Narratives of ICT exclusion and inclusion: exploring tensions between policy, gender and network engineer training

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Abstract

This thesis analyses the attempt by the British government and a US corporation, Cisco Systems Inc., to address the low participation of women in ICT fields. It draws from government documentation on women's inclusion and contextualises this policy within a wider analysis of socio-economic exclusion. Three related cultures of inclusion emerge which are linked to improving the nation's access to the new economy, and central to each is the reconfiguration of democratic citizenship for people classified as socially excluded. Incorporating Cisco's and academic perspectives on gender and technology relations, a phenomenological perspective is used to unravel the reality of this present day snapshot of social and ICT exclusion and inclusion, with the Heideggerian concept of 'Gestell' reformulated to include a neo-Marxist framework and a gender analysis. Adopting the methodological approach of narrative and feminist critical theory, the thesis describes three key backgrounds to the related ICT policies and strategies and matches each with the experiences of students and staff engaged in the case study of the Cisco Certified Network Associate, a network engineer training programme. In contrasting these macro and micro accounts, the thesis seeks to explore underlying sites of tension to show how policy and practice are often in opposition to one another. Motivated by the research question of whether ontological security arises from the equity model of inclusion for a subset of the socially excluded, lone women parents, it is suggested that it does not. With the appearance of social control and not personal empowerment, greater insecurity is argued to accrue. In providing this analytical and empirical approach, the thesis seeks to contribute to current research on gender and technology by widening its remit of investigation, and provide an innovative, multidisciplinary and critical perspective to IS research.

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This thesis would not have emerged without the support of a number of people. My parents, Ruth and Gywn, who have always had faith in me, and my brother Quentin who shared his invaluable experiences of a similar project many years ago. My supervisors: Shirin Madon and Susan Scott who guided me through the initial stages, and Nathalie Mitev who nurtured, supported and befriended me during the critical final period. My fellow colleagues with whom I shared many happy and occasionally inebriated hours; and numerous friends who gave me privacy, tolerated my moods and continually encouraged me. I am also grateful to the Information Systems department at LSE that recommended me for scholarships, without which I most certainly would not have embarked on this life changing endeavour. Finally, my thanks to a wider community of academics who expressed interest in my research, patiently listened, constructively advised and enabled an open exploration of ideas.

The process of constructing this thesis took me to the limits, and beyond, of my abilities, triggering emotional and mental traumas in which I would doubt what I was doing and why. Yet it also produced a euphoria that I have rarely experienced intellectually. I now understand why people who completed their doctorate many years ago still talk of it as if it happened yesterday. It is one of the pinnacles of academic exploration, and thanks to the above people and many others it has been an experience that I also am unlikely to forget.

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Situating the problem domain

"When capital enlists science into her service, the refractory hand of labour will always be taught docility" (Marx 1890(1974): 563[1]).

1.1   ICT infusion as an agent of change

The above Marxist maxim serves to remind us that politico-economic utilisation of scientific and technological innovation does not necessarily serve the interests of all. As nations-states and businesses turn to such innovation, in particular the vast array of networked information and communication technologies (ICT), to improve not only economic but also civic cohesion and social malaise, the effects on our daily lives are profound. With ICT systems becoming "an expression of our interests, an implementation of our values, an extension of ourselves, a form of our lives" (Dahlbom 1996: 14), such integration gives rise to the notion of technology as an agent of change, an "engine of economic growth" (Dahlbom 2001; Millar and Jagger 2001: 1). This transformative association provides the background context to this research, where the technological strategy for global growth and integration (Hanseth and Braa 2000), or ICT infusion, is presented by the British government and a major United States (US) corporation, Cisco Systems Inc., as the silver bullet for economic, civic and social reform.

A productive shift is said to be occurring in the West, moving from a Fordist generic mass production to a Post-Fordist focus on qualitative and selective ICT commodities and services. This shift is seen to herald a 'new economy' with a global span (Castells

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[1] Taken from Ure (1835). Certain text has been referenced to reflect its historical location by citing its first publication. Whilst this format is somewhat cumbersome, it was necessary for showing the origin of the argument.

1996; Bauman 2000), and to capitalise on this techno-economic market expansion, the British government is taking a liberal stance. Deregulation of trade, capital flow, labour, working arrangements and organisational practices are seen to assist ICT infusion and enable emulation of the growth of the US economy. Fuelled largely by the ICT boom during the mid to late 1990s when its Gross Domestic Product (GDP) rose annually by 4% (Oliner and Sichel 2000), the US is enviably viewed across the ocean. In a speech by Patricia Hewitt (Hewitt 2002), then British Secretary of State for Trade and Industry in 2002, she noted that employers longingly look across the Atlantic at the US model of economic activity, whilst workers fondly gaze across the Channel toward the European social model of employment protection. This polarity of outlook, shaped by diverse and conflicting relations to production, is perceived by the British government as in need of reconciliation if the beneficial attributes of ICT infusion are to be successfully implemented. Both employers and employees need to work together to prepare for this transformation that is reconfiguring social and employment practices and relations.

This unison of endeavour and its underlying polarity of interests are the focus of this research, particularly the socio-political and economic effects on sections of the population who are on the front line of reform - the socially excluded, in particular lone women parents. This research initially emerged from a personal and horrendous experience of a computer science post-graduate degree, where a potentially extremely interesting subject was submerged in a volume of decontextualized, factual precepts, and taught in an unimaginative and stressful way. Having been in education most of my life, I held a strong conviction that such a delivery was unnecessary and should be challenged, for out of some ninety students, less than seven of us actually graduated.

Initially interested in exploring this problematic, the tight structuring of a doctoral thesis upgrade and introductory reading of the literature positioned the parameters of investigation in a different, yet related framework.

A central problem domain for two key subjects of investigation, Cisco Systems and the British government, was the low participation of women in ICT related fields, the so called 'hard' sectors such as computer science, engineering and science in general. In delving into the related policies and strategies for improving the recruitment and retention of women, a wider picture emerged that contextualised their focus on this problem domain. Consequently, the research was shaped by this representation, but moulded to investigate the motivation behind it. In building the thesis from this literature in the manner that is outlined below, it is hoped that whilst increasing women's profile in the ICT domains is no longer considered the core focus by some academics interested in the gender and technology relation debate (Wajcman 1991; Adam 1997; Wilson and Howcroft 2000; Adam et al. 2004), exploration of it may provide a fresh contribution. Since it remains the focus of attention for these institutional players, the goal is to position its logic in three key exclusion concerns that are highlighted by government: low productivity, low skill levels and high social exclusion, and to explore and scrutinise the analyses for ICT inclusion that have emerged from these concerns.

1.2   Legacies of exclusion

The British economy has been performing poorly and this legacy of low productivity, compounded by a history of recessions in the past three decades, is argued to contribute toward the nation's exclusion from the world markets. Lacking a global

competitive edge, under investment in ICT innovation and human capital[2] are regarded as key contributory factors. Compared with Europe, Britain has a high rate of low or semi-skilled citizens, resulting in low aspirations of employment and personal development. This legacy of low skill levels is contributing toward an ICT skills shortage, particularly in the field of network engineering (DTI 2000, 2002; NSTF 2000; Rochlin and Boguslaw 2001), and this shortfall is said to constitute a serious threat to the commercial exploitation of ICT infusion, inhibitory of economic competitiveness, and reflective of an inability to adjust to change (DTI 1998a, 2003c).

Linked with these two legacies of low productivity and low skill levels is a third legacy, that of increasing social exclusion. Unemployment remains high, placing a heavy strain on social mechanisms of support such as welfare benefits, with recipients' reduced exposure to the labour market seen to negatively affect their interaction with the new communication technologies. A digital divide is said to be emerging between those who have access and those who don't, with the latter at risk of exclusion from the new economy (Castells 1996, 2001; DTI 2001c). Growing socio-economic exclusion in Britain, significantly so in terms of lone parents or those with care responsibilities[3] (Walby 1997; Mishra 1998; Taylor-Gooby 2002), is presented as polarising society further by generating deep–rooted and long-term problems (Kennedy 1997; Durieux 2003; Millar 2003) that contribute toward an unstable and unproductive society. With women forming a large percentage of these

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[2] 'Human capital' is a term used to connote the set of variables that individual people bring to the productive process, such as: relevant skills, expertise, qualifications, experiences and age that a person brings to (Igbaria and Chidambaram 1997; DFID 2002; Walby and Olsen 2002). The use of the term 'capital' holds wider connotations today than in Marx's time, and the thesis integrates several interpretations of it which are developed in various chapters and outlined at the end of this one.
[3] The term 'care' is used in this thesis to connote an array of domestic and public responsibilities, ranging from care of children, the elderly, the frail, the disabled, the sick to partners in general.

socially excluded groups (Osborn et al. 2000; Rees 2002), policies and strategies are in place to increase their participation in the labour market, specifically the ICT one (Kennedy 1997; DTI 2001b; Greenfield et al. 2002). Regarded as particularly vulnerable to exclusion from the new economy, this attention by government to improve women's socio-economic circumstances requires a radical review of nearly three decades of attempts to redress their inclusion to digital technology arenas (Greenfield et al. 2002; Rees 2002; Roberts 2002).

These three legacies of exclusion are said to prevent emulation of the US success, to hold back national and individual empowerment, aspiration, achievement, prosperity, equity and social cohesion. The British government therefore seeks socio-political and economic reform to address these legacies by fostering three cultures of inclusion.

1.3   Cultures of inclusion

With three aspects of a healthy economy said to be: well functioning markets, higher levels of human capital, and the size of the labour force (Walby and Olsen 2002), the British government is addressing all three. In viewing a vibrant market through enhanced ICT productivity; investment in human capital through concerted education and training in ICT skills; and labour market expansion through encouraging women, specifically lone women parents, to pursue ICT careers, the government seeks to create the necessary infrastructures for inclusion. To realise these goals, the notion of 'democratic citizenship' is currently being reconfigured; in legitimising civic individualisation though the fostering of active responsibility, ICT employability and relational expertise, the government seeks to turn round its legacies of exclusion.

By encouraging entrepreneurship and partnerships with business, the government is hoping to kick-start new economic momentum by taking advantage of ICT innovation and infusion. By adjusting its macro and micro economic management to encourage domestic and foreign investment, it seeks to create a climate where companies specialising in ICT, such as Cisco Systems, may flourish. Cisco, a virtual networked organisation, is currently the market leader in providing network solutions through its core products such as router and switch technology. These products currently provide the standards for network telecommunications and as such hold immense commodity value in maintaining Cisco's leadership, setting the pace of innovation, the scene for transformation, and market growth. Through encouraging this productive growth, the government believes that new opportunities for its citizens will emerge if they take greater active responsibility for their socio-economic inclusion.

A critical aspect of this strategy is that the skills of the population are commensurate with the requirements of these productive forces, and with a qualitative and quantitative skills crisis narrated government seeks to ensure that its citizens keep pace with labour market changes. As part of this endeavour, the encouragement of pedagogic partnerships with business, the notion of 'lifelong learning' and ICT skills acquisition sees the restructuring of tertiary vocational education and training (VET) programmes for the low skilled. This pedagogic culture of inclusion also centralises e-learning provision and one such programme is the Cisco Certified Network Associate (CCNA) qualification, presented as part of Cisco's corporate social responsibility to social inclusion. As a vendor-specific qualification, it consolidates and standardises network engineer knowledge, a subset of computer science. This new pedagogic culture promises skills of the future, with enhanced employability,

better pay and promotion for citizens, with both Cisco and the British government proactively targeting those regarded most at risk of unemployment and social exclusion.

With equity and full employment regarded as the main pillars of a democratic and inclusive society (COM 2000; Osborn et al. 2000), government is specifically keen to extend these values to women, for whilst they may hold equal rights in law, they are often not realized in reality (Walby 1990, 1997; Rees 1992; Osborn et al. 2000; Greenfield et al. 2002). This, the government believes, must change with policies and strategies in place to do so, for the perception is that women possess the 'touchy-feely', 'soft' or 'relational' skills said to be important in the new economy's customer relations management (Millar and Jagger 2001; DTI 2003b; Webster 2003b). Today, validation of this 'feminine' expertise constitutes the grounds of women's citizenship inclusion, with the feminisation of ICT a major component of this vision (DTI 2001b; Rees 1992; Lageson 2003).

To realise this vision, an array of affirmative action strategies are in place to facilitate women's inclusion to the ICT labour market, such as the revamping of the industry's image; ambassador and mentoring programmes; gender mainstreaming; and family-friendly employment policies (Osborn et al. 2000; Work and Parents Taskforce 2001; Greenfield et al. 2002; Rees 2002). Through such activity and partnerships with the business and pedagogic worlds, the government believes the right policies and strategies are in place to ensure women's socio-economic inclusion, improving not only their economic independence and career development but also their personal

circumstances and those of their families (Rochlin and Boguslaw 2001; Greenfield et al. 2002).

Whilst these three cultures of inclusion are posited as addressing the legacies of low productivity, low skill levels and high social exclusion in Britain, it is acknowledged that more research is needed to understand the complex, multi-dimensional aspects of socio-economic exclusion (Osborn et al. 2000; Rees 2002). This thesis attempts to provide an in-depth qualitative analysis of this complexity with specific regard to ICT inclusion by providing a blend of macro and micro analyses.

1.4   Macro and micro settings

This attempt at integration of macro and micro settings is not a new task (Knorr-Cetina 1981), yet it has not been common to do so within the Information Systems (IS) research community or indeed in gender and technology research today. For macro analysis is seen to run the risk of presenting universal, stable, pure and coherent synopses, and as such may distort our understanding of the everyday variances in personal lives and in the socio-political, economic and cultural practices and institutions that are regarded as not so stable or pure today (Harding 1991; Phillips 1992; Gedalof 1999). By attempting to reposition 'purity' within 'impure', unstable and shifting foundations, this research seeks to provide fresh analysis and data on the problem domain by opening up the scope of research to encompass both wider and local settings. For if we find and embrace the instability of analytical categories and use them as a resource for our thinking and practices, we also need to build solid foundations on which to understand the commonalities that cut across time and space.

In taking this approach, it is hoped to supplement the growing research on individual experiences with neglected analyses on structural processes that give form to those experiences. By so doing, the multiplicities of expression and experience of exclusion and inclusion are woven together, offering a broader understanding of how and why people remain on the fringes of society, or indeed of ICT, despite attempts at integration.

To give a framework to this mode of investigation, the research uses the Heideggerian concept of 'Gestell', or technological enframing, which is presented as a philosophical analysis of our common ontological relation to technology (Heidegger 1962(1977a), 1962(1977b)). Formed within a phenomenological understanding of social existence, the concept permits a weaving of the wider settings, yet does not lose sight of the localised parts. With interpretive flexibility, the concept is developed to incorporate the macro and micro gendered settings of the three cultures of inclusion. In using phenomenological language, macro will be renamed as 'backgrounds', and micro will be referred to as 'experiences'. Backgrounds will incorporate the policies and strategies to address socio-economic exclusion, and experiences will include the everyday realities of students and staff participating in the case study of the CCNA.

In so constructing the thesis, the backgrounds will provide the wider points of reference or epistemologies that give meaning to our shared experiences and activities in a common world (Heidegger 1927(1962), 1962(1977a), 1975(1982); Myers 1995). In focusing on experiences, personalised accounts of existence are privileged, providing an array of ontological bases from which to understand the concreteness of

ICT inclusion for the socially excluded. The research attempts to ground Heidegger's philosophical quest for understanding the human condition in relation to technology by developing the concept of Gestell in such a way that rich descriptive expressions of the key players: Cisco, the British government and the participants on the CCNA, are provided. To enable this, the thesis uses narrative methodology; a versatile, fertile and fluid mode of investigation that provides articulation of the diverse array of voices within their localised and wider settings. Enabling the hidden stories behind the statistics (Osborn et al 2000; Trauth 2002), or backgrounds, to emerge, the narrative research tool is positioned within an interpretive framework which explores the socio-cultural dimensions of human and institutional life. The thesis supplements this methodology with critical feminist theory to provide an epistemological background to gendered exclusion. In seeking to unravel the complexities of the problem domain, both the overt and subtle dimensions and manifestations of inclusion are explored and by focusing on both, sites of tension may emerge where the grounds for empowerment of the socially excluded may be explored.

1.5   Sites of tensions

To use a phenomenological expression, backgrounds of reference or constellations of meaning tend to 'black-box'[4] our traditions, beliefs, values and prejudices, so that we take for granted their subtle and hidden assumptions and inferences (Heidegger 1927 (1962), 1975(1982); Introna and Ilharco 2002; Moran 2002). These relatively closed systems may conflict with the actualities of our everyday experiences, potentially blocking or distorting open and aware interactions with social reality (Heidegger

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[4] The term "black-box" is used in computing, and other technical environments, to connote the closure of a set of tested and then hidden instructions that enabled a routine or function to robustly perform an action or set of activities (Winner 1993).

1962(1977a); Flores 1998; Smith 2001; Moran 2002). Such distortion may obscure deep fissures of tension lying between 'what' is prescribed and expected, and how it actually and concretely occurs in daily existence. In revealing these sites of tension, or exposures to our specific realities, viewpoints or frames of interests taken from particular backgrounds are opened up (Walsham 1993; Klein and Myers 1999), and the conflicting experiences of the socially excluded are voiced. Gestell will encompass these sites of tension as part of its development, and is initially interpreted as the technological and gendered enframing of backgrounds, experiences and sites of tension.

In the light of this reformulation of Gestell, and bearing in mind the three cultures of ICT inclusion where enhanced ICT productivity, investment in human capital and labour market expansion constitute the government's basis for reform, the thesis lacks an analytical tool for understanding these socio-economic structures and processes. Drawing from Marx's theory of productivity, it is adapted to modern ICT settings and the parameters of this research by focusing on two key processes: valorisation of capital and the labour process. Interpreting the forces of production as constitutive of government, business and pedagogic partnerships, and the relations of productive as shaped by the three variables of inclusive citizenship, this socio-political and economic configuration is added to the formulation of Gestell. The gradual development of this concept is covered in the Theoretical Framework chapter, and its reformulation will assist exploration of how the valorisation of ICT productivity influences the labour process in terms of the socially excluded, specifically lone women parents. Underpinning this exploration is whether the present model of inclusion offers these people ontological security or insecurity.

1.5.1   Ontological in/security

The government's move toward individualisation of citizenship suggests there is freedom to choose, and that we are able to take ownership of the consequences of our actions. Self-determination, self-containment, self-activation and self-responsibility are replacing government accountability in the drive for greater economic participation, democratic citizenship and social cohesion. Yet, this trend toward individualisation may be at odds with our actual experiences, with our personal interests and goals, with aspects of life such as the family (Beck and Beck-Gernsheim 1995; Chanter 2001), and with the diverse variables of socio-economic exclusion.

This fundamental tension shapes the thesis. For Heidegger (1927(1962)), it is reflective of the way in which humans are viewed and treated; we are positioned not as 'who' we would authentically like to become, but rather as 'what' we are expected to be (Angell and Ilharco 2001; Chanter 2001). This who-ness of a person is seen to reside beneath her or his surface appearances, their what-ness, and drawing from Arendt (1946(2000), 1954(1961), 1958(1998)), its suppression takes us further away from a sense of community, belonging or personal worth. For Bergson, an early 20th century French philosopher, a subject of action, alive, fluid, dynamic, governed by time, space and history, intentional and with a full sense of self and empowerment, is one who may assert their interests and champion their causes. Such a person may only do so if her or his personalised sense of self and existence, or who-ness, is positively and richly acknowledged. If such affirmation and scope for meaningful social interaction is fostered, then greater ontological security may develop.

But if who-ness is restricted by the what-ness of inclusion in the form of the reconfiguration of citizenship, then it may not. The grounds of exclusion are, in part, linked with a sense of ontological insecurity, and inclusion formulated by government and Cisco as accruing greater ontological security through membership to mainstream society. If this sense of belonging is explored in terms of the tensions between policy, gender and network engineer training, the narratives of ICT inclusion may be positioned as either transformative mechanisms for change and empowerment, or restrictive mechanisms of social control.

Tension may be understood as the embodiment of contradictory dimensions in the political, social, cultural and techno-economic structures of capitalism, or "sets of principles that are inherent within it [capitalism], and yet are opposed in their working" (Edwards and Wajcman 2005: 10). By investigating the antagonistic sets of principles and their manifestations [working] in terms of the experiences of socially excluded people, we may begin to unravel how "capital enlists science into her service", and how the "refractory hand of labour will always be taught docility". If sites of tension are a necessary part of capitalist dynamics (Marx 1890(1974); Edwards and Wajcman 2005), where both civilising and destructive forces are present (Block 1990; Edwards and Wajcman 2005), then by exploring some underlying structures and relations of ICT production, a deeper understanding of the complex, multi-dimensional experiences of exclusion and inclusion may be offered. Through formulating these parameters of the research, the thesis gradually presents the argument that the very grounds of exclusion are in opposition to inclusion, for capitalist socio-political and economic structures and relations are inherently

interwoven with injustices of inequity and discrimination that amplify ontological insecurity for the socially excluded rather than reverse it.

1.6   Research questions

In seeking to understand how the experiences of inclusion manifest for people whose lives are woven in this web of transformation, the research specifically inquires as to how the what-ness of ICT inclusion background policies shapes the who-ness of individual socially excluded people, specifically women lone parents. In seeking to answer this question, three subsidiary research questions are posed:

- what is the background of ICT policy and how does it shape the who-ness of individual socially excluded women?

- what is the background of ICT vocational training policy and how does it shape the who-ness of individual socially excluded women?

- what is the background of ICT gender policy and how does it shape the who-ness of individual socially excluded women?

The research will explore these questions by describing in detail the drive toward ICT inclusion and the experiences of those targeted for reform. It will investigate how the model of inclusion manifests on a personal level in terms of the promises of empowerment, employability, equity and social cohesion.

If the old order is now dysfunctional and socio-economically unviable, then perhaps ontological and epistemological shifts are required to understand how an authentic and inclusive existence may be fostered in an increasingly individualised world. If efforts toward ICT inclusion constitute the focus of government and the corporate

world, then an ethical responsibility of research is to explore how these efforts contribute to or undermine the authentic who-ness of the socially excluded.

1.7   Research Contributions

The benefits of this research to the IS community fall into three categories: theoretical, methodological and empirical. Theoretically, in providing a phenomenological investigation the thesis covers a relatively uncharted framework, seeking to offer a more grounded application of the concept of Gestell which is all too often used in abstract philosophical terms (Kallinikos 1995; Ciborra and Hanseth 1998; Introna 2002). In providing a neo-Marxist perspective on the structures and relations of ICT productivity, the thesis offers a theoretical framework that IS has, until recently, not utilised (Greenhill and Wilson 2005; Richardson 2005). In exploring the implications of the digital divide, this debate will be widened to go beyond the concerns of ICT access, redistribution and marketplace solutions (Wilhelm 2002; Strover 2003).

