth component received little attention in Pinch & Bijker's original work and is a source of criticism over the undue emphasis on agency and neglect of structure (Russell, 1986; Winner, 1993; Woolgar, 1991). This omission was acknowledged by Pinch (1996), whilst Bijker (1995: 126) introduced a technological frame or "frame with respect of technology". Although this was an important step towards recognition of structure another fundamental problem existed with the assumption that the various social groups were equal and ever present during design processes. SCOT continually "fails to adequately attend to power asymmetry between groups" (Klein & Kleinman, 2002: 30) and some groups may even be prevented from participating in the design process altogether (Williams & Edge, 1996).

The Social Shaping of Technology (SST) emphasised the importance of human choice and action in technology development rather than seeing this technology as a politically and ethically neutral independent force with its own logic and motivation or, "a mysterious black box that cannot be analysed socially" (Lievrouw, 2002: 185). Central to SST are the choices inherent in both the design and trajectory of innovation programmes, although these choices were not always necessarily conscious decisions. Different directions are available during development leading to different technological outcomes, and these choices can have diverse implications for society or particular groups within society (Williams & Edge, 1996: 866).

Actor-Network Theory (ANT) (Callon, 1999; Latour, 1999, 2005; Law, 1992) attempted to overcome the problem of linear causality. It rejected strong technological determinism and strong constructivist arguments and considered people, technologies, and institutions alike as *actants* having equal potential to influence technological development (Callon, Law, & Rip, 1986). "If we abandon the divide between material infrastructure on the one hand and social superstructure on the other a much larger dose of relativism is possible" (Latour, 2000: 51). Technology and people should be considered as interrelated nodes in constantly changing socio-technical networks which constitute the forms and uses of technology differently in unrelated times and places for different groups (Lievrouw, 2002). Finding a better framework that more realistically recognises the interconnectivity between structure, agency, and the context of technology development and adoption processes is imperative to a more complete understanding of the interactions and relationship between technology and society.
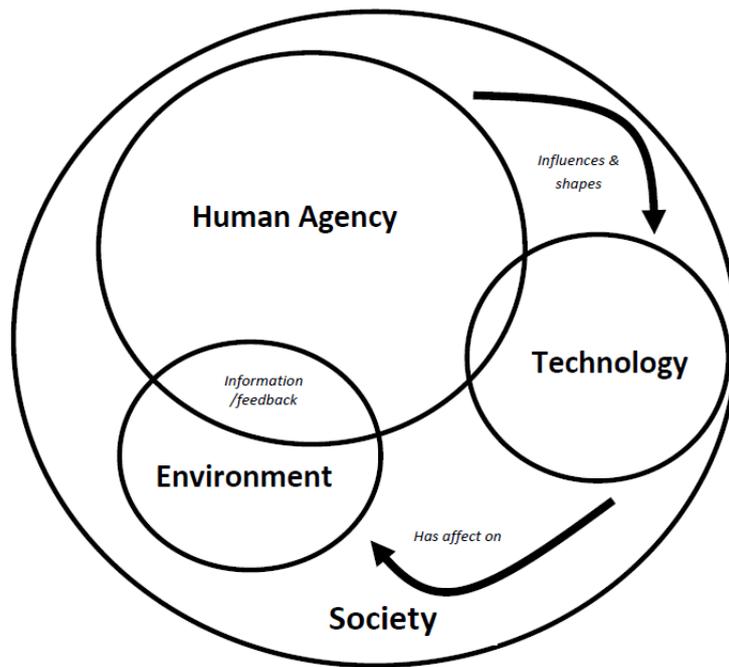
Figure 3 - A Model of Technological Constructivism

Summary of the Technological Constructivism Model
• The system model is based on an overall view of society
• Human agency strongly influences and shapes technology development and direction
• Human agency recognises the importance of the environment, specifically in the context of ecologically relevant social groups such as the green movement, and as part of overall public awareness and consciousness of ecological damage
• Technology, in turn, has affects on the environment, both good and bad
• Social factors contribute considerably to the success or failure of a given technology
▪ Technological development occurs recursively.