Methodologically, the thesis will explore the under-utilised tool of narrative to provide rich, descriptive accounts of both background and local settings, presenting a welcome infusion of individual tales (Trauth 2002). It will contribute toward the gender debate by incorporating the voices of women from a feminist critical theory perspective, one that seeks to expose gendered inequalities. This is a much needed contribution since IS research reflects a dearth of such explorations (Panteli et al. 1999; Wilson and Howcroft 2000; Adam et al. 2001; Wilson 2001b; Adam 2002; Adam et al. 2004). By offering a critical social theory that is grounded in methodology and practice, this research will contribute to the growing emergence of

such work which forefronts empowerment of not only the researched, but also those bereft of recognised power (Howcroft and Trauth 2005).

Empirically, it will provide a set of original and critical snapshots of how analyses of ICT exclusion and inclusion influence the experiences of socially excluded people, addressing a shortage of data in critical studies of IS (Ngwenyama 1991; Hirschheim and Klein 1994; Adam 1995, 2002, 2005). By recounting how these experiences are shaped by the valorisation of ICT productivity, the thesis provides empirical evidence on the labour process, first in terms of network engineering and thereby responding to the deficit of analysis on the technical, engineering and ICT side of IS (Orlikowski and Baroudi 1991; Orlikowski 1992; Orlikowski and Iacono 2001; Adam et al. 2004; Ellen and Herman 2005); and second, in terms of the feminisation of ICT which is also absent from IS literature.

In making these innovative contributions, the thesis takes an eclectic approach to the problem domain of the exclusion and inclusion of women to ICT fields, attempting to reposition the techno-gender relation that persists through time and space in a broader analysis. The structure of the thesis is as follows: chapter two covers a literature review of ICT exclusion and inclusion; followed by chapter three on the theoretical framework of backgrounds, experiences and sites of tension. The fourth chapter outlines the chosen methodology of narrative and critical feminist theory; and chapter five introduces the reader to Cisco Systems. Chapters six, seven and eight form the analysis section and are titled: a Network Technology Gestell; a Network Engineer Training Gestell; and a Gender Gestell. Chapter nine concludes with the research findings and discussion which points to areas of weakness in the research and

considerations for change. Appendix A contains the interview schedule, and Appendix B introduces two modules of the first semester of the CCNA.

The term 'capital' will be used in a number of senses. The standardised use of 'human', outlined in this chapter, and 'social', explained in the next chapter, is purely to show how government perceives investment in its citizens and their communities. In an attempt to differentiate between and politicise the specific accruing of human, social and material resources, three new terms are offered. In the Theoretical Framework and Network Technology chapters, 'entrepreneurial ICT capital' is developed, and in the Network Engineer Technology and Gender Gestells 'pedagogic capital' and 'gendered capital' respectively.

Analyses of ICT exclusion and inclusion

2.1   Introduction: legacies and cultures

This chapter outlines the British government's policy documentation on socio-economic and ICT exclusion in terms of its three legacies of low productivity, low skill levels, and a high rate of social exclusion in which women form a substantial percentage. In providing these three backgrounds to the problem domain of women's exclusion and inclusion to ICT fields, the chapter then proceeds to overview literature on three gender and technology perspectives. The first perspective presents a legacy of inhibitors based on sex differentiation drawn upon by Cisco and the British government to formulate their compensatory strategies. The next perspective takes the social shaping of technology and gender approach which positions the sex differentiation analyses as technologically deterministic and gender essentialist, seeking to explore the wider societal shaping of the problem domain. The third perspective is that of the social construction of technology which regards the social shaping approach as culturally and institutionally deterministic, privileging the discursive expressions of individuals to unravel the heterogeneity of relations to technology.

Whilst the problem domain is not one that the information systems research community has generally focused on, a growing body of work is emerging and the chapter outlines a synopsis of some of this literature. It then introduces three cultures of inclusion which will form the substance of the thesis, and in which citizenship is reformulated to encourage greater labour market participation. These cultures will be contextualised within European directives, for they inform much of the British

government's policy formulation. Finally, the chapter concludes with how the issues raised here will be explored in the remainder of the thesis.

2.2   Analyses of exclusion

Three legacies[1] provide key government policy backgrounds to the formulation of the concept of exclusion, situating the problem domain within the context of: low productivity, low skill levels and a high rate of social exclusion.

2.2.1   A legacy of low productivity

The British economy is a struggling one, sharing a history of recent recessions in the past three decades with many advanced capitalist societies such as the US. Market stability is generally shaky, in part because of increasing socio-political unrest, costly military endeavours and environmental calamities across the world that impact not just on local markets but also wider ones (Galbraith 2003). In Britain, this market volatility is jeopardised by a history of low productivity, with a productivity gap of 40% compared with France and Germany, and 20% with the US (Lloyd 1999), resulting in the country lagging behind the main OECD[2] nations and taking 19th place (DTI 2004a). Productivity, as the economic ratio of output to input, measures the extent to which resources are effectively used, and influences the rate of economic growth and the size of the labour force (Walby and Olsen 2002).

Britain's poor productivity performance is seen to be a result of a shortfall in production that is related to a number of factors: the smaller size of British firms

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[1] The term "legacy" was initially used by a Cisco representative in a fieldwork meeting as she talked about the historic association of technology as a masculine preserve in the western world which appeared to be absent in developing countries, such as India, Dubai and South Africa.

[2] The Organisation for Economic Co-operation and Development. It encompasses the leading advanced market economies such as N. America and Mexico, Western Europe and Turkey, Australia and New Zealand, Japan and S. Korea (Hirst and Thompson 1999).

compared to other countries, with the exception of a few industries such as pharmaceutics and aerospace; a 'tail' of poorly performing companies which tend to pay lower wages and pull down the average; lack of investment in equipment, infrastructure, technology and human capital; and too much regulation which costs in the region of some £31 billion each year (DTI 1998a, 2000; Gilman 1998; Lloyd 1999; Duncan 2004). This poor economic profile is said to be inhibitive of the state's global competitiveness, reflective of an inability to adjust to change, and constitutive of a serious threat to the commercial exploitation of ICT infusion (DTI 1998a, 2003c). An integral component of this snapshot is the low level of skills in the country's population.

2.2.2   A legacy of low skill levels

For more than a hundred years, large sections of the British economy have been associated with low skilled and low-value added employment, resulting in a legacy of high rates of illiteracy, innumeracy and low expectations in terms of work and learning, with the majority of the population preferring a job to formal education (Kennedy 1997; Payne 2000; LSRC 2003, Feinstein et al. 2004). In 1996, more than one in five, nearly seven million people, lacked basic numeracy, literacy and ICT skills, with only half of the population qualified to 'A' level standard (DfEE 1998; DTI 2001c, 2003c; LSC 2003a, 2004a). One in three adults have not taken part in education or training since leaving school, compared with Europe's one in 10, amounting to 64% of the workforce with no vocational qualifications (Fryer 1997; Kennedy 1997).

By 1999 the situation was not much better, with 56.9% of the population at skill levels below National Vocational Qualification (NVQ) level 2, compared with the US (53.7%), France (32.4) and Germany (20%) (DfES 2003). Britain then is regarded as seriously lagging behind many other Anglo-Saxon countries in terms of its skills base, with this state of affairs seen to limit the range of opportunities for its citizens and to contribute toward Britain's exclusion from the new economy (DTI 1998a, 2001c; DfEE 1999; DfES 2003). Furthermore, a critical quantitative and qualitative ICT skills shortage is said to exist, both in Britain and around the world, particularly in network engineering (DfEE 1999; NSTF 2000; Milroy 2001; Rochlin and Boguslaw 2001; CNAP 2005). This legacy is linked to a third historical inhibitor to productivity, that of a high rate of social exclusion.

2.2.3   A legacy of high social exclusion

A growth in social exclusion across Europe is particularly prevalent in Britain, where "a shocking snapshot of exclusion and segregation" exists (Osborn et al. 2000: 7; DfES 2003; LSC 2003a; Naegele et al. 2003). Demographic and socio-economic changes in Britain and Europe have resulted in increases in unemployment, immigrant mobility and an ageing population, with a decline in marriages that alters the family structure; all of which put pressure on public spending and are seen to diminish social capital[3] (DfES 2003; DTI 1998a, 2003b, 2003c; Naegele et al. 2003; Duncan 2004). The rise in lone parent families in Britain, from 9% of the population in 1971 to 25% in 2001, is particularly acute amongst the poorer sections of the population, with approximately 1 in 4 children affected and the majority of these parents being women

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[3] The term 'social capital' is used to connote social investment and consumption, where the building of social projects to foster strong links amongst communities is aimed at inculcating a sense of belonging, an improvement of labour production and a viable consumer base (Gough 1979; DFID 2002; EOC 2003a).

(Walby 1997; Cousins and Tang 2002; EOC 2003a; Duncan 2004). To address these contributory factors to exclusion, the Social Exclusion Unit was set up in 1997 (Kennedy 1997; SEU 2004).

The term 'social exclusion' is a relative new one for government; it implies an array of positioning outside of mainstream society and is indicative of a rupture in the social bond between sets of people and society (DFID 2002). The term reflects an attempt to broaden analysis from a mono-causal view of poverty to include other contributory factors such as: family breakdown, unemployment, poor health and housing, old age, criminal activity, inadequate education and low skills, violence and abuse; all of which are seen to create deep–rooted, long-term problems (Kennedy 1997; Durieux 2003; Millar 2003; ODPM 2004; SEU 2004).

This growth in social exclusion is also said to contribute toward a 'digital divide', or a 'two speed eEurope' (CEC 2000). This divide is often understood as the division between those who have access to the new communication technologies and those who don't; a dichotomy first coined by the Clinton administration in 1995 (Lu and Wang 2003). It represents a widespread belief that the new advances in networked telecommunication systems will lead to economic development, work and educational opportunities and 'put the world at your fingertips' (Castells 1996; COM 2000a, 2002a; CNAP 2003g; DTI 2003c; SEC 2002). Such a perspective regards non-access to these technologies as running the risk of exclusion from the new economy and hence from society (Becta 2001; Castells 2001; Norris 2001), with women perceived as being particularly vulnerable.

2.2.3.1   A legacy of low participation of women in ICT

Women's participation in tertiary, post compulsory education is very low, resulting in them holding fewer qualifications than men and although younger women are generally better educated today, the gender imbalance has worsened over the past few years (Millar and Jagger 2001; Greenfield et al. 2002; Walby and Olsen 2002; Vendramin 2003). Women's skill levels are often below NVQ level 2 and as such, many will form a large percentage of those at risk of socio-economic and digital exclusion (COM 2000a; Osborn et al. 2000; Rees 2002; SEC 2002; Valenduc 2003; Webster 2003b). Whilst the ICT sector in both Europe and Britain is expanding, the number of women represented in it is decreasing, both in terms of the industry and academic disciplines (Panteli et al. 1999; Webster 2003b; Webster and Valenduc 2003).

Full-time women student graduation rates in Computer Science in the 1970s was 25%, by 1996 it had fallen to 12% (Panteli et al. 1999). In computing courses in general, their enrolment fell from 28% in 1978 to 13% in 1985, and then down to 9% in 1998 (Robertson et al. 2001). This trend is reflected in the US, Canada, Western Europe and Australia (Taggart and Needham 2001; Greenfield et al. 2002; Selinger 2002a), and these declining levels are only pertinent to the 'hard' technical field of computing, since women's participation at university level, across all academic disciplines, has generally increased (Robertson et al. 2001).

These statistics are not confined to academia, they are also to be found in ICT employment, where women are under-represented across Europe (Panteli et al. 1999; Millar and Jagger 2001; NTO 2001; Robertson et al. 2001), and across the US,

Canada and Australia (Camp 1997; Mayer-Smith et al. 2000; von Hellens and Nielson 2001; Rees 2002). The number of women in ICT employment across Britain has fallen from 25% in 1995 to 22% in 2002; software engineering accounts for only 8%, network engineer professionals for just under 6% across western Europe, and ICT services and electronics manufacturing fare even worse (Millar and Jagger 2001; Selinger 2002a, 2002c; Steedman et al. 2003a). This aggregate of statistics reflects the Anglo-Saxon world, particularly Britain, as performing very poorly in terms of gender profiles within the ICT sector (Selinger 2002a; Steedman et al. 2003a; Webster 2003b). Whilst quantitative data flags this disparity, it does not provide explanations as to how this phenomenon has occurred or why it persists, so several perspectives have emerged which offer analyses, of which three are outlined.

2.2.4   Three perspectives on the gender and technology relation

Descartes' analysis of light as pure and fundamental was empirically disproved by Newton who noted a spectrum of seven primary colours[4]. So to with perspectives on the gender and technology relation, a subject of research for a number of years, which provide a diverse spectrum of analysis, none of which can be said to be definitive or pure. The following perspectives chart its history in a limited form and whilst chronologically placed, analyses today may draw on one or the other, or from several.

2.2.4.1   A legacy of inhibitors perspective

The Anglo-Saxon world's legacy of women's low participation in technology has been attributed to a number of inhibitory factors that centre on analyses of sex differentiation. They take the form of: behavioural and cognitive sex differences;

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[4] Red, orange, green, blue, yellow, violet and indigo.

socialisation and identification; 'technophobia'; and discrimination. These analyses

inform Cisco and the British government's set of compensatory strategies to counter:

the absence of a 'critical mass' of women; the 'shrinking pipeline' or low retention of

women; and the impenetrable 'glass ceilings' or 'glass walls'.

Underpinning these strategies is the cognitive and behavioural sex differentiation

debate, in which the common argument is that women and men see, think and act in

the world in different, hard-wired, biologically innate ways (Kwan et al. 1985; Turkle

1987, 1988; Turkle and Papert 1990; Ahuja 2002). These sex variances are presented

as giving rise to opposing gendered expectations, assessments of ability and values in

relation to digital technology (Turkle and Papert 1990; Venkatesh and Morris 2000).

Formed through socialization and identification in early life, each sex becomes

normatively associated with specific roles, behaviours and cognitive abilities (Frenkle

1990; Spertus 1991; Klawe and Leveson 1995). This array of associations defines

what a 'female' and 'male' is, and influences what she or he does or engages with in a

dualistic, oppositional and hierarchical manner (Grundy 1996; Faulkner 2000b, 2001;

von Hellens et al. 2003; Wagner et al. 2003). 'Femininity'[5] is presented as being in

conflict with technical interest, and 'masculinity' as not (Gorriz and Medina 2000;

DTI 2001a, 2001b), giving rise to the oxymoron of women and technical competence.

This feminine/masculine dualism has raised questions as to whether women are

technically incompetent or 'technophobic' (Zimmerman 1986; Turkle 1988; Spertus

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[5] The terms 'femininity' and 'masculinity' represent culturally constructed persona and norms based on biological sex or perceived gender and, as such, impart variables of control, imagery, conformity and identity (Butler 1990, 1997; Haraway 1991; Harding 1991). Typical notions of masculinity convey worldly, rational, success-oriented, aggressive, strong, pragmatic, individualistic associations. Femininity conveys gentleness, morality, emotionality, delicateness, softness, sharing, family orientation, communication, caring and concern for others.

1991; Grundy 1996). Perhaps the computer represents a symbol of what a woman is not since it is often associated with logical, analytical, mathematical, rule-governing dexterity and purity; traits that are not commonly assigned to the feminine (Cockburn 1985a, 1999a; Turkle 1988; Hacker 1990; Wajcman 1991; Harvey 1997). For image conscious young women at a critical stage of development, such as puberty when many decide on their educational and vocational areas of interest, their knowledge of computer science is formed by these normative associations. These stereotyped and recalcitrant legacies act as powerful inhibitors, manifesting as fear of technological failure, anticipation of rejection, and concern about the effect on their perceived femininity, their family life and career prospects (Wajcman 1991; Grundy 1996; DTI 2003b; Vendramin 2003). The effect is to turn many girls away from maths and science areas of study long before they leave primary school (Frenkle 1990; Spertus 1991; Klawe and Leveson 1995; Cooper and Weaver 2003).

For when it comes to describing what a computer professional is, images of a nerdish, geekish, laddish, anti-social male expert who appears to have some passionate, romantic supremacy over his machine come to mind, reflecting a masculine world which holds associations of power, control and prestige (Tierney 1995; Panteli et al. 1999; Faulkner 2000a, 2000b; Wagner et al. 2003). The abundance of masculinised, aggressive or destructive jargon, such as aborted or killed programmes, crashed or bombed systems, male and female sockets, combined with an ideology of technological solutions to problems serve to segregate, isolate and exclude many women from what they see as hostile, unwelcoming and discriminatory environments (Tierney 1995; Panteli et al. 1999; Guffens 2003; Wagner et al. 2003).

Both Cisco and the British government share these concerns, drawing from a selection of these analyses in their explanations of the shortage of women in the ICT domain (Taggart and Needham 2001; Greenfield et al. 2002; DTI 2001b, 2003a, 2003b). Whilst Cisco holds to the cognitive and behaviourist approach, British government policy documentation does not directly refer to it today, but it shares the belief that women have different needs and that these must be compensated for. Both these institutional players maintain that the way to address the ICT exclusion of women is to take a quantitative approach, or the Deficit Model (Wajcman 1991). The way to attain this 'critical mass' is through the use of role models and mentors (Frenkel 1990; Pearl et al. 1990; Klawe and Leveson 1995; Ahuja 2002; Berg 2004). The logic being that if more women entered ICT fields then perhaps the impenetrable managerial and promotion structures, the overt and more significant and insidious covert forms of discrimination that women experience would be overcome through supportive networks of concerted action (Panteli et al. 1999, 2001; Robertson et al 2001; von Hellens and Nielson 2001; Wilson 2001a; Trauth et al. 2003).

This quantitative focus is part of an attempt to reverse the 'shrinking pipeline' analysis that both Cisco and the British government adhere to (Taggart and Needham 2001; Greenfield et al. 2002; DTI 2003b). This analysis refers to the disproportionate number of women who drop out of science, engineering and technology (SET) education the further they progress (Camp 1997; Panteli et al. 1999; Robertson et al. 2001; Roberts 2002). By focusing on the institutional gendered causes of this shrinkage and proactively encouraging more women in, it is hoped to address the 'glass ceilings' or 'glass walls' analyses (Hemenway 1995; Igbaria and Baroudi 1995; Baxter and Wright 2000). These two terms refer to the invisible and impermeable

barriers to progression, where the lower salaries of women and the disproportionate number of male managers restrict their career and financial advancement (Rees 1992; Truman and Baroudi 1994; Igbaria and Baroudi 1995; Panteli et al. 1999; DTI 2002). Women may see the opportunities but they can't attain them, giving rise to gender disparities in the career progression of ICT or Information Systems (IS) professionals (Igbaria and Chidambaram 1997).

This legacy of inhibitors is "damaging the UK's supply of scientists and engineers" (Roberts 2002: 47) by deterring women from entering ICT and SET academic disciplines and employment. Government reports flag women's reluctance in pursuing an ICT career; concern for the large number of women leaving related employment because their skills are under-utilised or they lack support; and the strain of having to work harder to convince their male colleagues that they are capable (DTI 2001a, 2001b; Millar and Jagger 2001; Roberts 2002). Others earmark the problematic of the corporate culture of long working hours that has little or no respect for a healthy work-life balance; and the lack of affordable and suitable childcare facilities (Cassels 2002; DTI 2002; Greenfield et al. 2002).

Whilst some of these reports are beginning to reflect cultural, organisational and societal factors underpinning these inhibitors, this perspective, a legacy itself of 1970's feminist debates, is problematic. It has a tendency toward: individualising the problem and placing the onus on women themselves to change; ignoring the complex power dimensions of inequality; accepting sex and gender as given and unchanging, and technology as unproblematic; inadequately explaining why some women are in computing; and lacking theoretical substance (Stepulevage 1997; Henwood and

Miller 2001; Adam 2002; Adam et al. 2004). In presenting this perspective, its proponents risk ignoring the historical and current instantiations of how sex differentiation is produced and reproduced, of how wider influences mediate these differences; as a result, it is critiqued as mono-causal, deterministic and essentialist.

2.2.4.2 A social shaping perspective

A body of scholarship emerged during the mid to late 1980s which sought to analyse the social shaping of technology and gender by viewing both as far from deterministic or essentialist. By placing attention on the form, control and direction of technology, the myth of its determinism is seen as a simplification of an array of complex societal factors that are gender biased (MacKenzie 1984; Wajcman 1991; MacKenzie and Wajcman 1999; Mitev 2005). It is not technology per se that is gendered, but our social relations to it. By questioning the recalcitrance of gender essentialism, the social shaping of gendered beings is explored to open up axes of inequality that are constituted by prejudice and discrimination (Cockburn 1983, 1985a; Harding 1991; Walby 1990, 1997; Wajcman 1991, 2000).

As a highly charged category of classification, gender shapes our experiences through its historical, socio-political associations (Suchman 1994a, 1999; Bowker and Star 2000; Adam 2002). These associations are said to be male defined and against which women are measured and found to fall short (Wajcman 1991, 2000; Lloyd 1993; Adam 1995; Wilson 2001a). In offering the notions of 'hegemonic masculinity' (Cockburn 1983, 1985a, 1999a; Wajcman 1991, 2000), or 'hegemonic patriarchy'[6]

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[6] The use of the term patriarchy implies the law of the father, the foundation upon which the underlying structures of control regulate, organize and position women and men in different positions of value, with different access to their self determination. It provides the context, support and legitimization for

(Walby 1990, 1997; Bowker and Star 2000), these hegemonies produce and reproduce gendered aspects of societal power in relation to the development, production, dissemination, use and control of technology.

These power struggles are embedded in our normative gendered backgrounds of reference, so in exploring these structural frameworks where no single force is seen to dominate, this perspective goes beyond mono-causal, individualistic explanations (Wajcman 1991, 2000; MacKenzie and Wajcman 1999; Trauth 2002). It regards gender and technology as mutually shaping each other, and in so doing defines the relations of exclusion and inclusion that permeate everyday life, guiding and constraining people's activities and agency (Wajcman 1991, 2000, 2002; MacKenzie and Wajcman 1999; Wilson and Howcroft 2000; Wilson 2002). In focusing on how women are excluded, how technology has come to be perceived as masculine, and how it is implicated in the shaping of gender (Cockburn 1985a, 1985b; Wajcman 2000, 2002), research is opened up to multi-dimensional analyses.

The varied instantiations of technology and its uses are explored; gender blindness in many past and present analyses are addressed; and structural analyses are offered (Cockburn 1983, 1985a, 1985b; Wajcman 1991, 2000; Mackenzie and Wajcman 1999). Whilst today, this perspective has revised the term 'societal' to incorporate both local and wider structural analysis, another body of research has given the local more attention by focusing specifically on individuals.

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the various sex discrimination activities that privilege men and oppress women (Grosz 1988, 1992; Grosz and de Lepervanche 1988; Walby 1990).

2.2.4.3 A social construction perspective

This perspective draws from the social construction of technology studies that are part of more recent postmodern analyses. Rather than regarding the techno-gender relation as a universal and mutual shaping of hegemonic forces, this approach focuses on the co-construction of individuals and technical artefacts within a broad array of networks of relations that give each meaning (Latour 1987; Law 1992; Gill and Grint 1995; Ormrod 1995; Tierney 1995; Henwood and Miller 2001). This analysis takes an epistemological and ontological relativist perspective that rejects the purity of universal concepts such as 'woman' or 'women'; 'man' or 'men'; 'gender' or 'technology'; 'society' or 'patriarchy' (Haraway 1991; Harding 1991, 1992; Barrett and Phillips 1992; Braidotti 1996, 2002; Gedalof 1999). There is nothing real, self-evident, fixed, given or obdurate about these constructs that produce "artificial analytical closure" (Gill and Grint 1995: 20).

As early as 1935, the anthropologist Margaret Mead noted that characteristics assigned to each sex had a cultural, not a biological base (Roberts 1997). The term 'gender' was introduced by Oakley (1972), and expanded upon by Rubin (1975) in a ground breaking anthropological text which attempted to move beyond the limitations of universalising theories. Rubin made the distinction between 'sex' and 'gender', blending both into one coherent sex/gender system. Clarifying sex as a set of biological characteristics, and gender as a set of variable social norms influencing the behaviour of sexed individuals, her sex/gender system is regarded as having some fundamental weaknesses today. Seen to duplicate the logic of traditional epistemology, her system does not historicise or relativise either term, positioning both as fixed, static and homogenised categories, with gender often associated with

women and neglectful of men (Irigaray 1985a, 1985b, 1990; Harding 1991; Crowley

and Himmelweit 1992b; Oakley 2000).

The term gender and its expressions of femininity and masculinity in social

constructivist analyses are used as relational constructs to reflect multiplicities of

identity, difference and ambiguity which are expressed through sexual orientation,

ethnicity, location, culture and linguistics, for example (Butler 1990, 1997; Crowley

and Himmelweit 1992c; Geladof 1999; Braidotti 1996, 2002; Henwood et al. 2000a).

These expressions are recursively constructed as individual processes of 'performative

becoming' (Butler 1990, 1997). Social life for postmodernists is about doing, rather

than being (Moore 1999b). So too with the terms 'society' or 'structure', viewed not

as fixed and concrete forms that hold us together, but rather ongoing outcomes of

networks of activity that are negotiated and renegotiated by human actors (Giddens

1984; Strum and Latour 1999; Bijker and Law 2000; Latour 2000).

Equally so with the term 'technology', for the purpose is to regard these broad

concepts as problematic black boxed universals, requiring deconstruction and

disassociation from their dualistic and oppositional links (Harding 1986, 1991; Kline

and Pinch 1999; Strum and Latour 1999; Akrich 2000; Bijker and Law 2000; Latour

2000). In unravelling the diverse expressions of these concepts that are reflected in

constructions of consumption, marketing and use for example, the problematic is what

it means to act fluidly as an individual in any given techno-relation, and whether

gender can be assigned relevance (Cockburn and Ormrod 1993; Grint and Woolgar

1995; Håpnes and Sørensen 1995; Henwood 2000; Gilbert 2001).

Each of these three perspectives provides very different analyses on the techno-gender relation(s), and each has its weaknesses. The first reduces gender to essentialism and technology to determinism; the second privileges structural factors and whilst beginning to acknowledge the local is short on individual expressions; and the third deconstructs conceptual black boxes as having no universal significance. Yet, if a black box signifies a piece of knowledge or practice that one challenges at one's peril (Whitley 2002), then in deconstructing only one end of a interwoven continuum, postmodern theorising neglects the wider structural settings in which individuals share commonalities of cultural, religious and ethnic discrimination for example, leaving the multiplicity of their daily performative activities floating in an expressive 'freedom for all' undefined space.

This postmodern space has been empirically observed in anthropology as less a case of fluidity, and more of lack of choice in gender identity (Moore 1999b). The claims that knowledge is symmetrical; that technical artefacts and their properties are constructed by heterogeneous networks of power; that their use is through meanings assigned to them by 'relevant social groups'; and that these properties and meanings neither dictate nor have any consequence independent of humans for they have 'interpretive flexibility'[7] (Latour 1987, 2000; Law 1992; Kline and Pinch 1999; Biker and Law 2000; Monteiro 2000), are bound up with degrees of authority. These variances will considerably influence the claims, and by investigating 'relevant' or visible agents less attention is paid to those whose socio-political and economic circumstances marginalise significance and constrict meaningful, discursive

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[7] Technology is seen to have very different meanings for different groups of people, and can be used in ways that designers never had in mind (Kline and Pinch 1999; Bijker and Law 2000).

performances (Hoffman 1999; Mackenzie and Wajcman 1999a; Robertson et al. 2001; Wajcman 2000, 2002). Bereft perhaps in recognisable forms of power and visibility, such people are vulnerable to prejudicial associations and the taken for granted, covert, deterministic and essentialist backgrounds of gender and technology. Produced and reproduced by individual, institutional and societal relations, the social constructivist approach lacks analysis of the interconnectedness between them.

Seeking to unravel this connection, the thesis will blend the second and third perspectives in order to review the first for its analyses of compensatory strategies provide the rationale of ICT inclusion for both Cisco and government. By providing a framework of both structural and individual analyses, presented in the following chapter, the weaknesses of both these approaches may be addressed. Research on gender and technology then is diverse, encompassing broad differences in analysis and priority of action or study, and whilst a body of research is emerging on gender and technical education (Faulkner 2000a, 2001, 2002; Henwood 2000, Henwood et al. 2000b; Miller et al. 2000), what is lacking is an account of network engineering and this is reflected in the body of information systems literature.

2.3   An information systems overview

The social study of information technology (IT) and IS literature has an interesting body of research focusing on gender issues, and largely draws on the social construction of technology perspective. Other related literature which draws on aspects of the first perspective has been covered in that section. The articles referred to here are by no means definitive, but give a flavour of the scope of research on

gender which encompasses both concerns about IT exclusion and considerations for inclusion, although they do not use this language.

Research on gender involves: the unequal effect of the IT industry on women's career advancement, and the tensions that exist between balancing home and work responsibilities (Trauth 1994; Ahuja 2002; von Hellens et al. 2003). More research covers gendered biases and rhetoric in computer-mediated communication (Herring 1999); the challenges experienced by women in the professional field of IT (Wilson and Howcroft 2000; Adam et al. 2001; von Hellens and Nielsen 2001; Ahuja 2002; Trauth 2002; Wilson 2002); and user resistance and information systems failure (Wilson and Howcroft 2000; Wilson 2002). Others investigate the gendering of information systems developmental processes (Wilson 2001b); gender imbalances in access to information infrastructures (Shade 2002); and the use of women's hybrid skills to improve information systems design participative approaches (Woodfield 2002). These manifestations of discrimination and inequities in our own and related professions, in our practices of systems construction, implementation and use, require more of a focus on individualized stories for understanding how women experience and cope with them (Trauth 2002).

Extensive as this gender research is, there continues in IS research to be a shortfall in combined feminist and ICT analyses; an absence of a strong theoretical approach to either; with little reference made to the gender and technology literature outlined above (Adam et al. 2004). Feminist investigation has been slow in coming forward in IS research, attributable perhaps to the limited number of analyses which lack citation by mainstream scholars; lack encouragement of such research; and fears of militancy

(Gilbert 2001; Adam 2002; Adam et al. 2004). The quest for rigour, respectability and objectivity steers clear of controversial and fuzzy interpretive studies, and a misleading belief in the newness of discipline regards it as devoid of discriminatory baggage that may encumber more established academic fields (Adam 2002). Yet, feminist studies are emerging that explore the experiences of working class women engaged with at-home telework (Wilson and Greenhill 2004; Greenhill and Wilson 2005); and how its theory can inform critical IS studies (Adam 2002). Others focus on how the contributions of its epistemology may inform computer ethics or the universalising tendency in IS (Adam 2001, 2005; Adam and Richardson 2001); on how gendered ways of knowing are inscribed in Artificial Intelligence systems (Adam 1998). However, there is a need to change how we talk and think about gender, and about technology (Dahlbom 1996), and there remains a deficit of research that covers both the structural and local influences. Whilst critical IS is beginning to explore these dimension (Howcroft and Trauth 2005), more studies are needed particularly in relation to network engineering and its training, and to ICT exclusion and inclusion.

The IS research and the three perspectives point to a substantial range of contributory factors toward the problem domain but they hold consensus on inequity in the techno-gender relations, and this is taken up by British and European policies. Inequity is seen to shape and construct women's exclusion through prejudicial perceptions and practices (CWSET 1994; Osborn et al. 2000; DTI 2002, 2003a, 2003b; Roberts 2002; Guffens 2003). Manifest in life, education and the labour market, inequity is counter to human rights, to the treaties of Rome and Amsterdam (Rees 1992; Osborn et al. 2000; Walby 1990, 1997, 2004; Walby and Olsen 2002). It disadvantages, disrespects, disregards and under-utilises the diverse skills base of the European

Union, and must be changed to ensure greater societal participation and democratic citizenship (Fryer 1997; Greenfield et al. 2002; W&E Unit 2003).

2.4   Analyses of inclusion

In seeking these inclusion values, the British government, alongside Cisco and the Union, is beginning to articulate the notion of 'culture', both in the sense of fostering a sense of change and belonging and in terms of recognising that social and ICT exclusion is a result of socio-cultural factors in addition to economic, cognitive and behavioural ones. Whilst one Cisco representative has done so only in meetings through her use of the term 'legacy' (see p26), the government and the Union are more developed in their analyses.

The concept of 'culture' is often understood as embodying systems of meanings, beliefs and values that influence behaviour, perception and judgment; these systems and practices enable us to make sense of our world and give substance to our roles and responsibilities (Avison and Myers 1995; Franklin 1995; Willis and Trondman 2000; Euben 2001). Culture implies both identification and differentiation; the former referring to membership based on assumed shared norms and values, and the latter to variances or oppositions in which fragmented, contested, temporal and emergent notions of meaning and belonging position people as non-members or outsiders (Orlikowski 1991; Friedman 1994; Avison and Myers 1995; Moore 1999a). It implies that a sense of community and commonality is fostered, but this may be contestable, open-ended, mobile and hybrid (Moore 1999a).

If agency, power and privilege adhere to inclusive membership (Euben 2001), then the establishment of cultures forms a critical part of the vision for social cohesion. By

using the term culture, the thesis attempts to embody the system of policies that the British government provides for making sense of the world. In a move to turn around its legacies of exclusion, the British government is encouraging three key cultures of inclusion, and as part of this socio-economic strategy the notion of democratic citizenship is being reconfigured, particularly in terms of the roles and responsibilities of the socially excluded. Given that many of the government's policies are shaped by the European Union, the latter's directives will form the background to these cultures.

2.4.1   A culture of ICT productivity

The launch of a comprehensive telecommunications policy began in 1994 when the Union flagged the importance of ICT for economic rejuvenation, competitiveness and improved quality of life for its citizens (Europa 2002). Further development of this policy took shape at the Lisbon European Council Summit of 2000, where the goal was to give the community a new, high level and dynamic politico-economic momentum by widening and improving Internet connectivity to create more open environments for business and generate employment (Mansell 1993; COM 2000a, 2002b; Cedefop and Eurydice 2001). Regarded as enabling an 'eEurope' to make "a quantum leap stemming from globalisation and the new knowledge-driven economy", the political vision is development of its most important asset, human capital, and ensuring all citizens have access to the new telecommunication technologies (COM 2000a: 3; Cedefop and Eurydice 2001). Voiced in the context of the Union's employment policy and the need to tackle social and digital exclusion, this ICT policy formulation is seen to enable professional or educational opportunities for citizens to move around the Union (Com 2000a, 2002b; Rübsamen-Waigmann et al. 2002; Stratigaki 2004). By   building   a   pan   European   ICT   infrastructure,   the

internationalisation of the telecommunications market will enable effective partnerships between public and private sectors, and meet the needs of multinational producers and users (Mansell 1993; COM 2001).

The British government shares this vision and seeks to address the lack of investment in ICT infrastructures by cultivating a culture of entrepreneurship and strategic partnerships to turn round its legacy of low productivity (DTI 1998a, 2000, 2003c, 2004a). In a White Paper (DTI 2000), the government's position is clear; harnessing scientific and technological ingenuity to improve the country's entrepreneurial profile and the quality of people's lives. This outlook was summarised by the Confederation of British Industry (CBI 2000) as:

> "A culture which recognises and values innovative ideas and the people who have them, provides support and leadership, and can deal constructively with failure and risk will be much better placed to take advantage of opportunities as they arise. Being good at creating knowledge is not enough, the U.K. must also excel at using that knowledge both innovatively and profitably. As such, the rate at which knowledge can be translated into exploitable products and services may well become the key criterion for success." (CBI 2000: 3).

This entrepreneurial culture of innovation and its utilisation constitutes the ground upon which the ability to seize new business opportunities rests, and requires business to be more flexible in its productive processes (DTI 1998a, 2004a). In this new economy, companies and nations do not act alone and networks of allegiance are emerging between them, between producers and suppliers, between employers and employees, between business and pedagogic communities (DTI 1998a, 2000, 2003b, 2004a; Roberts 2002). Such networks in the business sector can be seen in the clustering of companies in Silicon Valley in California and Silicon Glen in south Scotland.

These strategic alliances are built and developed through piggy-backing on private/market, 'always-there' base infrastructures such as energy and telecommunications (Mansell 1993; Dahlbom 2000). Vital for ICT infusion, these infrastructures enable business to explore new regions and means of production, giving rise to the notion of 'globalisation' (DTI 1998a, 2003c, 2004a). To facilitate access to these emerging new global markets, the British government has since the 1990's followed the US example by taking an 'arms-length' regulatory stance toward economic activity (DTI 1998a, 1998b, 2000, 2003c, 2004a; Webster 2003a).

Such 'new' economic activity not only has implications for trade, but also for citizens. With the British government regarding social exclusion as part of the "failure to match rights and responsibilities with a passive welfare state that traps people on benefits rather than enabling them to help themselves", individual responsibility for active empowerment is to be encouraged (DTI 1998a, 2004a; SEU 2004: 3). Today we are witnessing the emergence of a politico-economic reconfiguration of the partnership between socially excluded citizens and government. One route aimed at connecting excluded groups to such responsibility, to democratic processes, to public services and to the opportunities of the new economy, is to ensure that ICT skills are an essential part of pedagogic curricula (PAT 1999, 2002; DfES 2001a; DTI 2001c, 2002; Roberts 2002; ODPM 2004).

2.4.2   A culture of ICT employability

The background to this strategy are European directives on effective adaptation of education and training systems to meet today's flexible labour market requirements (COM 2000a, 2002b; Naegele et al. 2003). Within this framework are the goals of

digital literacy and lifelong educational pursuit for every European citizen (COM

2000a, 2001, 2002a; Cedefop and Eurydice 2001). Lifelong learning connotes the way

in which human capital is regularly developed and improved through informal

learning processes, enabling citizens to keep pace with the labour market's changing

requirements and engage with ICT infusion in all areas of their lives (Eurydice 2000,

2001; COM 2000b, 2002a; Cedefop and Eurydice 2001). With education seen to

improve a person's productivity and wages (Feinstein et al. 2004), current pedagogic

systems and practices need to adapt to enable user-oriented, high quality and

adaptable infrastructures that reflect the diverse needs of the Union's population

(Cedefop and Eurydice 2001; COM 2001; Webster 2003b).

At the same summit in Lisbon 2000, the European Council of Ministers pledged to

realise these goals by positing online tuition or e-learning as the solution, for the array

of electronic tools and assessment procedures are regarded as bringing about more

efficient and wider access to information and pedagogy (COM 2000a, 2001; Eurydice

2000; Selinger 2002b; Naegele et al. 2003). Such a strategy is envisioned to meet the

imperative of defining a common set of ICT professional skills that are currently

diverse and confusing within training provision (Valenduc 2003). It will also provide

opportunities for the socially excluded, and counterbalance the failure of supply to

meet demand for a skilled ICT workforce, or 'knowledge' workers (Osborn et al.

2000; COM 2001, 2002a). In the late 1990s, a doubling of professions in Europe led

to the creation of some 10 million posts (Webster 2003b), generating a significant

skills shortage which is predicted to rise by over 1.7 million[8], and this is regarded as

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[8] A prediction that was based on 800,000 unfilled posts in 1999 (COM 2001).

seriously hampering economic development (COM 2001; Rübsamen-Waigmann et al. 2002; Valenduc 2003).

In Britain, the demand for knowledge workers and network engineers is also outstripping the ability of education to produce them (DTI 1998a, 2001c, 2004a; DfEE 1999; NTO 2001; DfES 2003). This shortage requires recruitment from alternative avenues, and in the light of the legacies of low skill levels and high social exclusion, one key tertiary sector of pedagogy, Further Education, that has traditionally offered provision to the low or semi-skilled population, is being targeted for restructuring. This restructuring takes several forms: the acquisition, standardisation and consolidation of ICT skills; identification of barriers to widen access; improvement of standards and management; generation of a culture of lifelong learning; and utilisation of e-learning platforms (Fryer 1997; Kennedy 1997; DfEE 1998, 1999; e-skills NTO 2001; LSC 2001; 2003a, 2004a; UVAC 2002; DTI 2004a).

The aim is to ensure that the population is educated to a minimum of National Vocational Qualification (NVQ) level 3. NVQ provision blends education with vocational training, providing the work experience so valued in the recruitment process (e-skills NTO 2001; Steedman et al. 2003a). The provision of universally recognised qualifications, such as the CCNA vendor e-training programme which is positioned between NVQ level 2 and 3, is part of the strategy to meet the restructuring goals (e-skills NTO 2000; QCA 2004). The underlying logic being that the higher the qualification, the higher the rate of return for both the individual and the employer; a better skilled workforce will improve employment opportunity and career migration, and encourage employers to be more innovative, adapt faster and move upmarket with

their productive strategies (Fryer 1997; DfEE 1998, 1999; Greenfield et al. 2002; Roberts 2002; DfES 2003). In this light, a socially excluded citizen's responsibility is to enhance their employability through the acquisition of ICT qualifications and skills, with the latter defined as the ability to find and use digital knowledge resources (LSC 2002b). As many people as possible should possess them, since they are said to be essential for setting up and operating their own businesses, for finding employment in the new economy, and for boosting productivity (DfEE 1999; DTI 1998a, 2003c, 2004a; CBI 2000; LSC 2004a).

This vocational pedagogic model of inclusion is based on Britain becoming a genuine learning society, and said to provide the nation with a pool of ICT human capital, thereby ensuring the digital divide does not widen. For, a "highly educated workforce with a culture of lifelong learning is more likely to adapt to economic change" (Fryer 1997; DfEE 1998; CBI 2000; DfES 2003: 12; LSC 2004a). By providing its citizens with opportunities for pedagogic and personal improvement, their employability, their quality of life and that of their families and their communities will be positively transformed (Fryer 1997; Kennedy 1997; Greenfield et al. 2002; Roberts 2002; DfES 2003). With the pressing ICT skills shortage requiring "fishing from a wider pool" (Rübsamen-Waigmann et al 2002: 5), and with women viewed as an under-tapped and under-utilised resource, recruiting more of them into the labour market is another government and European policy priority.

2.4.3   A culture of feminisation of ICT

This wastage of women's skills and knowledge is regarded as a matter of concern, since it holds constant across scientific disciplines and national boundaries (Osborn et

al. 2000; Rees 2002; Rübsamen-Waigmann et al. 2002; Walby and Olsen 2002). The
Treaties of Rome (1957) and Amsterdam (1999) set the European scene for citizen
equality between the genders (Walby 1997; Osborn et al. 2000; Walby and Olsen
2002). The Lisbon Summit in 2000 furthered this goal by setting quantitative targets
to reduce occupational segregation and tackle discrimination (COM 2000b; Rees
2002; Rübsamen-Waigmann et al. 2002; Webster 2003b). With the main pillars of a
democratic society established as equity and full employment (COM 2000b; Osborn
et al. 2000), concern was emerging since previous directives were not achieving the
desired results for many member states or nations were not implementing them (Rees
2001, 2002). New strategies were required, and the focus today has become 'gender
mainstreaming'.

First voiced at the Beijing Conference on Women in 1995[9] (Osborn et al. 2000; Rees
2001), and adopted by the Helsinki Report (Rees 2002), gender mainstreaming
became the tool for women's democratic citizenship and inclusion. Defined as "the
systematic integration of gender equality into all policies, into organisations and their
cultures", gender mainstreaming is regarded as a powerful vehicle for tackling the
structural and institutional inhibitors (Rees 2002: 3). Designed to ensure more women
are represented at managerial and policy levels, its logic is that this will help tackle
the 'old boys network' where personal invites to fill posts, sexism and nepotism are
rife (Osborn et al. 2000; Rees 2002). It will also assist the challenging of stereotypic
images of science and technology as a male domain that are all too often perpetuated
by the ICT industry, peer groups and the family (Guffens 2003; Valenduc 2003).

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[9] The fourth World Conference on Women, held in China, declared a global action plan to enhance the
socio-economic and political empowerment of women.

Recommendations that have emerged from this focus are: the use of role models and mentoring programmes; the promotion of public understanding of science and technology; and changes to organisational cultures (Com 2000b; Osborn et al. 2000; Rees 2001; Guffens 2003). Part of this transformation involves greater flexibility in employment arrangements to reconcile the demands of work and family commitments, enabling more women with care responsibilities to enter the labour market (Wagner et al. 2003; Stratigaki 2004). This strategy is regarded as making good business sense by augmenting the range of human capital, and diversifying the workforce (Rübsamen-Waigmann et al. 2002).

The British government has adopted these European directives, with the main responsibility for gender mainstreaming falling on the Department for Trade and Industry (DTI), and its subsidiary the Women and Equity Unit. Responsible for championing British commerce, the DTI expresses concern for the low representation of women in Science, Engineering and Technology (SET), as a series of reports indicate (DTI 1993, 1994, 2000, 2002, 2003a). With women regarded as vital to the diversification of the workforce, the goal is to ensure more are offered ICT skills and qualifications by which to gain personal and financial empowerment, and to improve their retention by providing role model and mentoring schemes (CWSET 1994; DTI 2001b, 2001c; Greenfield et al. 2002; PAT 2002). One core policy takes the form of a set of work life balance initiatives, and underpinning this is the notion that it is possible to combine a family life with a working one, to be good parents as well as good workers (EOC 2001b; Work and Parents Taskforce 2001; DTI 2003b; W&E Unit 2003; W&W Commission 2005).

Furthermore, the new economy's focus on customer professionalism requires relational skills, and women are viewed as 'innately' possessing them (DTI 2003b). These skills are seen to enable better management of the complex customer requirements that networked business environments generate (DTI 1998a, 2003b; LSRC 2003). With this expertise said to be in short supply, the feminisation of the ICT workforce is paramount (DTI 2001b, 2003b). Citizenship inclusion for women then takes the form of ICT relational expertise. The government now believes that all the right policies and strategies are in place to boost its economy by developing ICT production and ICT human capital, and by encouraging greater labour market expansion through its reconfiguration of citizenship; all that remains is for business and educational organisations to implement them. If corporate policy is stimulated toward an inclusive working environment, and the problem domain tackled at both individual and organisational levels, then opportunities for inclusion will emerge (NTO 2001; Roberts 2002; Greenfield et al. 2002; LSC 2004b). Britain's legacies of low productivity, low skill levels and low participation of women in ICT, and the skills crisis will no longer be salient issues for its policy formulation.