Table 3 - Technological Constructivism

(Critical) Realism: *getting real about society and technology!*

Many sociological approaches to technology development and adoption fall into categories of determinism or constructivism. Determinists generally overlook the social context of technology while, conversely, constructivists claim technological progress is primarily the result of social or cultural forces. To avoid extreme positions Schroeder (1997) argued for a realistic perspective which takes into account the growth of scientific knowledge and material make-up of technological artefacts, and the social settings in which these become embedded. There is a requirement to define the intelligence of technology in political, cultural, and ethical terms and not just in how we develop and market these technologies and changes. The goal for technological realism is neither to champion nor dismiss technology but somehow understand and apply it in a manner more consistent with basic human behaviour, practices, and values. Technology must be acknowledged as an influential agent for social change and, unlike determinists, a realist approach supposes that people can control and direct the way in which technology is developed and adopted. While it is not reasonable to un-invent technology or erase the values it currently holds for society, realism argues

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against its uncritical embracing or rejection. Long before it was fashionable Mumford (1967) sought to balance the presence of technology in our daily lives with design principles taken from ecology in his book *The Myth of the Machine*. The title was Mumford's term for the erroneous belief that technology is the primary factor determining the direction of history. Society is vulnerable to what Winner (1997: 57) described at 'technological somnambulism', which is our semi-conscious sleepwalking attitude towards technology. He believed we often released technologies into society and quickly abdicated any responsibility toward it, and he suggested we should manage and debate the terms of our relationships with technologies long before they becomes embedded into our daily lives. The practical application of such a technological realism approach remains, heretofore, somewhat elusive.

Main School of Thought	Production or Consumption Focussed	View of Technology	Structure or Agency Focussed	Main Theoretical Strands	Prominent Authors
Ecological Modernisation	Production	Optimism	Structure	Technology Fix Market Dynamics New Governance	Joseph Huber Arthur P.J. Mols Gert Spaargaren David A. Sonnenfeld
Determinism	Production	Mostly Optimism, but sometimes Pessimism	Structure	Cultural Lag Media Determinism	Thorstein Veblan Clarence E. Ayres John Dewey Marshall McLuhan
Constructivism	Production	Neutral Position	Agency Both Structure and Agency	SCOT SST ANT	Wiebe E. Bijker Trevor J. Pinch Donald A MacKenzie Judy Wajcman Bruno Latour John Law
(Critical) Realism	Production and Consumption	Neutral Position	Both Structure and Agency	Practice Approach	Rudi Volti Werner Rammert Elizabeth Shove Wanda Orlikowski

Table 4 - Key Debates in Society, Technology Interaction
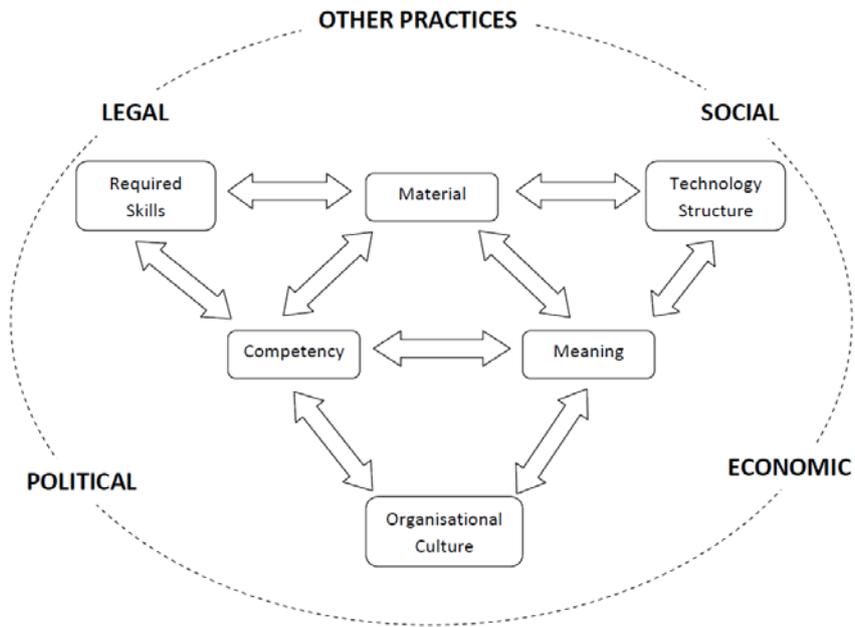
Towards a Practice Approach