2.5   Conclusion

Having outlined three legacies of exclusion which are said to blight the British economy and overviewed three cultures of inclusion to turn them around, this chapter has offered three perspectives on the gender and technology relations. Each focuses on different analyses of the problem domain of the low participation of women in ICT arenas, and these diverse accounts reflect its complexity which requires a multi-pronged approach (Osborn et al. 2000; Adam 2002; Rees 2002; Guffens 2003; Wagner et al. 2003; Webster 2003b). Summarising the IS literature on gender and IT

systems, the call for a fuller critique of gender and ICT is made so perhaps a wider, multidisciplinary analysis of our relations to each will supplement the legacy of inhibitors, the social shaping and the social construction perspectives.

In drawing from the social shaping perspective, the thesis will position the three cultures of inclusion: ICT productivity, ICT employability and the feminisation of ICT as epistemological backgrounds of what-ness formulated in response to the three legacies of inclusion. The three reconfigurations of inclusion citizenship: active responsibility, ICT skills acquisition and relational expertise will constitute the ontological cultures of inclusion. Utilising the social constructive perspective to look at how they manifest in terms of the experiences of those classified as socially excluded, focus will be particularly on the subset of lone women parents. In an attempt to understand how these epistemological and ontological cultures of ICT and socio-economic inclusion shape individual women's lives, this analytical formulation will structure Chapters 6, 7 and 8. These three snapshots will look in greater detail at how government, business and pedagogic partnerships formulate improvement to productivity and inclusive citizenship, and how those on the frontline of reform experienced this formulation. The central motivation for this research is to explore the tensions between these cultures of inclusion and their practices in everyday life.

In pursuing this course, attention will be on the following areas of activity: ICT productivity as the harbinger of the new economy, its global reach and the imperative for entrepreneurship, partnership and active responsibility; the demand for knowledge workers, the restructuring of vocational pedagogy and the acquisition of ICT skills through e-learning and lifelong learning; and the improvement of women's

recruitment and retention through the feminisation of ICT and the privileging of relational skills. These backgrounds of inclusion will be investigated by posing the main research question of how the who-ness of individual women is shaped by these settings. Subdivided into three parts, as the previous chapter outlined, each subsidiary question looks at the different policies and strategies to attain the goal of democratic, inclusive citizenship. They ask how the what-ness of inclusion as constituted by ICT policy, ICT vocational training policy and ICT gender policy shape the experiences of women, and is ontological security or insecurity the result?

Whilst the thesis does use the broad concepts of gender, ICT, society and many others, it does so with no universalism intentionally implied. It takes the view that diverse as our existences are, we do not act in isolation and our specificities are shaped by broader structures, relations, processes and pressures that are both overt and taken for granted or hidden, manifesting as if beyond our immediate influences or concerns. This manifestation wields power that coerces and moulds what and how we do things and why, in ways that we often don't understand or reluctantly concede to. By naming some of these manifestations in relation to gender and ICT, this research hopes to explore how they influence the lives of individuals and how we give meaning to black boxed constructs that are used in everyday parlance. To do so, the next chapter outlines the theory. Drawing from phenomenology to give greater substance to the notions of backgrounds, experiences and sites of tension, Heidegger's concept of Gestell and Arendt's formulation of who-ness is developed, alongside an understanding of citizenship and Marx's analysis of the forces and relations of productivity.

Backgrounds, experiences and tensions

3.1   Introduction: epistemological and ontological shaping

This chapter builds on the previous chapter's outline of legacies of exclusion and cultures of inclusion by using the three key schemes of the thesis: backgrounds, experiences and tensions. It weaves them together using two theoretical frameworks: phenomenology and Marxism. Both these frameworks provide analysis of some hidden dimensions of social existence; the first in relation to epistemology and ontology, and the second to capitalist productivity. The chapter introduces the Heideggerian concept of Gestell or technological enframing, and as it progresses this concept is developed to encompass the themes of gender, inclusive citizenship and productivity. As the reformulation of Gestell takes shape, a table will be presented outlining its construction, but it may be useful to hold an initial image of the concept as:

Table 3.1: Initial image of Gestell

Gestell ≡	Backgrounds + Experiences + Tensions		
The epistemological and ontological enframing of our relations to technology	Gender	Productivity	Inclusive citizenship

As a dynamic challenging of our epistemological and ontological relations to technology, Gestell positions us as both objects of use and manipulation and as subjects or agents able to break away from this functionality. As an enframing of objects, we are controlled within a technological background that reduces everything to malleable resources. Such a paradigm has its roots in Cartesian epistemology which definitively shapes our understanding of 'what' phenomena are, and the chapter extends the concept of Gestell to encompass the background points of reference for

our gendered being. In seeking to unpack these background abstractions of what-ness, phenomenology turns to the everyday experiences of individuals and describes the undefined grounds of their ontological existence. In so doing, sites of tension between the macro backgrounds and micro experiences are explored, for they offer windows of awareness from which we may free ourselves of this distortion of existence.

The chapter then turns to Gestell as an enframing of subjects, in which the challenging takes the form of recognition of this distortion, and through awareness of this we may come to realise that which we may wish to be, our who-ness. In order to understand this reasoning, it is necessary to revisit the concept of 'essence', for phenomenology is a science of essences; Gestell is the essence of technology and who-ness the essence of ontology. In so doing, a number of other concepts are introduced to explain how Heidegger's use of essence holds very different interpretations to conventional thought. These concepts will not be used in the thesis for they are polemical and can give rise to their own distortions of interpretation. In offering an interpretation of essence as that which holds a relational and dynamic bringing into awareness of that which remains hidden, technology and by extension gender are positioned as mediators of our who-ness.

Heidegger and Arendt argue that this mediation presents a fundamental dilemma of existence, where their concept of 'rootlessness' reflects a state of disenfranchisement and disassociation, or insecurity that distorts our ontology. The chapter proceeds by expanding this concept of who-ness, developed from Heidegger and Arendt to connote a sense of personalised agency where authentic belonging and membership in social life resides. In the light of the thesis' focus on exclusion and inclusion, where the

research question reflects on how the what-ness of inclusion positions the who-ness of individual socially excluded people, this sense of inclusion is central. Holding in mind the previous chapter's review of government's policies, three background cultures of inclusion constitute the grounds of reform for tackling the three legacies of exclusion. These background cultures establish the epistemological points of reference for inclusion, and key to this formulation is the concept of 'citizenship' which this chapter will outline to convey the historical association of social cohesion with membership, equality, rights and responsibilities. Currently being reconfigured by government to encompass an emphasis on responsibility and individualization, three key civic relations specifically shape the ontological inclusion of socially excluded people and these will be built into the concept of Gestell.

The chapter then turns to a Marxist analysis because it provides a materialist grounding to phenomenological philosophy by situating sites of tension in the dialectical productive sphere. Two central contributions of Marxist theory are outlined: the valorisation and the labour processes; they are then positioned within the structures and relations of present day ICT productivity in the context of the thesis' research parameters and added to the concept of Gestell. Finally, the chapter revisits the polemics of macro and micro analyses, commenting on their weaknesses and their strengths, for the thesis will blend both and regards each as a continuum that merges into the other. The chapter concludes with a new formulation of Gestell as the socio-political and economic enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity. Shown in Table 3.9 on page 91, this is adapted to structure the analyses chapters and conveyed in Table 3.10, page 99.

3.2   A phenomenological perspective

Phenomenology focuses on what is out there in the real world (Arendt 1946(2002), 1954(1961); Isomäki 2002; Moran 2002). Based on the works of two 19th century philosophers, Franz Brentano and Edmund Husserl, it privileges everyday existence in an attempt to move away from the traditional Anglo-Saxon focus on what is within, in the sense of subjective 'cognito', or thinking. By providing a descriptive base of phenomena, phenomenology seeks to unwrap 'pure' Cartesian thought, its positivist and empiricist abstractions of objectivity and rationality, to provide more detailed accounts of messy, fuzzy and situated experiences (Mingers 2000, 2001b; Moran 2002; Ciborra 2004). As a science of phenomena[1], it studies appearances or "that which shows itself in itself"; the manner in which phenomena are seen, made evident, manifest, obscured, falsified or denied (Heidegger 1927(1962): 51; Moran 2002). Heidegger took this phenomenological base for investigation and related it to technology, using the concept of Gestell.

3.2.1   Gestell: a background of technological enframing

As an appendage to the human body, a tool such as a hammer extends its capabilities to perform some task, and a machine "replaces the entire sequence of sensory-motor initiatives" (Kallinikos 1998: 387). Each of these forms of technology is specifically designed for some way of engaging with the world and whilst less intentional practice sometimes arises, this usage gives rise to a common understanding of technology as something that provides us with functionality:

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[1] The term 'phenomenon' may be applied to virtually anything: a person, a laptop, a table, an organisation, a society, a belief, an occurrence, a process.

"The manufacture and utilization of equipment, tools and machines, the manufactured and used things themselves, and the needs and ends they serve, all belong to what technology is" (Heidegger 1962(1977a): 4).

Yet, such a means to end description, or an instrumental definition, simply provides the what-ness of technology (Heidegger 1962(1977a)). For Heidegger, this what-ness hides a deeper understanding of technology and by peeling away its functionality that which is revealed is a Gestell or an enframing (Heidegger 1962(1977a), 1962(1977b)).

Gestell has been translated as a putting into place, a commanding (Brown and Lightfoot 1998); an ordering (Dreyfus 1992); a technological skeleton or frame that gives shape, form, definition or structure (Heidegger 1962(1977a), 1962(1977b); Ciborra and Hanseth 1998). Representing an active, ongoing process and not a static one, for Heidegger, Gestell as the essence of technology dynamically challenges humanity by both regulating it and setting the ground for its release from this control (Heidegger 1959(1966), 1962(1977a), 1962(1977b); Ciborra and Hanseth 1998):

> "Enframing is...a destining that gathers together into the revealing that challenges forth...As this destining, the coming to presence of technology gives man entry into That which, of himself, he can neither invent nor in any way make...in this destining the saving power is said to grow...this saving power lets man see and enter into the highest dignity of his essence" (Heidegger 1962(1977a): 31-32).

Gestell gathers together in a particular manner all that is before it, and in so doing, shapes ways of being that endure through time, yet vary according to technology's specific instantiations. In challenging-forth[2] humanity in this way, Gestell brings to awareness its regulation and its dignity; for Heidegger, the fundamental question concerning our relation to technology is to unravel this challenging-forth by investigating:

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[2] Translated as a harbouring-forth, a movement from the relative security of a harbour to the insecurity and risk of what lies hidden beyond (Brown and Lightfoot 1998).

"the constellation in which the revealing and concealing, in which the coming to presence of truth, comes to pass" (Heidegger 1962(1977a): 33).

Exposing this constellation, or background, in which the enframing of technology is formed will reveal the essence of our ontology, one that both challenges us to recognise ourselves as 'what' we are and 'who' we may wish to become.

Gestell challenges-forth the what-ness of humans and objects by enframing them in an ordered and regulated world, in which instantiations of technological manipulation and control are not of their own choosing (Heidegger 1962(1977a), 1962(1977b); Huntington 2001a; Introna 2002). This objectified challenging-forth of enframing delivers not a nearness to things, to our worlds or ourselves, rather all becomes concealed as 'standing-reserve' and ready for use (Heidegger 1962(1977a); Dreyfus 1992; Kallinikos 1995; Introna 2002). Standing-reserve connotes a fundamental undifferentiated supply of the available, a reduction of everything to functions and raw materials (Heidegger 1962(1977a); Brown and Lightfoot 1998; Thomson 2000; Huntington 2001a). Modern technology[3], for Heidegger (1962(1977a)), is all things swept together in a vast network of standing-reserve, in which existence is functionally regulated and manipulated (Pike 1986). In this sense, modern technology challenges-forth by contending with everything that is, imposing seizure and requisition for use where nothing is allowed to appear as it is (Heidegger 1962(1977a)).

As objects of manipulation, we hold an urge to conquest, know, shape and subjugate our world in ways that we encounter only mirror reflections of ourselves and our

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[3] Heidegger was referring to the technology of his time such as the hydroelectric plant, the radio and what he referred to as the 'airliner'.

practices, and by which we can know only that which we ourselves have made (Arendt 1946(2002), 1954(1961); Heidegger 1952(1977), 1954(1968), 1959(1966), 1962(1977a); Kallinikos 1995, 2001). This self-referential, means-end pursuit offers less scope for mediating events, for in the gathering of the standing-reserve we cease to have significance as individuals (Heidegger 1962(1977a); Ciborra and Hanseth 1998; Feenberg 1999):

> "Thus when man, investigating, observing, ensnares nature as an area of his own conceiving, he has already been claimed by a way of revealing that challenges him to approach nature as an object of research, until even the object disappears into the objectlessness of standing reserve" (Heidegger 1962(1977a): 19).

In an attempt to discover 'what' is permanent in the world, so that it might fully be known, man's arrogation has assumed dominion over everything, including himself (Heidegger 1952(1977), 1962(1977a)). Humanity, Heidegger (1959(1966), 1962(1977a), 1962(1977b)) argues, has entrapped itself in this enframing where everything is structured as malleable resources, and hides the referentiality and authenticity of our individual existences. It presences us not as that which we are, but as 'what' we are positioned to be: functional, rational, wilful, grasping, calculating and ordering (Heidegger 1952(1977), 1962(1977a); Feenberg 1999, 2000b; Thomson 2000; Introna 2002; Introna and Ilharco 2004). The table below summarises this background what-ness of our relations to technology in the concept of Gestell:

Table 3.2: Gestell as a technological background

Gestell ≡	Technical Background
The epistemological and ontological enframing of our relations to technology	The technological challenging-forth of background references of what-ness as regulation, order and control of all that is positioned as standing-reserve

Phenomenology regards such a background of reference as residing in Cartesian epistemology (Brown and Lightfoot 1998; Moran 2002; Introna and Ilharco 2004).

Seeking to break away from an impersonal and divine spirit, a 17th century epistemological shift gave rise to the notion of autonomous self-presence, objectively detached from the world. Through the detachment and disembodiment of Descartes' 'cogito ergo sum'[4] proposition, humans are set as self-transcendent, immortal and omnipotent beings (Heidegger 1962(1977a); Harding 1986; Haraway 1991; Lennon and Whitely 1994; Oakley 2000), establishing the scene for ontological[5] and epistemic security to reside in an ordered will and the self-certainty of inductive and rigorous logic (Marcuse 1968; Feenberg 1999).

In a quest for the ultimate truth, unity and universality of existence, Anglo-Saxon thought seeks fixed laws and orders of hierarchical value, where everything follows rules or structures that are eventually knowable (Marcuse 1991; Feenberg 1999). Any grey or murky areas are rationalised out, for the Anglo-Saxon epistemological premise of the excluded middle defines something by what it is not: either it is A or Ā (not A) (Arendt 1946(2002), 1954(1961); Bowker and Star 2000; Gilbert 2001). This is reflected in Newtonian physics of mathematical purity and certainty, a cornerstone of computing technology, where the challenging-forth objectified enframing of such values has been termed a one-dimensional technical universe (Marcuse 1991); a technological paradigm (MacKenzie and Wajcman 1999a); or a technocracy (Feenberg 1999).

Each arises when society privileges, and is organised around, technical prowess, imposing an exercise of techno-power in which our acts of choice and models of

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[4] I think, therefore I am.
[5] Ontology is used in the sense of being or mode of existence that acts as a framework for interaction with the world, shaping a person's reality which informs her epistemology.

security are embedded with political and epistemological rationality (Feenberg 1990, 2000a; Robey and Bourdreau 1999). Strong inferences to improving life and society are presented as being rooted in this prowess, for it is legitimised by reference to scientific objectivity where a purity of rationality privileges reified forms (Heidegger 1952(1977), 1962(1977a); Harding 1986; Feenberg 1999). In such a form, networked technology strips away social contexts and values, enframing how we engage with our worlds and with others through formalisation, organization, stabilisation, standardisation and legitimisation of particular sets of world-views that exclude what is not known (Kallinikos 1995, 2001; Orlikowski and Iacona 2001).

Embodied in their design, fabrication, implementation and interpretation of use, once stabilized our technical systems become instruments of knowledge about our world (Whitley 1997, 2002; Orlikowski and Iacono 2001). Backgrounds of networked technology utilise this knowledge, representing it as programmable sets of propositions that are codified in Boolean algebra of 'on' or 'off' electronic states in the quest to maximise exactness, regulation and standardisation of functionality. Piggy-backing on this base technological infrastructure are backgrounds of ICT systems that process information according to these context-free procedural rules. Shaped and informed by Cartesian rationality that 'what' is known is representable and codifiable, these simplified and reductive rules fail to reflect the complexity, fuzziness and changeability of today's ICT systems (Adam 1995; Ciborra 2004), and the pluralism and fluidity of social existence.

The precision of their functionality requires hierarchical binary distinctions to be made between sets of knowledge, between their codifiable properties and their social

requirements, and these become immutability embedded in our technological systems. Hardwired even into the logic of the Intel chip, this immutability risks exclusion of that which is not known or deemed irrelevant, for fuzzy intuition is replaced by clarity of procedural thought, chaotic nature by ordered technological algorithms, and 'feminine' irrationality by 'masculine' rationality.

3.2.2   Gender: a background of social enframing

If a phenomenon is known, it is already conceived in its what-ness through core or structural properties that fundamentally define and shape it (Heidegger 1927(1962), 1975(1982); Introna and Ilharco 2002; Moran 2002). These structural properties are the abstracted, functional, external, behavioural and cognitive properties that immutably and permanently form their boundaries. They provide the 'horizonal schema', or horizons of meaning which constitute shared constellations of reference that provide context to our ways of being in, and knowing of, our worlds (Heidegger 1975(1982): 308; Winograd and Flores 1986; Introna and Ilharco 2004). Born into these predefined backgrounds, they select, classify and name phenomena, informing our common values, beliefs, axes of measurement, aspirations and expectations, and by so doing make communication possible and bridge the gap between past and present (Heidegger 1952(1977); Arendt 1954(1961); Brown and Lightfoot 1998; Dreyfus 1998; Levison 2001).

Yet, 'man', as the shaper of all that comes before him, moulding the world in his form, rendering it hierarchical, measurable, calculable, and reducible to objects of representation through rational reasoning and self-definition (Arendt 1954(1961); Marcuse 1968; Kallinikos 1995; Shildrick 1997), reflects a gendered mirror image

which excludes or marginalizes women. Haraway (1991), like Heidegger, traced the development of the term 'gender' to the Latin verb of generare which means to beget, stemming from the noun 'gener'. Referring to the begetting of race or kind, national European variances in its use conveyed slightly different connotations: the generic English application since the 14th century implied sort, kind or class; the Spanish and French implied kinship, language, biological taxonomy or nationality; and the German reference was to sex, stock, race or family. Today, the English use of the term has come to signify more of a reference to the begetting of sex, sexuality or sexual difference that is used to delineate categories of race or class for example. But it is also used in the sense of engendering, where the interpretation of producing, promoting, developing or generating is generically applied to the setting up of particular conditions, like the production of ideas or the reproduction of humans.

This modern English use of the term 'gender' is not context free; it is woven in socio-political horizons of meaning or backgrounds of societal construction (Haraway 1991; Harding 1986, 1991; Adam et al. 2001; Gilbert 2001; Mills and Wilson 2001). This context positions a person's what-ness as her or his biologically and sociologically inscribed givens; attributes or appearances that identify the human species on pre-defined axes of gender, ethnicity, sexuality and class, for example (Lloyd 1993; Geladof 1999; Kristeva 2001; Lane 2001; Jalusic 2002). It also sets the primary site of action in individualised masculine knowledge, and thereby sets people as specific resources for information processing (Shildrick 1997; Dreyfus 1998; Adam 2002). These axes of difference position each of us in an already over-determined world as particular kinds of individuals (Flores 1998; Smith 2001), with particular relations to

technology. Subsumed and dispersed in these backgrounds, which provide the 'wholes' that give meaning to our 'parts', 'what' and how we see, feel, or think are shaped by them (Heidegger 1927(1962); Myers 1995; Chanter 2001; Holland 2001). The table below reflects this epistemological what-ness of gendered backgrounds in the concept of Gestell:

Table 3.3: Gestell as a gendered background

Gestell ≡	Gendered Background
The epistemological and ontological enframing of our relations to gender	The gendered challenging-forth of background references of what-ness as abstract, behavioural and cognitive and social classificatory properties of humans

By so conceptualising and construing people, objects and events in epistemological backgrounds of gender and technology, our intended and unintended activities are recursively informed as we go about the routinization of our daily lives, and without them we would flounder (Giddens 1984; Galliers 1985, 1990; Lee 1991; Winograd and Flores 1986; Moran 2002). They are integral to a sense of community and identity, both for individuals and for societies, for without this shared acceptance and understanding we would possibly find ourselves amiss, our sense of ontological security perhaps threatened (Giddens 1984, 1991). Yet, these deeply ingrained, taken for granted backgrounds appear to take place outside of our own invention (Arendt 1954(1961); Dreyfus 1998; Gordon 2001; Levison 2001), so to understand how we engage with this structural what-ness of existence, phenomenology focuses on the daily experiences of ordinary people.

3.2.3   Everyday experiences: privileging ontology

If I am of this world, if it is continuously present for me, a world of facts and values and practical encounters, then it is to this world that I belong and bring my comparing,

counting, inferring skills, my acts of theorizing (Heidegger 1962(1977a)). Ontology, for phenomenology, precedes epistemology - I am before I think (Heidegger 1927(1962), 1975(1982); Arendt 1946(2002)). In privileging ontology, a personalized framework for our interactions in the world shapes our epistemology; doing precedes thinking, where knowledge of something comes after an encounter (Arendt 1954(1961); Marcuse 1968; Moran 2002). If I phenomenologically ground my activity and exist not solely in thought, I may gather sense data[6], and use it to clarify meanings of my worlds by noticing that something occurs and observing how it does so (Heidegger 1927(1962), 1975(1982); Moran 2002). In gathering this sense data, phenomenology seeks to reveal, or bring to light that which is as it presents itself, that which is beneath and beyond phenomena by stripping it of its surface appearances (Heidegger 1927(1962), 1975(1982)).

By observing and describing how a phenomenon proceeds forth, comes into play, takes place and goes on, the manner in which it exists and is experienced, the underlying taken for granted processes of what-ness that are hidden by our backgrounds of reference are exposed (Heidegger 1927(1962), 1962(1977a), 1975(1982)). In viewing phenomena as processes of activity that change over time and space, their shaping, meaning and interdependence are stripped from levels of abstraction that mask the actualities of everyday existences (Arendt 1946(2002), 1954(1961); Dahlbom and Mathiassen 1997; Flores 1998; Curtis 2001; Levision 2001). By peeling away this masking through rich descriptive accounts of a phenomenon's functional instantiations, it comes to be understood as that which it is

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[6] Phenomenology encompasses the five senses of sight, smell, touch, hearing and feeling, and I include a further one of intuition.