An exploration of the interconnectivity between society and technology, and in particular the use of virtual mobility tools and options to replace the need for physical travel, was undertaken for this paper; part of work package three of the ConsEnSus Project investigating household consumption and sustainability in Ireland. The principal

focus of this particular strand of research was on telework[1] and how this method of working could be better implemented to suppress unnecessary travel and reduce the (over)consumption of distance in Ireland. A realism theoretical approach to work, technology, society, and sustainability was considered necessary. Much of the previously discussed approaches were deemed inadequate due to the absence of more concise conceptualisations of how telework shapes, and is shaped, by social, economic, political, and legal issues. Many other consumption frameworks rely heavily on cognitive-reasoned explanations such as economic and socio-psychological behavioural models (Ajzen, 1991; Becker, 1976). These approaches focus attention strongly on the individual for explaining behaviour, drawing on rational choice theory. This research suggests that viewing individuals in isolation to other significant external influencing factors is both unwise and unsatisfactory. Therefore, applying an approach which puts practice centre stage was deemed necessary.

Practice Theory, in its initial format, was heavily influenced by Bourdieu (1977, 1990) and his attempts to balance structure and agency, which he saw as complementary forces. Giddens (1986) structuration theory was an effort to move beyond the dualism of structure and agency and argued for the duality of structure, where social structure was both the medium and the outcome of social action. Foucault (1977) attempted to balance a number of theoretical options between structuralism and post-structuralism as a frame to analysis relations between bodies, agency, knowledge and understanding, while latour's science studies (1993) bestowed addition weight to human action. Practice theory have been further developed by scholars over the past number of decades (Reckwitz, 2002; Røpke, 2009; Schatzki *et al.*, 2001; Shove, 2004; Shove & Pantzar, 2005; Warde, 2005). People engage in practices in their everyday lives. By performing and reproducing practices in time and space they reproduce social order and, although individuals are not the point of departure for studying practices, they are carriers of practices. In much analyses of practice theory three major components of linkage are identified; material, competency, and meaning, although these have been labelled differently by various practice theorists. For this research other elements of telework practice were identified including skills, organisational culture and technology structure, and all become embedded within the initial frame of telework practice. A further important aspect of practice is *context*. The context in which telework operates include political, economic, social and legal, all impacting upon telework practice to varying degrees in time and space.

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[1] Telework is the concept of working at home, for part or all of the week, using a phone or/and computer terminal electronically linked to one's place of employment. It is viewed as a sustainable mobility option because of the potential to suppress or eliminate the daily commute to a central work location or office.

Figure 4 - Key Components of Telework

Employing a practice approach will help develop a more practical hypothetical framework of elements and allow empirical investigation to take place on the practice of telework. It is unreasonable to consider the sum reasoning and logic behind an individual's decision-making and judgements with regards to choosing and adopting this way of working and, in any case, the unit of analysis is on practice and not the individual themselves. This research formulates generic components of telework from qualitative data obtained from sixteen structured interviews with Irish teleworkers over a period of twelve months. These teleworkers, nine male and seven female, were randomly selected and their professions and careers largely represent current teleworking practitioners in Ireland. A realism approach for how the practice can be understood, and thus possibly better implemented, was developed from this collected data. Many elements interact with each other to varying degrees providing meaning and understanding of the practice for the practitioners. The legitimacy of the practice for an individual becomes embedded when a person makes sense of their own actions, and by reproducing the practice it becomes normalised in their everyday life and understanding of what is right and appropriate for them.
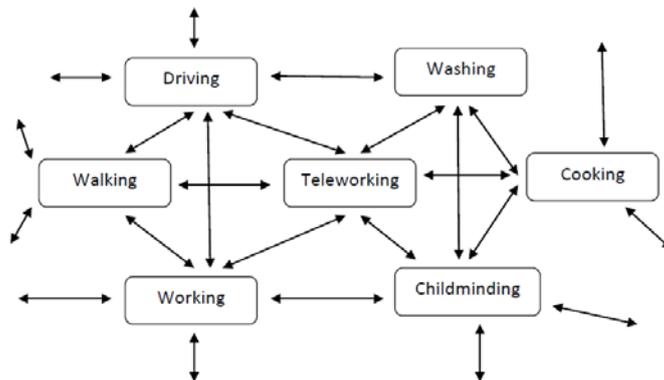
Figure 5 - The Interaction between Practices

A further aspect to this practice approach is; telework does not function in isolation, rather our everyday doing, saying, performing, and making sense is a tangled web of interacting different practices. Telework is significantly connected to work and driving and also the domestic significant practices of childminding, washing, and cooking. All practices impact upon others to various degrees of intensity in time and space to create a tangled web whose interactions and interconnectivity need to be more clearly defined and understood.