(Heidegger 1927(1962), 1975(1982); Inwood 1997; Moran 2002). For

phenomenology, the daily, micro experiences of ordinary people are grounded in the

manifestations of these instantiations (Coyne 1998; Mingers 2000, 2001b; Introna and

Ilharco 2002; Moran 2002). This focus becomes incorporated into the concept of

Gestell as:

Table 3.4: Gestell as experience

Gestell ≡	Experiences
The epistemological and ontological enframing of our relations to technology and gender	The experiential challenging-forth of background reference of what-ness as manifest in the daily situated lives of individuals

This focus on experiences precedes postmodern theories, but the use of structural

philosophical concepts such as 'ontology', 'epistemology' and 'background' has

excluded phenomenological analysis from much of present day theorising, particularly

postmodern feminist debate. Regarded as universalising and essentialist language as

the Literature Review chapter introduced, much of today's focus is on moving beyond

such notions, and later on this chapter and the next expands on this feminist analytical

tension. However, information systems interpretative research has, to some extent,

been informed by phenomenology, yet it lacks critique of this tension (Adam and

Richardson 2001). In an attempt to understand user resistance and high rates of

misuse, disuse or failure, for example, the centre of attention is on the situatedness of

individual users (Orlikowski and Baroudi 1991; Wilson and Howcroft 2000; Wilson

2002; Mitev 2003). Hermeneutically utilising sets of codifiable knowledge, IT and

ICT systems attempt to incorporate socio-cultural and organisational requirements

within the technical specifications (Boland 1985, 1991; Walsham 1991, 1993;

Avgerou et al. 1999; Scott 2000). Attention is also drawn to the designers and

developers' hidden, implicit socio-cultural material constructions of information technology artefacts (Orlikowski and Baroudi 1991; Galliers 1995; Adam et al. 2001; Orlikowski and Iacona 2001). By bringing to light these human dimensions of our systems, mismatches between configuration, implementation and use are brought to light. It is these sites of tension that phenomenology seeks to expose.

3.2.4   Sites of tension: breakdowns and mismatches

Backgrounds of reference influence each and every one of us, they enable us to exist as social beings, yet they are often concealed by their obviousness, their self-evidence, invisibly giving shape to our existence (Heidegger 1962(1977a); Winograd and Flores 1986; Villa 1996; Moran 2002). They may once have more overt, but time and power dynamics have black boxed them as accepted and expected traditions, deeply submerging them within normalised practices and processes so that we have largely forgotten their historical shaping (Heidegger 1927(1962); Wenger 1998; Bowker and Star 2000). Heidegger (1927(1962), 1962(1977a)) regards this as a potentially dangerous affair, for misconception, deception and distortion may accrue through conflicting encounters with the world, where recalcitrant referential backgrounds may not match with individual experiences.

In conceptualising existence as shaped by underlying backgrounds of formal structures and representations, these deep-rooted and taken for granted traditions prejudice our perceptions and thinking, and potentially block an openness to, and awareness of, our social existences. In opening these black-boxes, phenomenology seeks to reveal deep fissures in 'what' is prescribed and how it actually and concretely manifests in our everyday lives (Heidegger 1927(1962), 1975(1982); Winograd and

Flores 1986; Mingers 2000). These fissures are sites of breakdown, or tension, instability, confusion, contradiction, mismatch (Heidegger 1962(1977a); Winograd and Flores 1986; Lee 1991, 1994; Walsham 1993, 2001). During breakdown, an interrupted moment occurs in our routinised and comfortable existence that exposes some fundamental nature of our practices and equipment, compromising our normative preconceptions (Winograd and Flores 1986; Suchman 1987). As "a situation of non-obviousness in which the recognition that something is missing leads to unconcealment", the underlying nexus of necessary relations and specific viewpoints or frames of interest are exposed as 'what' they are (Winograd and Flores 1986: 165; Walsham 1993; Klein and Myers 1999). This exposure may also expose a situation that is so obvious we assume it is integral to our concrete, manifest state of affairs. The table below integrates this formulation of breakdown or tension in the concept of Gestell as:

Table 3.5: Gestell as tension

Gestell ≡	Tensions
The epistemological and ontological enframing of our relations to technology and gender	The conflictual challenging-forth of situations of non-obviousness in the background references of what-ness

Phenomenological investigation then seeks to move beyond searching after the background what-ness of a phenomenon, to show how its functional objectification distorts daily experiences. In exploring the manifestations of these distortions through sites of tension, the undefined middle ground, the hidden spaces of existence or borderlands of ambiguity are exposed. By reformulating the concept of Gestell as the dynamic enframing of backgrounds, experiences and tensions in both a technological and gendered sense, functional and determinist rationality positions our what-ness as

gendered objects requisitioned for use and value. This constriction of our ontology and epistemology may be in conflict with that which we may wish to do or become, our who-ness. Heidegger regarded this constriction as obscuration in clouded, fettered thinking, in mindless chattering, in the temptation of popular culture, in inauthentic modes of existence, in drifting in blind conformism and mediocrity in the shifting and groundless opinions of others, and in the everyday superficiality and ambiguity of the routinization of social life (Heidegger 1927(1962), 1954(1968), 1959(1966); Leland 2001).

For Heidegger, the solution lay in acknowledging the dynamics of Gestell. Acting as a fulcrum point that pivots between static stagnation and dynamic change, Gestell presents both a cautionary tale of how technology is transforming our world (Bartky 2001), and a visionary account of how it may release us from this functional enchainment. Gestell as the challenging-forth revealing, or enframing of subjects enables us to become aware of our constricted technological relations with the world, and by so doing realise our who-ness. Heidegger did not regard our existence as consisting of two separate entities of subjective self and objective world, but rather both are co-dependent (Heidegger 1962(1977a); Dreyfus 1992, Haugeland 1992). As two sides of the same coin, co-joined and inseparable, subject and object are interwoven and "both the one who acts and the other who is acted upon are constituted by the same range of disciplinary forces" (Shildrick 1997: 150). If a subject is already immersed with objectiveness, and an object similarly with subjectiveness, then for Heidegger technology acts as the mediator, the enframing of both (Arendt 1946(2002), 1954(1961); Heidegger 1962(1977a); Introna and Ilharco 2004), and by

extension, the mediator and enframing of gender. Technology is not an independent, deterministic force but a particular ontological expression of our relation to the world. It is in this sense of enframing that this challenging reveals a coming into presence of the essence of technology (Heidegger 1962(1977a)), and the essence of our personalised sense being or who-ness.

3.2.5   Gestell: a release from enframing

The synthesis, for Heidegger, was to knowingly be aware of, and accept, the hidden functionalities that order our technological enframing, and through this acceptance we may become more open to letting that which presents its self come forth, and thereby reveal that which has remained veiled or submersed in backgrounds of reference (Heidegger 1962(1977a), 1962(1977b); Mosse and Whitley 2004). To understand this philosophical positioning of our ontological enframing by technology, it is necessary to revisit the concept of essence. As a science of essences, phenomenology is much criticized, for the concept usually implies fixed, timeless, stable, universal and ahistorical states of objectified abstraction and reified mental isolation (Butler 1990, 1997; Phillips 1992; Gill and Grint 1995; Feenberg 1999). Essence implies an a priori statement which points to 'what' permanently endures, the fundamental set of properties that define a phenomenon (Brown and Lightfoot 1998; Introna and Ilharco 2004). Yet this interpretation of essence is inessential essence to Heidegger (Heidegger 1952(1977), 1962(1977a), 1962(1977b); Brown and Lightfoot 1998). The phenomenological use of essence is not the what-ness of a phenomenon or its prescribed givens, rather the nature of its manifestations (Moran 2002; Introna and Ilharco 2004). These may be instantiations of what-ness or they may be instantiations

of who-ness; both are also two sides of the ontological coin and the task is to unravel that which they are and how they come about.

Heidegger revised the traditional Platonic conception of essence by interpreting it as a more fluid process, a way in which things appear and remain in play (Thomson 2000, 2001). His use of the term was in the sense of 'wesen': a German verb that connotes the way in which something holds sway, administers itself, develops and decays; the way in which something comes to presence as it is in 'truth', stripped of all its background references (Heidegger 1952(1977), 1962(1977a), 1962(1977b). For Heidegger, 'truth' is a notion which pertains to authenticity or 'alētheia', a Greek essence of truth, a coming to presence of that which appears to us as it should and is in accord (Heidegger 1952(1977), 1962(1977a), 1962(1977b); Hirschheim 1985; Thomson 2000). It connotes something concealed that is brought out into the light of understanding (Huntington 2001a). It is not the Roman 'veritas', or the contemporary understanding of truth; both of which imply a correctness of an idea or occurrence.

'Alētheia', or truth, connotes a rescuing, recovering, securing; a coming to presence of not simply 'what' something is but how it does so (Heidegger 1952(1977), 1962(1977b)). It represents a way in which something pursues its course and remains through time, and is brought into the open; a revealing, an arising of something from out of its self, a coming forth into realms of appearance (Heidegger 1952(1977), 1962(1977a), 1962(1977b); Brown and Lightfoot 1998; Introna 2002). It is this exposing of diverse manifestations of existence that many of us tend not to see (Walton 2000); our eyes, feelings and minds closed by ignorance or fear as they

become conveniently subsumed under the backgrounds of reference; we rarely go beyond these surface understandings of 'what' phenomena are.

For Heidegger, if we open ourselves up to how these manifestations present themselves, a sense of freedom or relational, dynamic 'letting be' emerges, conceived not as a logic of will but of humans submitting themselves to attentive, authentic awareness of self, and by extension others (Heidegger 1962(1977a); Polt 1999; Introna 2002). Letting be, or 'Gelassenheit', connotes an acceptance, an abiding in harmony with one's environment and one's self, a seeing of things as they manifest in reality, pointing to the personal potential within each of us, acknowledging our uniqueness and our difference (Arendt 1954(1961); Huntington 2001a). It does not imply an imposing mode of existence or passive acceptance, rather an active, self-regulating, open, reflexive and ethical awareness of 'who' we are in any given situation (Villa 1996; Huntington 2001a; Introna and Ilharco 2004). Such ontological clarity may emerge in temporary nanoseconds of vision or revealing, allowing us to renegotiate our way (Heidegger 1927(1962), 1962(1977a); Chanter 2001); and may only be developed if we unravel our own life stories (Leland 2001).

To discern the 'alētheia' of modern technology requires a full revealing of the phenomenological essence of technology, Gestell, for it is nothing technological nor is it linked to technical aspects (Heidegger 1962(1977a)). This essence has been airbrushed out according to Heidegger, hidden in a Greek word 'technikon' from which today's word 'technology' derives and means that which belongs to 'technē', a pre-Greek conceptualisation (Heidegger 1962(1977a); Dreyfus 1992). 'Technē' is equivalent to 'eptisēmē', a way of knowing and moulding that incorporates the fine

arts and skills of a craftsperson. It implies being entirely at home with something, an expert (Heidegger 1962(1977a)). As a form of 'poiēsis', it is something artistic or poetic to Heidegger; a constructive, innovative, powerful and creative mode of coming into presence, of bringing into appearance that which is not present, of disclosing and revealing that which otherwise would not bring itself forth (Heidegger 1952(1977), 1962(1977a), 1962(1977b); Dreyfus and Hall 1992; Brown and Lightfoot 1998). Modern technology for Heidegger holds this potential, yet it does not bring-forth, rather it challenges-forth, enframing us as standing-reserve for we hold to it as an instrument of control.

If essence is accorded Heideggerian historicity with phenomenological and gender lenses to open up its own black box, then we may expose its background layers of determinism and simplified reductionism. We may strip away the black boxed layers of technological and gendered abstraction, functionality, manipulation and what-ness, allowing the undefined, hidden specificities of their instantiations to unfold or manifest. In shredding away these surface appearances, their Heideggerian essence becomes that which shows itself as it is in reality. By revealing the technological and gendered backgrounds of inclusion and by recounting the daily experiences of the socially excluded, we may unravel these black boxes. How these experiences shape their personal sense of who-ness, their spaces of possibility as subjects of action, fluid and adaptable as they proceed in their everyday lives, is shown in the sites of tension. Such manifestations of essence hold multiple and interwoven spatial, temporal instantiations, varying in structure, form and experience. The question regarding the

techno-gender relations then takes the shape of how we may come to know the black boxed distortions and more authentically engage with our 21st century existences.

3.2.6 Who-ness: an expression of ontological security

As conscious and intentional agents, we knowingly engage in our worlds, interpreting and renegotiating our existences (Giddens 1976, 1984, 1991). We know what we do and why we do it, albeit we frequently act in ways that seemingly contradict this at times, for we are not only pragmatic (Haugeland 1992; Coyne 1998); reflexive and changeable (Giddens 1984; Kepp 1996); but also fragmented beings (Giddens 1984; Whitley 1997). This fluid agency sits in daily awareness, enabling us to perform our everyday activities yet not necessarily giving them direct 'discursive expression' (Giddens 1984: xxiii). Ours is a complexity of existence, where acts of distraction from knowing and experiencing our worlds with collective and historical awareness (Haraway 1991; Crowley and Himmelweit 1992d; Lennon and Whitford 1994), occur simultaneously with acts of embodiment, awareness and intentionality.

This complexity is regarded as a 21st century phenomenon by current research, where our ontological security precariously rests on unstable, shifting and drifting ground (Giddens 1984, 1991, 1999; Beck 1992; Bauman 2000; Ciborra and Hanseth 2000). But Heidegger and Arendt posited it as a primordial condition of human existence, for we have never been able to depend on secure, knowable, accountable foundations (Arendt 1946(2002), 1954(1961); Polt 1999; Curtis 2001). As a fundamental dilemma of existence, its manifestations in the 20th century were encapsulated in their concepts of 'rootlessness' or 'world alienation' (Heidegger 1927(1962), 1954(1968), 1959(1966); Arendt 1946(2002), 1954(1961), 1958(1998)). These terms reflected a

state of disenfranchisement and disassociation, or ontological insecurity, where people appeared to be not at ease with their general environment. The European upheavals of war and migration in the early and mid 20th century obscured and distorted a sense of plurality, of belonging to a common world, giving rise to deep-rooted feelings of aloneness, superfluousness and futileness (Arendt 1954(1961)). These feelings are reflected in this century, with many of us feeling swept asunder by forces beyond our circumstantial control and lost in the turmoil of change (Beck 1992; Giddens 1999; Bauman 2000).

This instability of feeling at odds with our actual experiences appears to sit in contrast to our consensus of stable meanings, our shared backgrounds that constitute our references of security. For Heidegger (1927(1962)), the way in which humans may act in a more rooted, secure manner is to:

> "exist only in the performance of intentional acts...which are bound together by the unity of a meaning...the person is a performer of acts" (Heidegger 1927(1962): 73).

This performance positions us as a 'who' of existence, in contrast to a 'what' or thing or object (Angell and Ilharco 2001; Chanter 2001). This who-ness of a person is that which a person is, their uniqueness that lies beneath their surface appearances; it may remain hidden from some of us, yet it distinguishes us from others (Arendt 1946(2002); Kristeva 2001; Levison 2001). It represents an 'alētheia' of existence; a revealing, opening, more authentic ontology which is disentangled from the backgrounds of what-ness, removed from nature and the impositions of society (Huntington 2001a; Kristeva 2001). For Arendt, it is realised within the background of togetherness in a common world, in the plurality of people emerging through

democratic action (Arendt 1954(1961); 1958(1998); Kristeva 2001; Lane 2001; Jalusic 2002). This who-ness of phenomenological ontology, anchored in life's rich, temporal pageantry of public experiences, changes over time (Arendt 1958(1998); Kristeva 2001), and space. It is a source of creativity, presenting us as human agents capable of socio-political action (Arendt 1946(2002), 1954(1961), 1958(1998); Kristeva 2001; Jalusic 2002). It implies that we take a clear-sighted, mindful, representational and critical stance with regard to private and public life. Integrated into the concept of Gestell, who-ness is the potential release from the technological and gendered backgrounds of what-ness, depicted as:

Table 3.6: Gestell as who-ness

Gestell ≡	Who-ness
An authentic enframing of our relations to technology and gender	The epistemological and ontological challenging-forth of a personalised awareness of being

For Arendt, it is the revealing of this who-ness that is a key responsibility of education, the task of opening up students' spaces of possibility (Arendt 1954(1961); Levison 2001), and thereby generating grounds for ontological security. Arendt (1946(2002)) regarded such security as located in an individual's expressions of existence, where 'I am' is that which I as myself am, situated in the here and now. As a fundamental character of citizenship, Arendt located this situated authenticity in a public world where her sense of democracy involved shared spaces with co-citizens engaging considerately and representatively in civic debate and action, with a government not about force or rules but about enabling the activity of its citizens through a public voice (Arendt 1954(1961); Canovan 1977; Gordon 2001). Idealised as this Grecian notion is, her analysis provides an initial perspective by which to investigate our present day epistemological and ontological cultures of inclusion, and

whether they are taking us toward a sense of community, belonging and inclusive citizenship.

3.3   Citizenship as a unifying model

As a universal symbol of fairness, equality and justice, citizenship acts as a unifying goal (Lister 1990a; Turner 1990; Taylor-Gooby 1991; Walby 1997). It encapsulates a complex relation between the individual, the nation-state and society that has Aristotelian roots (Lister 1997; Yuval-Davis 1997). Active citizenship in Greek times implied both being ruled and participating in ruling; a two-way process involving civic rights and responsibilities in which the elevation of the public sphere positioned the individual as the political actor (Lister 1997; Yuval-Davis 1997). As the basic unit of a community the individual's security and status resided in membership, autonomy, self-determination and freedom of choice (Gough 1979; Lister 1990a; Faulks 1998; Powell 2002). These civic values were later inculcated in the primacy of rational thought during the 17th century by Locke and Hobbes (Lister 1990a; Yuval-Davis 1997; Faulks 1998).

Further developed by Marshall (1950), this model of citizenship was segmented into three arenas of rights: civic, political and social, which provide the framework for current academic analyses (Lister 1990a, 1997; Walby 1997). Bestowed on those who are full members of a community, civic rights are considered to be necessary for individual freedom, such as the right to justice; political rights incorporate the right to exercise political power; and social rights encompass economic welfare and security, where the ability to live life as a civilised being and share the standards of the community are seen to lie (Lister 1990a; Yuval-Davis 1997; Powell 2002). This

liberal model of citizenship then involves a set of socio-political civic rights that inform the responsible relations between individuals their communities and the state, establishing the grounds for public interaction (Lister 1997).

This historical background to the concept of citizenship has provided the rationale for a number of previous British governments, particularly the Thatcher one during the 1980s and early 1990s. Citizenship was redefined in an attempt to address the perceived moral decline during the 1960s and the mid 1970s, in which permissiveness and passive reliance on welfare benefits were regarded as immoral by the incoming Tory administration in the late 1970s (Lister 1997; Faulks 1998). To counter this immorality, a paradigm shift with regard to citizenship reflected the market focus and took the form of basic economic rights. Consumerism, ownership of property and shares for example were set as fundamental civic rights, with legislation like the Housing Act of 1980 enabling council tenants to gain responsible footing on the property ladder by buying their homes (Lister 1997; Powell 2002). Encapsulated in the Citizen's Charter of 1992, this shift was one of power, away from the producers and providers of public services to the individual citizen, where the latter was encouraged to be more active in their selection of high quality commodities (Lister 1997; Yuval-Davis 1997; Faulks 1998). Citizens became equated with consumers and citizenship with consumer rights, transforming social citizenship, or socio-civic rights, into economic citizenship with the explicit aim of promoting individual autonomy, citizen obligation and a stronger sense of community (Lister 1990a, 1990b; Yuval-Davis 1997; Faulks 1998).

This economic citizenship legitimisation is based on the assumption that every citizen is able and willing to embrace its ethos, where each is able to "standardise [her or his] own existence" in such a manner (Beck and Beck-Gernsheim 1995: 7). We are undergoing transformation of 'what' is expected of us, and how we achieve it; we are urged to "do our own thing" (Giddens 1984, 1991; Beck and Beck-Gernsheim 1995: 2; Coyne 1998; Flores 1998; Bauman 2000). This current legitimacy is realigning the assignment of responsibility toward the fragmentation of self-assertion or individualisation, where rather than adhering to:

> "the telos or preordained destination...[modern society is] transforming human 'identity' from a 'given' into a 'task' and charging the actors with the responsibility for performing that task and for the consequences...of their performance" (Bauman 2000: 31-2).

Human rights and responsibilities then are relocated in personalised spheres in which individuals are 'free' to select their "own models of happiness and fitting life-style" (ibid: 31).

Today, the British government is placing a particular premium on the convergence of telecommunications infrastructures and their high quality of provision and services to facilitate greater choice and access to information (DTI 1998b). Citizens' opportunities are seen as residing in this ICT infusion, with the ground of equality reform incorporated in an ontological remodelling of citizenship that is geared toward ICT inclusion and enhancing ICT productivity. This focus reflects the polity concern that the rights and responsibilities of excluded groups are jeopardised by their lack of resources to fulfil 'what' is expected of them in all walks of life (Lister 1990a, 1997; Walby 1997; Yuval-Davis 1997; Powell 2002).

If exclusion in general rests on aspects of rootlessness in the form of low self-esteem, discrimination, and stigma in terms of unemployment and passive laziness through reliance on welfare benefits, then these aspects are seen to contribute toward their denial of citizenship in general (Lister 1997; Faulks 1998), and ICT citizenship in specific. In seeking to grant them membership and equity status, the present ontological reconfiguration of citizenship places an emphasis on responsibility in which three key civic relations emerge in the context of ICT inclusion and greater labour market participation: active responsibility; ICT employability and ICT relational expertise for women. Outlined in the Literature Review, these relations are to be fostered through: reduced passivity, ICT skills acquisition and the feminisation of ICT respectively. Adding this ontological formulation of inclusive citizenship into the concept of Gestell, it takes the shape of:

Table 3.7: Gestell as inclusive citizenship

Gestell ≡	Inclusive Citizenship
The ontological enframing of inclusive citizenship	The rights and responsibilities challenging-forth of active responsibility, employability through ICT skills acquisition and relational skills for women

This ontological reconfiguration of citizenship is viewed as vital for turning round Britain's legacies of exclusion and fostering cultures of belonging, and the three civic relations need to inform the everyday aspirations of the socially excluded. As such, these relations set the ontological background culture of ICT inclusion, positioning socially excluded people in a socio-economic enframing of citizenship. On one hand this civic enframing offers security through adherence to this model of citizenship legitimisation, and on the other the question arises as to whether it matches their

public and private needs, their own self-determination and authenticity or their who-ness.

The formulation of who-ness resides in philosophical contemplation and phenomenology would seek to ground it, but has yet to do so other than posing Arendt's model of active public citizenship (Arendt 1946(2002), 1954(1961)). Whilst Heidegger and Arendt wished to change the world, for they recognised that people's development of who-ness was not necessarily constituted by circumstances of their own choosing, their analysis lacked a material base. To offer this material grounding it is necessary to turn to another philosopher, Marx, who attempted such a task by reasoning that political emancipation did not lie in liberal rights and liberties, rather in social praxis (Marx 1844(1975); Hook 1950). In surmising that humans are essentially productive, that they need to produce their means of subsistence in order to satisfy their material needs, Marx and Engels set the ground for material, productive life as conditioning social life (Marx and Engels 1932(1974).

3.4   A Marxist perspective on productivity

Marx's thesis that "philosophers have only *interpreted* the world in various ways, the point, however, is to *change* it" sets the site of tension for how this change is to come about (Marx 1888(1968): 30; author's own italics). His historical materialism shifted philosophical contemplation about existence into the world of productive activity. Drawing from two key philosophers: Hegel and Feuerbach, Marx utilises Hegelian dialectics in which the essential nature of a phenomenon is deduced as a thesis, antithesis and synthesis triad (Engels 1884(1968b); Marx and Engels 1932(1974);

Hook 1950). Hegel understood this triad as being ultimately governed by a divine, absolute spirit, which Feuerbach did not challenge in his reworking of Hegel in the 'Sämmtliche Werke' in 1846, but premised that 'man' existed in a self-conscious social life, establishing the ground for materialism (Marx 1932(1977); Marx and Engels 1932(1974); Hook 1950).

Marx's historical materialism shifted the Hegelian emphasis on civic and religious duties to human activity, for it is not through thought, religion or civic citizenship but through social praxis that 'man' may take control of 'his' circumstances (Marx 1844(1975), 1888(1968), 1932(1977); Marx and Engels 1932(1974); Hirschheim 1985). In these early texts, many of which were published posthumously, Marx began to empirically formulate the historical materialism of human society by focusing on the forces and relations of production:

> "In the social production of their life, men enter into definitive relations that are indispensable and independent of their will, relations of production which correspond to a definite stage of development of their material productive forces. The sum total of these relations of production constitutes the economic structure of society, the real foundation, on which rises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the social, political and intellectual life process in general. It is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness...the material productive forces of society come into conflict with the existing relations of production" (Marx 1859(1968): 182).

This extensive quote encapsulates Marxist analysis of social existence as conditioned by productive activity. In showing how capital[7], in the entrepreneurial sense, is produced through the interrelation between the phenomena of commodities, their exchange and generation of value through circulation, Marx surmised that this was the

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[7] The term 'capital' in this sense is defined as the economic and social resources that dominant groups use to maintain their control over economic actors in market situations (Zukin and DiMaggio 1990).

surface appearance of the capitalist mode of production (Marx 1890(1974); MacKenzie 1984). Hidden beneath this surface productive mode (dialectical thesis), lies the driving force of capitalist accumulation, the means by which capital itself is produced: the valorisation process, often referred to as the labour theory of value (Marx 1890(1974); Mackenzie 1984; Fine 1985; Antonio 2003).

3.4.1 The valorisation process

This is the process whereby value is added, or surplus accrued, by producing a commodity of greater value than the cost of production (Marx 1890(1974); MacKenzie 1984; Fine 1985). This cost comprises of the forces of production (antithesis), which are the resources available to produce, such as machinery and labour power, with the latter comprising of the skills, knowledge and experiences of the people involved, often referred to as human capital today (Cutler et al. 1977; Gough 1979; Edwards and Wajcman 2005). Value is added through two key sub processes: reduction in the labour time required to produce the equivalent of the worker's wage, or speeding up productivity – relative surplus value; and lengthening the working day – absolute surplus value (Marx 1890(1974); MacKenzie 1984; Antonio 2003). These are achieved by the utilisation of machinery, or technology, and, in part, by drawing into the labour market new sections of the population, which at the time were women and children (Marx 1890(1974); MacKenzie 1984).

Through adherence to this valorisation process, arguably the essence of entrepreneurial capital, the capitalist mode of production valorises everything that exists; the appropriation of nature, of technology and of humans becomes one of value, or the value-being of resources (Marx 1890(1974); Eldred 2000). Resembling

Heidegger's standing-reserve, value as a politico-economic abstraction of accumulation positions neither entrepreneurial capital nor pure economics as the key constituents of human existence. Rather it reflects the particular social relations, or the labour process, that are constituted by the specific mode of production (Marx 1890(1974); MacKenzie 1984; Eldred 2000).

3.4.2   The labour process

The labour process comprises of the particular ways in which people work, and the particular technical instruments used to transform raw material into the particular commodities produced (Marx 1890(1974); Gough 1979; MacKenzie 1984). The mode and forces of production dialectically influence the characteristics and organisation of this process, and the resultant relations of production (synthesis) condition the social, political and intellectual processes, the cultural or ideological dimensions of existence, and the consciousness of humans. Under capitalism, the specific relations of production are unique, for they did not exist under other modes such as feudalism or agriculture (Marx 1890(1974); Marx and Engels 1932(1974)).

For Marx, social existence ultimately determines human consciousness, for workers are subject to relations not of their own choosing, and capitalist productive processes rest on workers selling their work or commodifying their labour power (Marx 1890(1974); Fine 1975; Gough 1979; MacKenzie 1984). This formal subordination of labour strengthens the authority of entrepreneurial capital by alienating workers from their real social existence, dividing the social structure into groups sharing a common relation to the means of production, or classes (Marx 1844(1977), 1890(1974); Fine

1975; Cutler et al. 1977; MacKenzie 1984). Alienation is accomplished by reducing

everything to:

> "saleable objects in thrall to egotistical need...Selling is the practice of
> alienation...man...can only affirm himself and *his own activity* to the domination
> of an alien entity, namely money...Alienation is therefore characterised by...the
> conversion of human beings into "things" so that they could appear as
> commodities on the market...by the fragmentation of the social body into
> "isolated individuals"" (Mészáros 1970: 35; author's own italics).

This alienation, akin to the Heideggerian challenging-forth of objects, presents the

what-ness of human productive activity, where capitalism alienates people as

commodified objects.

This commodification segments owners (capitalists) and labourers of production,

positioning each in opposition to the other. During the mid to late 19th century,

capitalism increasingly utilised scientific knowledge as a productive force and Marx

saw a division of labour between this knowledge and manual work, with the former

detached from and in opposition to the latter (Marx 1890(1974); MacKenzie 1984).

Through these inherent oppositional divisions and relations in the forces of capitalism,

the conditions and motivation for change are laid (Marx 1890(1974); Fine 1975;

Block 1990; Winner 1993). For they shape the means by which awareness is

construed and the manner in which it manifests, which for Marx took the form of class

consciousness and struggle. He reasoned that human, social praxis was the synthesis

for emancipation, and phenomenological thinkers such as Arendt would agree,

although she surmised that his analysis of 'self-alienation', man's alienation from his

social nature, was not the solution to the human condition, rather public, civic praxis

was (Arendt 1958(1998): 89). The building of the concept of Gestell now takes its

final integration of Marxist analysis:

Table 3.8: Gestell as productivity

Gestell ≡	Productivity
The epistemological and ontological enframing of capitalist productivity	The valorisation challenging-forth of the forces and relations of production as manifest in the RSV, the ASV and the labour process

Marx's materialist analysis of the social relations of production is grounded in the capitalist appropriation of technology which, like Heidegger, does not lie in the tools analogy for such an extension negates historical materialism (Marx 1890(1974); MacKenzie 1984). Technology strengthens capital's valorisation by intensifying, speeding up and rejuvenating the productive processes; it amplifies the alienation of workers by cheapening and weakening their labour power, and by placing greater constraints on and divisions in the labour process (Marx 1859(1968), 1890(1974); MacKenzie 1984). The resultant deskilling of labour, the incessant bind of servile and often monotonous work, and the selective utilisation of technology by management have been charted in the seminal works of Braverman (1974) and Noble (1984).

Relations of production are complex and evolving, as Marx postulated, and their current manifestations are shaped by the ICT mode of production and its global forces of networked technology, services and knowledge (Zukin and DiMaggio 1990; Walby 1992; Cassidy 2003). The labour process has become more flexible, the homogeneity of class fragmented, the labour market more segmented (Walby 1992; MacKenzie and Wajcman 1999b). The key resources of capital and low skilled labour are said to have been replaced by information, knowledge and highly skilled workers; and mass production replaced with customised services and flexible forms of work organisation (Beck 1992; Castells 1996; Bauman 2000). Much work today is automated, with low skilled tasks often repositioned off-shore to developing countries, where the division

of labour is said to perpetuate existing gendered relations of inequality (Cockburn 1983, 1985a; Wajcman 1991; MacKenzie and Wajcman 1999b; Poynter and de Miranda 2000).

In the light of this productive transformation, this thesis will utilise Marxist analysis by investigating how ICT capital is produced or valorised, how this accumulation is mitigated by ICT forces (backgrounds) of productivity, and how these forces influence the relations (experiences) of socially excluded people. These relations, or ICT labour process, will be reviewed in terms of the civic responsibilities of the unemployed, the requirement to be trained in ICT skills as contextualised by the CCNA programme, and the gendering of expertise. Given government is keen to expand the labour market through greater economic inclusion by reformulating citizenship responsibility, this research seeks to explore the implications of this reconfiguration in terms of ontological in/security rather than chart degrees or forms of alienation.

In reformulating Marxist theory in such a way, the concept of Gestell finally becomes the socio-political and economic enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity. How this enframing takes shape will be explored by outlining the backgrounds to, the experiences of, and the sites of tension in this process. The backgrounds will constitute the epistemological cultures of inclusion outlined in the Literature Review; that is, the cultures of ICT productivity, ICT employability and the feminisation of ICT. Shaped by the partnerships between government and business, or the politico-economic forces of productivity to turn round the three legacies of exclusion, how they influence the experiences of socially excluded people will be explored in terms of

the ontological cultures of inclusive citizenship: active responsibility, ICT skills

acquisition and relational expertise. Constitutive of their socio-economic relations of

productivity, the sites of tension, which may point to syntheses, lie between these

forces and relations of ICT productivity. Gestell now becomes:

Table 3.9: Final reformulation of Gestell

Gestell ≡	Socio-political and economic enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity
Backgrounds	Epistemological cultures of inclusion as constituted by the politico-economic forces of ICT productivity or the valorisation process
Experiences	The ontological cultures of citizenship as constituted by the socio-economic relations of production or the ICT labour process
Tensions	Between the forces and relations of ICT productivity, and between the what-ness of inclusion and the who-ness of existence

By formulating Gestell in such a way, it is hoped to combine and expand Marxist and

Heideggerian analyses to show how ICT productivity shapes the labour process in

relation to the unemployed, the low skilled and women and how individual people

classified as socially excluded are affected. As with all theories however, their

formulation often entails intrinsic weaknesses and Marx and Heidegger's theorising is

no exception, yet in combining their reasoning and observations, this blend may offer

insights which can be utilised in current research if the weaknesses are addressed or

acknowledged as polemical.

3.5   Revisiting macro and micro tension

Marxist, Heideggerian and Arendtian inquiries are generally regarded as unsuitable to

today's focus on impurity and fluid instability, for their structural or macro analysis is

viewed as an epistemology and ontology of purity, rigidity and stability (Knorr-Cetina

1981; Haraway 1991; Barrett and Phillips 1992; Shildrick 1997; Geladof 1999).

Structuralism is seen to give rise to general, universalising and trans-cultural theories (Cicourel 1981; Haraway 1991; Harding 1991). Held to be routed in 17th century Enlightenment thought, macro theorising is weakened by deterministic, decontextualised simplicity and by essentialist, white, bourgeois constructs, and therefore inadequate for recounting the diverse array of concrete, individual experiences (Harding 1986, 1991, 1992; Haraway 1991; Gill and Grint 1995; Lazreg 1994; Geladof 1999; Adam 2002). Such theorizing assumes false and misleading separations between a knower and a known, reinforcing an Archimedean standpoint from which gender, technology and social existence are known only from particular and fixed vantage points (Harding 1991).

Today, structures are seen as dynamic, fluid and continually evolving (Akrich 2000; Bijker and Law 2000; Edwards and Wajcman 2005). This postmodern approach takes issue with structural notions such as class, consciousness, intuition, meaning, security, ontology, subjectivity, truth, essence or authenticity, and the assumption that they lie at the levels of philosophical, social or economic structures (Knorr-Cetina 1981; Butler 1990; Barrett and Phillips 1992; Phillips 1992). Such concepts no longer hold centrality, rather contemporary talk is of discourse not structure, of consumption not production, of information and knowledge not labour, of diversity and difference, aesthetics, culture and lifestyle, and of an evolving and unstable framework of life (Haraway 1991; Butler 1990; Braidotti 1996; MacKenzie and Wajcman 1999b). Through destabilizing, deconstructing and overturning the founding assumptions of macro theories, abstractions from supposed commonalities are torn asunder by

focusing on the specificities of individuals (Haraway 1991; Barrett and Phillips 1992; Butler 1997).

In turning to this local, micro-level of investigation, everyday activities expose the perceptions, assumptions and performances of gender, technology and society, and the complex interplay of multi-perspective experiences given expression (Singleton 1995). For, the space of becoming is seen to be one of:

> "affinity and symbiosis between adjacent particles....one of dynamic marginality, and that which happens is not at the centre, but at the periphery, the points of intersection across the diverse particles of existence" (Braidotti 2002: 78).

Yet this is not dissimilar to phenomenological investigation, and if we go too far into this periphery, into the fragmentation of human activities, the hegemonic backgrounds of reference and power remain uncharted (Walby 1990, 1992, 1997; Oakley 2000; Wajcman 2000). A return to the centre through a macro analysis offers a spectrum wider than the local arena, for the crimes of racial and gender violence, for example, can not be understood by these categories alone (Walby 1992; Moore 1994). A focus on the multiple differences of these crimes loses sight of the shared commonalities, the widely repeated restrictions of agency that many people experience (Hooks 1981; Walby 1990, 1997).

If ethnicity and gender, for example, remain categories for discriminatory exclusion or non-discriminatory inclusion, then perhaps macro signifiers such as 'woman' and 'black' hold sufficient cross-cultural and historical continuity to retain a macro perspective. If the discursive expressions of inequality or equity reflect and reinforce the referential aspects of these categories, then these backgrounds need to be explored (Walby 1990, 1992, 1997; Wajcman 1991; Moore 1994; Gherardi 1995). For these

backgrounds validate or obscure expressive experiences, and in so doing they do not prepare us for the ways in which we may actually, concretely exist. In questioning the Cartesian epistemological model of a priori statements, where an Archimedean standpoint distances us from our surroundings by positioning phenomena as components of structures and systems (Arendt 1958(1998); Moran 2002), phenomenology does address the micro dimensions but also encompasses the wider ones.

Within the analyses of some who seek structural understanding, Marx's reification of capital as a dominant force over which we have little control unless we organise in classes, is argued to position productive logic as coherently aggregating the whole (Block 1990; Mintz and Schwartz 1990; Zukin and DiMaggio 1990). Yet, if this economic determinism is reviewed in the light of Marx's premise that people are both produced by and productive of society (Marx 1890 (1974); Mackenzie 1999; Edwards and Wajcman 2005), then social existence is also a determinate factor. And, if interpretation of determinate lies not in causing but influencing, it can be said that reductive critiques are misleading, for the worker-capitalist relation encompasses social, human dynamics (MacKenzie 1984; Edwards and Wajcman 2005). Whilst capital is reified by Marxist analysis, it reminds us that its forces of production are resilient and that this needs to be explored.

A further critique of Marx lies in little being offered on how capital's changing role in constituting power relations is influenced by socio-cultural, political, state, institutional and gendered intervention (Block 1990; Zukin and DiMaggio 1990; Walby 1990, 1997; Wajcman 1991, 2000; MacKenzie and Wajcman 1999b). Others

have developed more fully the state's role in ideological formulation (Althusser and Balibar 1970; Althusser 1977), and this thesis hopes to further explore the government's increasing role in influencing the course of productivity and its relations. Whilst Marx dismissed equality of rights as an individualistic and illusionary obscuration of class division (Lister 1997), the thesis will explore how governance mitigates people's socio-economic civic responsibilities and rights within the context of ICT productivity.

Today, analyses of technical automation as deskilling or reducing worker's autonomy have been critiqued as not so clear cut, for the advent of technology requires labour to adapt and acquire new skills (MacKenzie 1984; Zuboff 1988; MacKenzie and Wajcman 1999b; Zukin and DiMaggio 1990). This reflects flaws in Marxist analysis of class, where limits are set on the awareness, formulation and activity of people (Clegg 1998), and its homogenisation omits divisions within each class, particularly gendered ones (Cockburn 1983, 1985a; Wajcman 1991; Walby 1990, 1997; Eisenstein 1997; MacKenzie and Wajcman 1999b), and others of ethnicity, age and sexuality, for example. Marx noted that the 'rational' was valued over the 'emotional' (Wajcman 1991), and Engels that the "structure of society [is] based on ties of sex" (Engels 1884 (1968a): 456), where the production of the means of subsistence and the reproduction of humans rested on the family unit. But in surmising that these 'ties' will adapt to new conditions of production, like Marx, Engels offered no empirical evidence of how this will come about. Marxian and Engelian analyses have many blind spots and, as they stand, are conceptually poorly equipped to provide a framework for modern relations of production (MacKenzie and Wajcman 1999b). But an upgrade of their

framework of how capital's valorisation process affects people's relations to work may provide a diagnosis of present day civic tensions that accrue. For if the Marxist essence of humanity is to change these processes (MacKenzie 1984), then these sites of tension may point the way.

Perhaps we need to return to macro analyses, of which there has been an absence in IS research until recently (Winter and Taylor 1990; Howcroft and Trauth 2005), that have helped shape today's ground of multifaceted becoming, and reframe them in acknowledgement that women, for example, are universal in their particularity (Moore 1994). For, whilst production of our different voices may become a political intervention by relegating inequalities to individual suffering (Crowley and Himmelweit 1992d), it alone is insufficient in bringing about change, since we obscure the background socio-political and techno-economic activities on which common injustices are based (Winner 1993; Bauman 2000; Oakley 2000). Micro and macro dynamics are so enmeshed that it becomes hard to distinguish one from the other. Agency and structure reside not in opposition but in a complex continuum, as Marx outlined by stating that individuals act though not necessarily under circumstances of their own choosing; a premise shared by others (Marx 1859(1968); Giddens 1984; Walby 1997; Fuchs 2001). In reviewing the misleading macro/micro divide, a structural analysis need not be structuralist for individual discursive projects may be linked to the wide array of backgrounds that influence this choice (Cicourel 1981; Knorr-Cetina 1981; Walby 1990, 1997; Zukin and DiMaggio 1990). Such an approach may further our understanding of the common experiences of many women

who reject or struggle within the computing arena, and point to the complex and interwoven backgrounds of power or reference which are neglected in micro accounts.

3.6 Conclusion

In providing this blend of macro and micro analyses, the thesis offers a comprehensive framework for recounting the background epistemological and ontological cultures of ICT inclusion, the daily experiences of individuals engaged in a network engineering training programme (CCNA), and the sites of tension that emerge that influence these experiences. This framework will be incorporated in the new socio-political and economic interpretation of Gestell as the enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity. This will be investigated by exploring the:

- background epistemological cultures of inclusion that are shaped by the politico-economic forces of ICT productivity, where the what-ness of their policies and strategies is influenced by the valorisation process and partnerships between business, government and pedagogy;

- individual ontological experiences that are shaped by three socio-economic civic relations of productivity, where the what-ness of their formulation is influenced by the ICT labour process and take the form of: active responsibility through reduced passivity; employability through the acquisition of ICT skills; and the gendering of relational expertise through the feminisation of ICT;

- sites of tension that take the form of conflicts between these three forces and relations of ICT productivity, in which the ontological in/security of excluded people's experiences is matched against the goals of the policies and strategies.

The vision of Britain's government for turning round its legacies of exclusion, of Cisco Systems to address the digital divide, and of the shared interest in the problem domain of the low participation of women in ICT, will be questioned within this socio-political economy of ICT productivity. The aim is to link the new telecommunications technologies with their specific valorisation and labour processes, and to contextualise this link through recounting the experiences of social excluded people. The thesis will explore how instantiations of the valorisation of ICT capital mould the labour process in terms of the supply of network engineering expertise drawn from the ranks of the unemployed. By investigating the nature of its training and the wider contexts in which it occurs, the new socio-economic duties to foster responsible citizenship will be reviewed.

This will be presented in three snapshots of present day ICT productivity in an advanced capitalist nation, Britain, that structure the analysis chapters of the thesis and each of their manifestations will be provided in three Gestells: a Network Technology Gestell, a Network Engineering Training Gestell, and a Gender Gestell. This is conveyed in Table 3.10. In offering such a framework, it is hoped to answer the research question of how the what-ness of ICT inclusion background policies shapes the who-ness of individual socially excluded people, specifically women lone parents. Through the use of the concept of who-ness the attempt is to move beyond the problematic, universalistic notions of rootlessness, alienation and class, to situate ontological in/security within the specific manifestations of everyday, individual experiences of social life, and to locate synthesis in arenas other than the philosophical or the productive. These experiences are mediated by the backgrounds that contour the

parameters of ICT inclusion, and in so doing, the predefined what-ness shapes the

who-ness of individual socially excluded people. How this manifests is the research

question.

Table 3.10: Three Gestells of inclusion

Epistemological and ontological cultures of inclusion			
	Network Technology Gestell	**Network Engineer Training Gestell**	**Gender Gestell**
Background forces of ICT productivity: the epistemological shaping of politico-economic policies and strategies by the valorisation process	Business and government partnerships to enhance productivity	Pedagogic and business partnerships to enhance skill levels	Business and government partnerships to enhance participation of women
Relations of ICT productivity: the ontological shaping of socio-economic citizenship by the labour process	Active responsibility through reduced passivity	Employability through ICT skills acquisition	Employability through relational expertise and the feminisation of ICT
Sites of tension between the forces and relations of ICT productivity: for excluded groups	Between the backgrounds and the experiences of ontological in/security of active responsibility	Between the backgrounds and the experiences of ontological in/security of employability	Between the backgrounds and the experiences of ontological in/security of the feminisation of ICT

By taking this approach, an innovative understanding of the forces and relations of

ICT productivity and how they shape the daily existences of people on the fringes of

society is offered. Whilst our relations to technology and productivity have been

documented in this chapter, what is missing is a closer look at the gendered

epistemological background formulated in Table 3.2 on page 62. Turning to this, the

next chapter will outline a critical feminist approach which positions women as 'other'

in both an ontological and epistemological sense. This approach provides some insight

into the perceived problematic phenomenon of women's low participation in ICT

domains, and enables a reviewing of the inclusion cultures with personal

empowerment in mind. Also outlined is the methodological approach which will be

used to provide rich descriptive accounts of these backgrounds, experiences and

tensions; a critique of Heidegger and Arendt; a description of the fieldwork sites and

the people interviewed; and the data collection and analysis techniques.

Narrative and critical social theory

4.1   Introduction: descriptive accounts and critical reflection

This chapter introduces the methodology for providing rich descriptive expression of the backgrounds, experiences and sites of tension outlined in the previous chapter. Selecting a narrative approach to focus on the concrete details of social existence that are lost in quantitative, abstract analyses, this emerging research tool in IS interpretive studies brings to the fore the referential assumptions and prejudices that shape our experiences. By so doing, the parameters of the investigation and the objectified separation between the researcher and the researched are questioned. Such reflexivity requires ethical and responsible disclosure of a researcher's own positioning, and to manage this integration critical feminist theory is used.