One of the more unexpected initial findings was the role technology plays in support of sustainability, in particular sustainable consumption. Teleworkers reported that although in many instances the use of information communication technologies allowed them to work from home for all or part of the week thus reducing their overall travel demand, it increased other areas of consumption in their household such as food and energy. The affect of such a switch in consumption, in many cases, was to neutralise a great deal of apparent mobility savings when people worked from home using these technologies, as evident in the quotes below:

> winter time I'd prefer to come into the office rather than stay at home because if I'm staying at home in a big house I need more heating – *Teleworker A6 (male, aged 35-40)*

> I mean our bills haven't gone up dramatically or anything like that, I did ask my husband about it and I tend not to turn on the lights so there's not much electricity being used, you know the kettle does go on for a cup of tea now and again that's about it but the heating bill probably did go up but ever so slightly nothing that my husband told me he couldn't handle - *Teleworker A12 (female, aged 30-35)*

> I'm not sure what I save on petrol costs verses the additional power requirements in the house but it's probably not much but yea it's a contribution towards not being part of the drain on the environment as well I guess – *Teleworker A15 (male, aged 30-35)*

> When you just telework infrequently I think the benefits cover the costs – *Teleworker A16 (female, aged 35-40)*

Given some of the more negative environmental implications and impacts associated with increased information communication technology consumption and usage (Plepys, 2002; Røpke, 2001) much deeper analysis and investigation is required on this subject before concluding that telework is a practicable virtual mobility tool or option in efforts to reduce the (over)consumption of distance.

Conclusions/Discussion

Better understandings of the affects technology has on the individual and the impact work and society has on development and adoption processes is of significant importance to sociology. Previously, developers and technologists attempted to conceptualise the use of technology independently in order to merely improve design, leaving social scientists with their "queer disposition for details" (Monteiro, 1998: 250) outside this important domain. But a critical element of being human is our relationships with each other, the set of relations that we broadly call society. We also have linkage to the technologies we create and use and our interactions, at home and at work, inevitably involves interaction with other people and artefacts. Technology seeps and becomes embedded into many

aspects of modern life and can almost become unnoticeable in accomplishing our daily practices, with much of what we do we do so unconsciously. In many cases "the devices, techniques, and systems we adopt shed their tool-like qualities to become part of our very humanity" (Winner, 1997: 63). But technology does not always fulfil optimistic and positive predictions of success held by technologists and developers; a classic example of such unrealised prophecy being that of the paperless office[2]. This was chiefly due to a poor understanding of the complex interconnectivity between society, work, and the technologies we accept, adopt, and choose to use (or not) on a regular basis.

Utilising a practice theory approach to enhance our understanding of telework is also an attempt to develop more critical realism with regards to the social implications of work and technological change, and to wrestle control away from current constricted views of development and adoption processes. But this is a difficult proposition. Indeed, the conceptualisation of this particular practice approach, which has elements and connectivity fraught with ambiguity and abstraction, is inherently complex. Practice theory approach has been, heretofore, beset with contemplation but needs now to be made more tangible for use in empirical testing, notwithstanding the inevitable criticism some components and interactions of the model provided here will attract. Society can, and does, impact strongly on work and technology, and adopting this practice approach arrangement will enable us to conceptualise this in a more nuanced manner. Sociology should not be afraid of tackling technology in a manner that has more influence over its direction and development, and this work also serves as a call for the discipline to become more involved at all stages of development and adoption, a call that resonances with Winner's (1977) position. It also echoes a call from Law and Urry (2004: 404) for social science to "interfere in the realities, to make a difference, to engage in an ontological politics, and to help shape new realities". We can no longer simply consider technology as a *black box* shaping the trajectory of society but rather an element having varying degrees of influence, or not, in a particular time and space. It is important that society and technology are put into their rightful place.

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[2] The paperless office is a work environment in which the use of paper is eliminated, or greatly reduced, and is achieved by converting documents and other papers into digital formats. This has the potential to save money, boost productivity, save space, make documentation and information sharing easier, keep personal information more secure, and help the environment.

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