The chapter proceeds by outlining this theory which holds that practice, grounded in experiences, informs theory which in turn informs practice, for it is geared toward exposing imbalances of power and constraints of authoritative control. Emancipation is its goal and specifically privileges the voices of women. Overtly partisan, feminist critical theory will miss some areas of investigation but in bringing to attention gendered tensions, analytical extensions can be made to other excluded groups and individuals. Drawing from feminist epistemology this chapter positions women's experiences within a background of Cartesian 'otherness' in which their ways of being and knowing are devalued and marginalised. This historicity of exclusion provides a key cornerstone for understanding gendered injustices in general; the shaping of gendered relations to ICT; and the formulation of women's inclusive citizenship to ICT domains.

The chapter proceeds by providing a critique of Heidegger and Arendt, positioning their limitations or zeitgeist theorising in this methodological section because feminist critical theory may offer a way forward. Moving on to the data collection and analysis techniques, the chapter introduces the reader to the Cisco contacts and the four fieldwork sites. It concludes with how the weaving of practice (experiences) and theory (backgrounds) will provide the methodological base from which to critically review women's inclusion through the initial formulation of the socio-political economies of the three Gestells, outlined in the Theoretical Framework chapter.

4.2   Narratives: a rich expression of voices

The narrative approach was chosen to provide fertile accounts of the diverse voices of the researched, and to give articulation to the hidden stories behind the statistics (Osborn et al. 2000; Trauth 2002). It is particularly suited to phenomenological investigation, for it turns our attention not only to that which is explicit and overt but also to that which is implicit or taken for granted. Defined by the Concise Oxford English Dictionary, a narrative is a tale, story, recital of facts; and these articulations recursively order and match individual experiences against collective, wider referential backgrounds (Walsham 1993; Lee 1999; Oakley 2000; Alvarez and Urla 2002). Social existence may be understood as an evolving reformulation of narratives through which our realities are constructed, given personal meaning and comprehension (Boje 1991; Brown 1998; Alvarez and Urla 2002; Doolin 2003).

Through dynamic sense-making, individual and shared events are woven into comprehensible accounts that contextualise our own life stories in relation to the past, the present and the future (Chua 1986; Orlikowski and Baroudi 1991; Walsham 1993;

Czarniawska 1998; Doolin 2003). Through narrative articulation, 'what' and 'who' we are emerges into present awareness, and this performative activity reflects the fragility, fuzziness, contradiction and temporality of social life (Czarniawska 1998; Alvarez and Urla 2002; Doolin 2003; Wagner et al. 2004). Yet, this articulation may be inhibited or silenced by background narratives of legitimisation that provide normative accounts of desirable and appropriate behaviour, expectations and interpretations, powerfully 'black boxing' social existence (Brown 1998; Oakley 2000; Wagner 2000; Beech and Beech 2003). This closure provides order and stability through selecting particular viewpoints and excluding others (Boje 1995; Brown 1998; Czarniawska 1998; Alvarez and Urla 2002). In relation to technology, they have been termed 'technological frames' (Orlikowski and Gash 1994) which provide base assumptions, knowledge and practices that members of specific communities may hold with regard to related technological objects or systems. In relation to gender, they provide the what-ness of identity where similar ground rules are held with regard to humans.

In using narrative methodology to describe in detail these backgrounds, context is given to the daily lives of ordinary people (Brown 1998; Czarniawska 1998; Alvarez and Urla 2002; Wagner 2002; Wagner et al. 2004). By providing a narrative bridge between these wider accounts and the individual expressions of the socially excluded, the rhetoric and reality of ICT exclusion and inclusion is explored. For the wealth of expression from these diverse perspectives may point to how individuals create, recreate and compromise their lives against the background influences (Boje 1991, 1995; Brown 1998; Czarniawska 1998; Alvarez and Urla 2002); and in being drawn to particular stories, specificities of situations may emerge (Reissman 1993).

Narrative methodology has traditionally been used in literary discussion and text analysis, but in recent years there has been an increase in recognition of its role in understanding the processes involved in the construction, implementation and use of information systems. IS research is opening up to new methods of investigation to reflect the multifaceted nature of the discipline (Robey 1996; Vessey et al. 2002; Boland and Lyytinen 2004), with detailed accounts of individual engagements with ICT considered critical for understanding its work practices (Trauth 2002; Wilson 2002; Boland and Lyytinen 2004; Wagner et al. 2004). Narrative focus has been on the use of metaphors involved in the analysis and design of organisational systems (Hirschheim and Newman 1991; Walsham 1991; Kendall and Kendall 1993); or on understanding IS failure (Brown and Jones 1998). Other IS researchers have utilised this methodology to provide expressions of organisational management culture during software development (Dube and Robey 1999); and its relation to IT artefacts (Kaarst-Brown and Robey 1999). Some have used it to express the diversity of tales on the implementation of enterprise resource planning systems (Alvarez and Urla 2002; Wagner 2004; Wagner et al. 2004). None however, have focused on gender, socio-political and economic contexts, vocational pedagogic settings, or socially excluded people.

Located within an interpretive framework, narrative methodology requires sensitivity to the privileging of the author's voice and raises reflexive, ethical considerations. For the selection of what is researched, the theory most appropriate for enframing it, the particular interpretation of the literature, the construction of the fieldwork, the picking from the data and its application are considerably influenced by the researcher (Galliers 1985; Chua 1986; Brown 1998; Russo and Stolterman 2000). In this light,

ontology lies prior to methodology and theory, and substantially influences the research decisions and direction.

4.2.1   An interpretive framework: social reality

An interpretive standpoint assumes a fundamental difference between the physical and social worlds, and holds that the manifestations of the former are given meaning and value through human interpretation (Cecez-Kecmanovic 2005). To understand these interpretations and how they give rise to intended and unintended encounters, interpretivism explores the socio-cultural agency of people (Galliers 1985, 1993; Kaplan and Duchon 1988; Orlikowski and Baroudi 1991), and its researchers. In viewing research criteria as embedded in the beliefs, perceptions and judgements of the investigator, it re-evaluates the conception of objective observation where independence of theory, methodology and researcher are founded on axes of analytical, detached purity (Chua 1986; Winograd and Flores 1986; Orlikowski and Baroudi 1991; Mingers 2000).

IS interpretive research emerged as a response to this methodological reframing, regarding traditional quantitative epistemology and practices as unsuitable to the social dimensions of its systems (Galliers 1985, 1993, 1995; Galliers and Land 1987; Ngwenyama 1991; Lyytinen 1992; Wilson 1997). In moving beyond the what-ness of these accounts, it grounds its research in the diversity of interpretations of human actors that are missed when data is quantified (Orlikowski and Baroudi 1991; Myers 1997; Oakley 2000). By reversing the belief that data is value free, the embedded socio-historical values in IS design, implementation and use are investigated (Orlikowski 1991; Walsham 1993, 1995; Orlikowski and Gash 1994; Klein and Myers

1999; Lee 1999). This practice requires analytical and methodological diversity, and by logical extension, interdisciplinary and multidisciplinary investigation. Calls for such exploration are increasing in the belief that a stronger, more rounded, richer research process will result (Orlikowski and Baroudi 1991; Walsham 1993; Galliers 1995; Knights and Willmott 1997; Mingers 2001a, 2001b, 2003). If IS research as an applied social science makes use of the multiplicity of paradigms that lie outside the discipline, then the complexities of its social phenomena may be more comprehensively explained (Banville and Landry 1989; Benbasat and Weber 1996; Vessey et al. 2002).

It is acknowledged that this style of investigation is not without its problems and needs careful objectives and structures (Orlikowski and Baroudi 1991; Robey 1996; Benbasat and Weber 1996; Galliers and Newell 2000). For, an interpretive leaning may encompass an inherent prejudice that could obscure the results and lack substantive analysis (Galliers 1985; Chua 1986; Friedman 1994). Yet, these valid concerns may themselves be clouded by a legacy of quantitative analysis in IS, where the need to justify a qualitative focus places an emphasis on the rigorousness of the research process, and this quest for thoroughness risks constraining the eclectic versatility of interpretivism. Perhaps it is time for the discipline to move on from this debate, placing less emphasis on justification and more on the strengths of interpretive research and how it may manage its weaknesses. In generating tendencies towards relativism or individual solipsism (Marcuse 1991; Stanley and Wise 1993); omission of structural tensions (Chua 1986; Orlikowski and Baroudi 1991); prioritisation of the interpreter's perspective (Scott 2000); and assumptions that everything is socially

constructed (Mingers 2000; Mitev 2005), the responsibility of its researchers lies in addressing these risks.

In acknowledging that the interpreter and the interpreted may share similar epistemological axes, or backgrounds of legitimisation (Harding 1991; Stanley and Wise 1993; Walsham 1993; Ngwenyama and Lee 1997), research parameters radically shift. As social actors researchers participate in the world, interpreting it with their own set of beliefs and assumptions, entering the research situation with preconceptions of 'what' to expect (Walsham 1993; Galliers and Newell 2000; Scott 2000). These assumptions can be beneficial but need to be declared, for they enable researchers to have partisan points of reference that frame specific interests that may improve understanding of the researched (Stanley and Wise 1993; Klein and Myers 1999). But assumptions imply judgement, informing the research process by shaping the parameters of investigation through selection of: what and who is researched; theory and methodology applied; and how it is interpreted. This judgement and selection may provide deeper context to the research if it is ethically articulated and carefully managed. In being mindful and reflective of the research process, of the researcher's own social and prejudicial positioning and experiences, she reveals how they tint her lens of investigation (Chua 1986; Orlikowski and Baroudi 1991; Hirschheim and Klein 1994; Darke et al. 1998; Adam 2001). Scott (2000) uses the term 'lived methodology' to reflect this fusion of practice and theoretical reflexivity of the involved, situated researcher, and this synthesis is rooted in critical social theory.

4.3   Critical social theory

In offering descriptions of epistemological backgrounds and ontological experiences, phenomenology attempts to shift the philosophical base of interpretive research to one that engages with social realism. Critical social theory supplements this social realism with a questioning perspective, regarding interpretive research as unchallenging of the status quo; of equalising subjective social experiences and undifferentiating between them; and of being too passive and neglectful of conflicting interests (Orlikowski and Baroudi 1991; Cecez-Kecmanovic 2005; Mitev 2005). In focusing its research on these areas, critical theory engages with the historicity of unequal relations between people and their different material, socio-economic backgrounds (Orlikowski and Baroudi 1991; Cecez-Kecmanovic 2005).

For critical theory, practice and action are the other side of the research coin, and in seeking to understand the deep-seated injustices of social existence that are shaped by backgrounds of power, it bridges the gap between subjective and objective accounts (Chua 1986; Ngwenyama 1991; Orlikowski and Baroudi 1991; Ngwenyama and Lee 1997; Wilson 1997; Cecez-Kecmanovic 2005). In "unearthing, disrupting, transforming existing ideological and/or institutional arrangements", critical social theory highlights the restrictive conditions of the status quo, directing the researcher's concerns toward how authoritarian backgrounds serve to exclude or marginalize (Orlikowski and Baroudi 1991; Carspecken 1996: x; Flyvbjerg 1998; Kvasny and Yapa 2005).

Critical social theory is action-oriented and by reflexively linking practice and theory through transformative research praxis, it exposes taken for granted, determinist,

rationalist and essentialist assumptions, seeking to undermine power, domination and control by pointing to sites of tension (Marx 1890(1974); Orlikowski and Baroudi 1991; Wilson 1997; Robey and Boudreau 1999; Greenhill and Wilson 2005). These sites become sources of revitalisation in which injustices of social existence may be reviewed, whether their power bases be: political (Markus 1983; Winner 1993; Hughes 1999; Silva 2005); economic (Marx 1890(1974); Cutler et al. 1977; Arthur 1999); technical (Heidegger 1962(1977a), 1962(1977b); Marcuse 1991; Feenberg 1999); ontological (Heidegger 1927(1962), 1954(1968); Arendt 1946(2002)); gendered (Cockburn 1983, 1999a; Wajcman 1991, 2000; Adam 2002; Greenhill and Wilson 2005); pedagogic (Henwood 2000; Henwood et al. 2000b; Faulkner 2001, 2004; Henwood and Millar 2001); or other dimensions of power such as epistemological, ethnical, sexual, class, age, mental and physical ability.

In this endeavour, critical theory has empowerment of the oppressed as an emancipatory goal; the realisation of human possibilities freed from the constraints of these power backgrounds that distort, alienate and prejudice social existence (Marx 1890(1974); Hirschheim and Klein 1994; Wilson 1997; Mingers 2000). Emerging from the Frankfurt School during the early 20th century, critical theory sought to understand capitalism's resilience and tenacity. In exploring forms of class consciousness, technological determinism, instrumental rationality and communicative action more deeply, members of the school endeavoured to unify subject and object separation, and to respond to the rise of authoritarian societies (Lukács 1920(1971); Arendt 1958(1998); Habermas 1984; Marcuse 1991; Zuga 1999; Adam 2002).

Yet, this school of thought, which flagged the ways in which science and technology were directed toward profit and war-fare, was highly abstract (Wajcman 2002). Much of today's critical theory reflects this analytical legacy in being weak on specifying effective ways in which emancipatory goals may be realised, and often lacks empirical data (Ngwenyama 1991; Hirschheim and Klein 1994; Adam 1995, 2002, 2005; Adam and Richardson 2001). The emergence of critical IS theory seeks to address this weakness, with current foci on in-depth analytical and empirical investigation at both the local and wider levels and on transformative praxis (Howcroft and Trauth 2004, 2005). Supplementing the traditional Habermasian critiques that IS has turned to in the past (Hirschheim and Klein 1994; Ngwenyama and Lee 1997; Adam 2002, 2005), different analyses which draw from feminist epistemology and Marxism for example are evolving (Adam and Richardson 2001; Greenhill and Wilson 2005; Richardson 2005).

This thesis hopes to expand on these two new perspectives, openly stating that they constitute the experiential background of this researcher who intellectually trained and emotionally developed during the 1970s critical era. A neo-Marxist critique of the inequalities of ICT productive relations may give structural and material substance to the gendered injustices that feminist epistemology positions within a background demarcation of 'otherness'. This feminist analysis focuses on gendered systems of value, belief, ideas, knowledge and representation that negate women's ways of being and knowing, and in privileging women's voices, reflexive exploration of their concrete, individualised experiences helps to inform the specificities of their empowerment. In utilising this blend, the thesis hopes to contribute towards the IS discipline's deficit of both analyses.

4.3.1   Feminist epistemology: privileging women's voices

Much of feminist theorising would agree with the above critical analyses but its specific focus is the oppression of women, with the epistemological wing concentrating on Cartesian systems of value, belief, ideas, knowledge and representation that hierarchically divide gender. Regarding these systems, or epistemological points of references, as socio-political constructions that privilege the masculine voice and ways of thinking, and silence the feminine (Keller 1983; Lloyd 1993, 2000; Stanley and Wise 1993; Fricker 1994), feminist epistemology starts from this premise of omission as the root of women's subordination. In unpeeling the Cartesian shoring of gendered systems, it shows how women have been, and continue to be, omitted; how the realisations that things are not as they seem are grounded in artificial assumptions that distort their visions, thoughts, feelings and activities (Langton 2000; Adam 2002).

Regarded by some as a legacy of patriarchal relations that predated the 17th century, the falsification and distortion of women's epistemology, ontology and sexuality resided in this hegemonic background of gendered associations and values (Firestone 1971; Walby 1990, 1997; Stanley and Wise 1993; Langton 2000). All women were systematically undermined by the same repressive conditions in all locations, with some feminists surmising that this symbolic control was located in productive relations (Mitchell 1971; Millett 1972; Barrett 1980; Eisenstein, 1981; Hartsock 1983). Placing their oppression in patriarchal capitalism, the division of both domestic and workplace labour had consequences for knowledge accumulation and validation, and an analysis of the deeper levels of production (essence), would provide the logic by which the surface appearances (what-ness) were distorted (Hartsock 1983). For

Marxist feminists, the task was to expose the productive processes by which surplus

value was produced and appropriated by entrepreneurial capital, and the means by

which the gendering of work and domestic life systematically exploited women.

These earlier forms of feminism however are currently regarded as duplicating

Cartesian rationale by presenting universal and homogeneous accounts of women's

experiences (Gatens 1988; Grosz and de Lepervanche 1988; Grosz 1988, 1992;

Irigaray 1990). This tension in feminist theory, referred to in the previous chapter,

evolves, in part, around the emulation of masculine, white, middle class, eurocentric

and heterosexual privileged ways of engaging with the world (Cockburn 1985a;

Irigaray 1990; Wajcman 1991; Chanter 1995). For this emulation is regarded as

detaching the mind from the body, the subject from the object, and ignoring variances

of accounts. Such disembodied separation and unification of experience risks black

boxing concrete, real life encounters in generalised depictions of socio-economic and

symbolic existence (Haraway 1991; Bowker and Star 2000).

This feminist epistemological shift which occurred during the 1980s and early 1990s

sough to unpeel universal and culturally specific tendencies, to move away from

epistemology per se and become more grounded in the pragmatic, diverse and situated

experiences of both women and men (Haraway 1991; Phillips 1992; Stanley and Wise

1993). Recognizing that men were also subject to normative expectations, forms of

oppression were said to differ immensely according to specificities of ethnicity,

sexuality, culture and location for example. In unravelling these differences and

exploring their complexities in terms of personal, performative dramas, this

postmodern focus attempts to destabilise the hidden constructions of both genders

(Harding 1986, 1991; Haraway 1991; Adam et al. 2001; Gilbert 2001). In this current framework, our experiential expressions are not universal extensions of cognito rather they are decentralised and locally specific. For each of our realities and potentialities defies containment in known structures and systems of thought or activity (Stanley and Wise 1993; Geladof 1999; Huntington 2001b).

Whilst this is true to some extent, it negates a crucial gendered system of Cartesian epistemology; ownership of self is positioned as a key composite of agency on which identity is based (Haraway 1991). This predicate assumes control of our circumstances, as would appear to be the case with much of postmodern reflection, but this is not so clear cut (Marx 1890(1974); Haraway 1997; Walby 1997). The notion of control is complex and clearly polemical, and if reduced to individual manifestations the risk is negating how these expressions are influenced by the epistemological backgrounds of legitimisation and power. By focusing on how these backgrounds hold sway over the lives of women, feminist epistemology is mindful of the mutual shaping of the experiential continuum by both epistemology (what-ness) and ontology (who-ness). Empowerment lies in this recognition, for without the unravelling and challenging of our ways of knowing, our ability to give authentic expression to our ways of being remains distorted. The concept of who-ness attempts to convey this interwoven dynamic relation. Representing not a universal configuration of our core or essence, rather an empowering development of self and engagement with the world, its realisation is not necessarily of our own determination. As a relational yet interconnected composition that has historical, political and socio-cultural specificity, its progression changes as our experiences accrue but it is influenced by the backgrounds of legitimisation.

The postmodern focus on relativising emancipation, where no experience is more real than another, bypasses these backgrounds of legitimisation that shape ways of knowing, being and acting (Walby 1990, 1997; Wajcman 1991, 2000; Adam 2002; Mitev 2006). The charting of boundaries between these shared referential backgrounds that position women as secondary, unseen, unheard actors is missing. If the 'natural' gendered backgrounds relegate women's perceived anarchic passions and irrationality to their bodies and minds, and their experiences are perceived as non-experiences, non-thoughts, absences, empty spaces that are excluded from normative Anglo-Saxon epistemological narratives (Irigaray 1985a, 1985b, 1990; Stanley and Wise 1993; Lloyd 2000), then how this is structurally and symbolically reinforced is left unexplored and resolution of conflict consigned to individuals. Acknowledgement of the social responsibility and epistemology of collective activity appears to be absent (Adam and Richardson 2001).

Experiences alone are inadequate for understanding that which is occurring in daily life, or indeed for establishing theory (Flax 1983; Walby 1990), and individual empowerment may not be realisable without more detailed analysis of oppression in general (Adam and Richardson 2001). Sharing injustices, discriminations and inequalities, our tentative membership to society and to technological inclusion rest on the pervasive Anglo-Saxon demarcation between validation and non-validation (de Beauvoir 1972; Bowker and Star 2000; Lloyd 2000). This system of reference artificially delineates categories, one of which is citizenship as the Theoretical Framework chapter highlighted. Another is science which is divided into 'hard' and 'soft' sexual metaphors of the knowable world (Keller 1983; Adam 1995; Franklin 1995; Wilson and Howcroft 2000; Adam et al. 2001; Suchman 2001). Modern science

has become equated with authority, a neutral source of objective truth (Arendt 1958(1998); Heidegger 1962(1977a); Sartori 1994), and the ways in which hard and soft technology, a branch of this science, is constructed, used, portrayed and known bear the imprint of highly gendered values and their underpinning Cartesian logic.

As epistemological points of reference that valorise ICT processes, Orlikowski and Gash's (1994) technological frames of assumption and practice have been outlined in the Literature Review chapter as reflective of masculine cultures, and women's low membership attributable, in part, to them. Their entry to these cultures has been argued as either encountering a friendly or hostile reception (Gherardi 1995). Both have the effect of exclusion, for the first response sees women as guests unlikely to stay long, and the second locates them as intruders or troubled outsiders. Appearing to valorise some in the short-term and silence others, their attempts to participate in these masculine enclaves locate them as the De Beauvoirian 'other' (De Beauvoir 1972; Bowker and Star 2000). This can have the effect of inducing the Irigarayan 'non-presence' (Irigaray 1990; Chanter 1995), and situates women outside of mainstream technical and public arenas, where their abilities are negated and men's affirmed (Cockburn 1983; Wajcman 1991; Zuga 1999; Faulkner 2000a). Yet, the presence of men alone can not account for women's relative absence from ICT fields. Rather what is required is a focus on the historical and structural production and reproduction of gendered epistemological systems to unpick how it has come to be that women's technical presence, or ontology, may be discussed in terms of their failures of irrationality and emotionality, and their success transcendence of femininity (Wollstonecraft 1792 (1975); Kellner 1983; Lloyd 1993; Geladof 1999).

Feminist theorising then reflects a rich tapestry of standpoints and research. However, feminist critical epistemology specifically exposes that which is forgotten, airbrushed out, lacking in representation and credibility, seemingly unapparent and non-transparent, and taken for granted. It seeks to unmask the complexities of every-day life by bringing to attention gendered issues that philosophy and other areas of social exploration neglect (Adam and Richardson 2001). In this endeavour, feminist foci will be drawn to emancipatory projects for women (Walby 1990, 1997; Stanley and Wise 1993; Adam 2001, 2002). Overtly partisan in privileging their voices, it makes this standpoint explicit and its analyses may be analytically extended to other areas of injustices, to those divided and silenced through axes of difference such as ethnicity, sexuality, class, age or belief, for example.

As part of its roots, the 1970s feminist reflection that the personal is political implies that a mindful and proactive awareness of a person's circumstances will help bring about changes in her life (Millet 1972; Stanley and Wise 1993; Maggridge 1997). It is in this dynamic awareness of personal experience that the hidden tensions in everyday life manifest and in pointing to the mismatches between 'what' and 'who' people are, or between epistemological and ontological narratives, the grounds for transformative activity and empowerment may emerge. Not a big bang Marxist futuristic revolution or a Heideggerian philosophical ideal, but an ongoing series of interconnected, realistic tiny steps located in the here and now.

Because of this focus on women's ways of being and knowing, the relevance of feminist methodology is often questioned and its research may not be taken seriously, with a common assumption that its theorists are militant lesbians (Adam 1997, 2002;

Stepulevage 1997; Adam et al. 2004). This assumption was articulated by a Cisco representative as "being tarred with the feminist brush", and reflected her hesitancy in raising gender issues even though it constituted part of her brief. Often relegated to A.O.B. in meetings, she feared being associated with "doc martins, or knocking down the doors of parliament, or burning your bra". Feminist theorising is polemical and generates strong responses, and whilst it may be said to have a strong methodological approach in so far as it reflexively engages with the research process, another assumption is common. Social science analyses are thought to not belong to research on technology, for this discipline is steeped in the physical sciences which are believed to require rigorous quantitative methodology (Adam 1997, 2002; Maggridge 1997). It is hoped that this research will dispel these assumptions and strengthen acknowledgement of feminist theory as an invaluable addition to the IS community.

Much of current feminist theory would however take issue with phenomenology, lacking acknowledgement of its critical potential and sitting uneasily with its universal, ontological theorising. The work of Heidegger and Arendt has largely remained outside of its analyses and this is reflected in a deficit of critique, so the next section draws on the few who have reflected on their work and supplements their comments with those of other scholars.

4.3.2   A critique of Heideggerian and Arendtian phenomenology

Heideggerian analysis is tantalizing, for his metaphysical pointing is vague and his use of words does not lead to concrete signifying. He makes a distinction between pointing and signing as ways of revealing a world as it is in essence, of transmitting a fragmented message of already constituted information (Feenberg 2000b). His

language is elusive, esoteric, vacuous, culturally and structurally specific, ambiguously open to interpretation, and in conflict with postmodern thought (Bartky 1970; Phillips 1992; Dreyfus 1998; Chanter 2001; Huntington 2001a). A failure that Brown and Lightfoot (1998) attribute to inadequately grasping of terms and ideas which appear most close to us. His level of abstraction leaves little room for discerning between electricity and the atom bomb, between different realisations of technology and its socio-historical manifestations, and in so doing rigidifies technology to destiny (Feenberg 1992, 1999).

Heidegger lacked practice or empirical substance (Bartky 1970; Huntington 2001a), and his ideas are apolitical (Hungtington 2001a), for his theoretical model is itself trapped in its own theory (Arendt 1946(2002)), in its own pure formalism (Bartky 1970), and in its pretensions to universality (Chanter 2001). Some question Heideggerian thought as providing emancipation from masculine domination given he never explicitly addresses the feminine (Irigaray 1999; Chanter 2001; Derrida 2001; Glazebrook 2001; Huntington 2001a, 2001b; Leland 2001). Much of mainstream philosophy fails to conceptualise the socio-historical and gendered conditions in which existence takes place (de Beauvoir 1972), and according to Butler (1997), there are no more interesting ontological questions. It is for this reason, and the above, that feminist research has avoided Heideggerian work.

Yet Butler's assertion is contested (Stanley and Wise 1993; Adam 1998; Huntington 2001b), and a return to Heideggerian ontology through critical feminist lens may open up his zeitgeist positioning. Whilst his analytical clarity verges on the poetic, within this vagueness lies the ability to interpret in a multiplicity of ways, to utilise his

thinking in more concrete and practical forms. Heidegger's esoteric and elusive signing focused our attention on seeing the world in a particular way, where the technological backgrounds of already constituted relations influenced our experiences (Feenberg 2000b). By flagging this tension between 'what' exists and how we engage with it, Heidegger's analysis of Gestell indicates that our experiential enframing is not so much shaped by technology per se, but by our personal and communal engagements with its various forms. In this he shares similar ground with Marxism and some gender analyses that point to specific techno-gendered backgrounds and relations as decisive factors (Cockburn 1983, 1999a; Wajcman 1991; MacKenzie and Wajcman 1999).

In positioning technology as a mediator between subject and object, an enframing of their inter-relatedness, he surmises that we need to free ourselves from this background of reference (Heidegger 1962(1977a); Rorty 1992; Feenberg 1999). Gestell, as the essence of technology, offers a dynamic ontological framework by which to reveal a fuller picture of our social existences and our connections with others (Heidegger 1962(1977a); Rorty 1992). Revealing this bigger picture provides context to the enframing of our disempowerment and our empowerment, to our impersonal and personal senses of agency if we open up and submit ourselves to attentive awareness or what Heidegger calls 'meditative thinking' (Heidegger 1954(1968), 1959(1966), 1962(1977a)).

A sudden flash of realisation, a cultural fluctuation that calls into question our dominant practices and reconceptualises them in the light of those that are marginalized will reveal our authentic self, our who-ness (Heidegger 1962(1977a);

Brown and Lightfoot 1998; Ciborra and Hanseth 1998; Flores 1998). Is this a mystical mumbling or a pertinent philosophical pointer to a transformative relation with technology? If gender extensions are made, our attention is drawn to a potential on-going openness toward our personal sense of who-ness, to our diverse techno-gendered worlds, where a gendered self and world are always and already united and yet disunited. In this vein, Heidegger and Arendt argue for a meditative, considerate inter-personal recognition of our own and others' representation (Arendt 1954(1961), 1958(1998); Heidegger 1959(1966); Villa 1996).

This new sense of responsibility lies in being-in-the-world, in the reflexive here and now, in our situated, engaged bodies as channels for sense data where the socio-cultural concreteness of existence sets the ground for reflection (Heidegger 1927(1962); Brandom 1992; Dreyfus and Hall 1992; Chanter 1995), and action. This is the essence of feminist critical theory, and if our phenomenological being-in-the-world is where we may discover our who-ness (Heidegger 1927(1962), 1975(1982)), then by encountering each others' co-worlds, our shared backgrounds, the techno-gender relations of imbalance may be unpeeled from these symbiotic engagements, and not constructed around 'what' each is functionally, rationally, behaviourally and cognitively.

The basic problem for humans is, according to Huntington (2001b), to interpret things in such a manner that they come forth as they are, not distorted through the imposition of technological or gendered thinking. Whilst such freedom of representation is perhaps a romantic notion, by drawing our attention to this different way of being, Heidegger is a critical theorist, for he provides a compassionate understanding of the

uniqueness of every living thing, and his leap to freedom exists in the here and now

(Huntington 2001a, 2001b), not some hypothetical Marxist future. Whilst Arendt may

be critiqued for her privileging of Grecian ideals of equality and public spiritedness,

where the public realm holds primacy and the private not reflected upon, she, like her

mentor Heidegger, sought to give voice to the sociability of existence and the

collaborative power of meditative thinking (Lloyd 2000). In encouraging Kantian

representational public action, Arendt seeks to ground Heideggerian meditative

thought (Arendt 1946(2002); Gordon 2001), but she omits the structures of power

where individuals may not be able to speak or be heard (Adam 2005), and the

gendered dimensions like so many of her contemporary colleagues.

However, that neither were 'feminists' is insufficient ground upon which to dismiss

their ideas, and whilst Arendt and Heidegger's idealistic notions of emancipation risk

lapsing into prophecy (Bartky 1970), their theoretical formulation of meditative and

representational who-ness provide a critical survival strategy for 21st century life. By

utilising their theories to reflexively focus on backgrounds, experiences and sites of

tension, the narratives of those who are excluded are given voice and context, and

some omissions of Arendt and Heidegger are addressed. A feminist critical theory

blend of Heideggerian and Arendtian ontology in relation to gender, technology and

the public sphere offers an eclectic approach to radical empowerment (Huntington

2001a, 2001b), particularly if a neo-Marxist analysis is provided in relation to ICT

productivity.

In unpeeling the techno-gender relations in this way, a deeper understanding of the

'more women in' approach may unfold, and whilst some would seek to move beyond

this focus (Wajcman 1991; Adam 1997; Wilson and Howcroft 2000; Adam et al. 2004), it does constitute the attention of present government policy and corporate strategies. Only by exploring its manifestation may we begin to move forward and suggest viable alternative avenues that emerge from the experiences of those targeted for inclusion.

4.4   Data collection and analysis

Over a period of ten months fieldwork between 2002 and 2004, a cross-section of four educational sites was visited in South East England and Scotland: Higher Education (HE), Further Education (FE), a Women's Technical College and a Women's Training and Education Centre. The latter two are more community-based establishments which specifically targeted women from social exclusion settings. This cross-section of pedagogic settings provided a broad base from which exploration of the problem domain was possible; offered diverse contexts to, and cross-validation of, the data (Eisenhardt 1989; Gable 1994); and generated a volume of information which was then cross-referenced with the analyses, as an example in Appendix C demonstrates.

In total, 48 individuals were interviewed, with the gender profile of those interviewed as: 3 female Cisco related personnel - 1 from Cisco's European branch, 1 from Cisco's public/private organisation - the Worldwide Education, and 1 from the CNAP training organisation; 4 female and 2 male pedagogic managers or heads of department responsible for implementing the CCNA; 3 male and 4 female tutors of which 1 was a lone woman parent; 2 female and 2 male trainee tutors; 1 male laboratory technician; 9 male and 18 female students of which 7 were lone women parents. A further 3 male tutors, 2 male trainee tutors and 2 male laboratory

technicians were observed, with a fuller breakdown of the interview schedule provided in Appendix A.

The student body varied considerably depending on the institution. FE and HE have embedded the CCNA programme in existing courses such as the vocationally oriented BTEC in Computing and the academic BSc. in Networking. These sectors attracted younger people who wished to improve their networking knowledge, and sought further full-time education in computer science related disciplines, or work in the networking industry. Female enrolment in the FE and HE sectors was particularly low, less than 2%. In the community based education centres, the CCNA programme was a standalone with all daytime students being women, more mature in age, predominantly unemployed and lone parents. This student body was largely attracted to the programme because: it was free and offered nursery provision; they were curious or were being encouraged to retrain; and they believed that ICT skills were a requisite for employment. This daytime student profile varied immensely to the evening or weekend one; students tended to be already working in the industry, sought further educational progression for promotional reasons, and generally were self-financing. A large percentage of those interviewed were of Asian or African ethnicity who were either home students, foreign or refugees, with the latter group's inexperience of the English language a major obstacle.

Data was generated through semi-structured interviews that were recorded and transcribed, in some cases videoed, and provided the interviewees with opportunities to add their own insights (Darke et al. 1998; Cavaye 1996). In asking open-ended questions, informants were given the space to answer in a spontaneous, personal

manner, relaying what was important to her or him; only occasionally did this researcher bring them back to the areas of investigation for she wanted them to speak openly and freely. This meant that much of the interview content was unusable, but as a means of relaxing those interviewed, it was an invaluable and fruitful mode of investigation. Research participants were asked to talk about their background and why they were doing the CCNA; their experiences of the programme; and to identify what they regarded as the most critical issues influencing the effectiveness of the ICT training course.

Prominent themes were drawn from these narratives alongside participant observation, which included sitting in with students as they were given lectures, shadowing them as they engaged with the practical laboratory work assignments, and participating in an intense four week CCNA instructor training module. Participation also included attendance of government and industry related conferences, and the CNAP community's annual conference. These themes were then related to the government's official documentation on ICT production, vocational training and gender. Extensive quotes from this empirical data will be used to highlight the experiences of socially excluded women and their perceptions of the reality of inclusion in the light of the demands of the network industry. Text italicised in the selected narratives indicates an emphasis by the narrator, and the coding of interviewees marked their institution, their status and the number of interviewees per position. So for example the code 'H_T1' indicates a tutor at Hackney Community College who was one of two interviewed.

4.5 The business and pedagogic settings

4.5.1 Cisco Systems representatives

Interaction with Cisco related personnel was predominantly facilitated by one, at the time, freelance educational adviser who was extremely frank, generous with her time, supportive, and opened doors to the two community-based pedagogic institutions. Of the remaining two personnel, the Cisco Worldwide Education representative worked in the States and so access was via email, phone and one critical meeting in London; and the CNAP manager, who was reluctant to be interviewed but was met at a conference in Glasgow, Scotland. The Worldwide Education representative was the first approached for research permission, and set the parameters of the investigation by initially offering funding if Cisco's concern for the low participation of women on the CCNA was explored.

Her interest lay in knowing the facts behind this problematic: to gather data on how many women were leaving and why; to chart the financial incentives that were bringing them in; to look at strategies and best practices that were holding them in and how more could be targeted; and what could be replicated to inform government in terms of policy recommendations? She also wanted to know: where the CCNA program was being deployed and whether the departments or colleges were technical; who paid the fees and took the risks; and what were the effects on household income, on the home environment, on the cost to women if they were self-financing or had childcare responsibilities? In short, what was statistically happening on the ground in terms of recruitment and retention.

Lack of reliable data on these concerns meant this Cisco representative saw the research as covering a cross section of pedagogic institutions, "picking a site and building a pipeline to improve enrolment" and gather this information. However, this was not the initial choice of this researcher who wished to focus on one institution and ethnographically shadow a range of students. Initially daunted by, and uninterested in, these statistically based requirements, ethically reluctant to be in the purse strings of a corporation and unhappy with such a liaison, this researcher went along with these objectives in the early days of the research, in part because it validated her upgrade to PhD status. However, the funding did not materialise despite extensive and time consuming research formulations for Cisco, although the company did cover expenses for visiting one site and attending one conference. Ethically relieved by this resolution, the research continued with the cross-section approach but with different objectives, as outlined so far. The Cisco educational adviser was sympathetic and through extensive informal meetings with her, alongside related documents, website content and conferences, the bulk of the information on Cisco and the CNAP was gathered.

4.5.2   The Women's Technical College

Fife's Women's Technical College was a very small establishment in south Scotland set up in 1989. Located in an area of high unemployment where the decline of the regional coal mining industry, and more recently the closure of the neighbouring naval base with its shipbuilding industry, meant high levels of socio-economic exclusion were in evidence. This voluntary sector college's mission was to attract a range of women with few or no previous qualifications who had never been in the labour market, had been out for long periods, or had missed on schooling for a number of

reasons. The student body consisted predominantly of white, more mature, unemployed lone women parents, which had remained consistently around 30 in previous years, but had in the last two years more than doubled to 80 to meet the head count requirement of its local education authority.

The college's rationale was to break down the barriers these women returners faced, such as: lack of childcare; low confidence and self-esteem; abusive backgrounds; lurching from one life crisis to another; and lack of up-to-date technical skills. As part of this motivation the provision was free, with offsite childcare, assistance with travel costs, and all training materials such as books, pens and paper provided at not cost to the trainee. Its high rate of success, around 80%, in terms of recruitment, retention and completion of the CCNA was acknowledged to be based on the supportive and holistic counselling and pedagogic practices that encouraged women to realise what was holding them back from reaching their own potential. Such a strategy evolved as a response to the wide range of emotional, psychological and practical problems that its student body experienced, particularly in terms of domestic violence and long–term sexual abuse.

Impressed with Cisco's worldwide leadership in internet networking, liaison with the Cisco Networking Academy began in 1997 and the college became a CNAP Local Academy (explained in the next chapter) in recent years. Its interest in the CCNA was expressed by the manager as:

> "They're not learning just Cisco skills, they're learning the ability to help themselves, and a range of products to help people become marketable...Cisco provides the umbrella [of skills] and takes away the competition...the Cisco name opens the door, and this can be fed in with the school's agenda, so we move away from the 'talk the walk'...[to] 'walk the walk'" (F_M1).

In January 2001, a CCNA pilot scheme was offered in four semesters over a period of one year. The college's core 'Women in Technology' module, or one related, was a prerequisite preparation for enrolment on the CCNA. Work placements were compulsory and more easily found in comparison to the other three sites visited since the area had an abundance of high-tech industry and call centres, and was locally referred to as the 'Silicon Glen'. Their pedagogic ethos was to give students the space to develop at their own pace, with an emphasis on practical skills to facilitate understanding through application of the required tasks. Consequently, there was little formal delivery, with the CCNA's handbooks and online module providing the bulk of the guidance. The atmosphere was extremely friendly and open, with ex-trainees permitted ongoing access to the facilities for job seeking or advice on personal or educational matters. Before the new version of the CCNA which timed out exam sessions, the 10 students enrolled on the programme could take as long as they needed to complete the online questions.

4.5.3   The Women's Training and Education Centre

The Women's Training and Education Centre, Newtec, is another voluntary sector organisation located in an East End borough of London that had one of the highest rates of poverty in Britain. The daytime student profile was: 100% women with 81% of them black or of ethnic minority, 80% or greater with no or low qualifications, 78% lone parents, and 96% unemployed (Newtec 2000, 2000b). Established in 1984, it had a history of offering women manual trade skills such as carpentry, bricklaying and car mechanics, and childcare training at nursery level. In 1999, a curriculum review shifted the emphasis away from these National Vocation Qualifications toward a modular 'employability' approach with the development of IT certificates, and the

integration of key skills, such as communication and employability into some courses such as the CCNA (Newtec 2000a). This shift was designed to enable students to move in and out of learning; a strategy that was regarded as better suited to its student profile of women returners, lone parents and those with other care responsibilities.

Its mission was to adopt a commercial, not philanthropic approach; to 'change lives through learning', and develop a 'win-win' scenario by maximising the employment potential of its largely unemployed student body and meeting the skills and recruitment needs of employers (Newtec 2002a, 2002c). This demand-led customised training saw the key to successful change through the development of partnerships based on sound commercial footings rather than altruistic principles (Newtec 2002c). The integration of the CNAA programme in September 2000 was in line with this mission, which also included the introduction of e-learning. Newtec, as a Cisco Local Academy, had an open door policy with regard to the CCNA, where no previous IT qualification or experience was required. The programme was initially offered to women during the daytime courses and to both men and women during the evenings or weekends. However, low daytime attendance necessitated more cost-effective measures and daytime provision was opened to mixed enrolment in 2003.

The CCNA was offered as a one year course, with semi-formal tuition covering introductory lectures on each of the four main online modules, with additional support on the complexities of binary algorithms involved in IP addressing and subnetting (the process of dividing local networks into an array of subnets and outlined in Appendix B). In total, some 10 students attended the daytime provision, with a further 20 during the evenings and weekends, and whilst a breakdown of statistics for the recruitment

and retention rates was unavailable, consensus was that it was extremely poor. Exam settings were semi-formal, with students restricted in time but largely unsupervised, and the work placement scheme had yet to be implemented.

4.5.4 The Higher Education Institution

London Metropolitan University was located in another impoverished part of north London, and had recently merged with another university to become one of the bigger Higher Education establishments in Britain, with the new Libeskind architectural extension a bold and visual improvement to the campus. Once a polytechnic, it began life in 1896 with a focus on vocationally orientated technical curricula, and awarded university status in 1992. The university attracts a high percentage of local people who tend to be between 20 to 30 years old, with 55% from Asian, Bangladeshi, Indian or Afro-Caribbean backgrounds (London Metropolitan 2002). Racial tension was high, not only between these groups, but also between the student body and staff. However, this was not observed in the department in which the CCNA was run, where the staff and student profile was predominantly a mixture of European, English Asian or Muslim men.

Run as a supplement to the academic BSc. in Networking, and as an evening or weekend standalone, the CCNA was delivered in one year through formal, comprehensive structuring of lectures in the morning, followed by extremely well supported laboratory work through the active presence of tutors and laboratory technicians. It was situated in the School of Communications Technology and Mathematical Sciences which was part of the Faculty of Science, Computing and Engineering. Having run the CNAP for the longest of all four sites visited, about three

years, the university acted as a Regional Academy of the CNAP (also explained in the next chapter), and had the responsibility for training tutors and coordinating 15 Local Academies. Statistics for the gender recruitment and retention rates were unavailable.

For many of the 100 or so 'streetwise' students, the degree was a means to an end; they were not particularly interested in studying or engaging with their course, and attendance was not as high as staff would have liked. Yet this researcher observed some of the best tutoring in computer science she had ever come across: the pedagogic style was highly interactive; tutors were open, patient, responsive, and gave clear, concise instructions. In short, a delivery that was systematically logical and supportive, with students continually questioned, challenged and encouraged to think. Work placements were not part of the programme, and the exam environment was highly formal; no talking, no books, strictly timed and supervised. So formal that this researcher was unable to observe exam conditions, but she did have access to the online preparatory tests. Management was extremely generous in giving open access to the CCNA delivery, and in permitting this researcher to participate on the very intense four week instructor training module that was spread over a one year period (this experience is summarised in Appendix B).

4.5.5   The Further Education College

Hackney Community College is situated in yet another very run down part of central London; in close proximity to the capital's financial centre, the regeneration of business developments were encroaching on the predominantly residential area. Many buildings were dilapidated and boarded up, and the unemployment rate for the borough at 6.9%, one of the highest in England and Wales, with the largest group of

this section of the population being in the 16–24 year range (Hackney 2003). The ethnic composition of the borough was, at the time of the fieldwork: 11.98%, black African; 10.29% black Caribbean; and 44% white British (ibid.). A high percentage of recent immigrants and refugees from Africa, Asia and Eastern Europe lived in the catchment area of the college, but the student body was predominantly black English African or Caribbean, with their age ranging from 16 to 19 years old. There was a subsidized on-site nursery which offered places to children between the ages of 8 months and 5 years, and ran both day and evening sessions. Provision was offered to adults in the evenings, and the college provided a wide range of predominantly vocationally orientated courses and qualifications.

As a Local Academy, the CCNA had been running for several years as a two year, four hours a week daytime supplement to the BTEC[1] National Diploma in Computing, situated in the Computing, Accounts, Business Studies and Secretarial Department. The first and second semesters of the CCNA were offered in the first year, and the third and fourth semesters in the final year. The BTEC diploma was currently undergoing restructuring to be split into two National Diplomas for IT Practitioners; one in software development and another more general module designed specifically for women, since their recruitment and retention in the BTEC IT programme and on the CCNA module was extremely low, less than 1%. Of the 60 students on the BTEC programme, about 90% go on to study at university, either to do a Computer Science, Multimedia and Design, or an ICT degree. The CCNA was also offered during the evening, advertised as a multimedia on-line curriculum with practical workshops, and generally attracted mature male students.

[1] Business and Technology Education Council

The rationale for including the CCNA in the BTEC programme was outline by the

head of department as:

> "I decided basically that it would be a good *deal* to put it on because I felt that it
> would help our national [diploma] because really national doesn't take you
> anywhere but university...it's *not* sufficiently *specific* that you can actually get a
> programming job...It's in an attempt to kind of organizing things so that those
> students...who actually *don't* particularly want to or *can't* [go to university]
> because they're asylum refugees, or their status is unclear, or their parents can't be
> bothered with it....that they've got *some* qualification which they can take away
> with them which is immediately employable..." (H-M1)

The pedagogic style was facilitating, with informal guiding of students replacing

lectures and tutors taking a background position as they dealt with the high

bureaucracy of the CCNA and its recent updates. The students generally worked

together, coming and going as they pleased; exam settings were unsupervised with a

relaxed, open book, sharing approach; and work placements were not systematically

part of the programme. Interviewing students at this site was problematic, in part

because privacy was absent, and many were overwhelmed by oncoming examinations

and the resultant workload. This stress, combined with English not being the first

language of a few and their shyness, meant that monosyllabic responses were

generally given during the interviews.

In all of these sites, the bulk of the student time was observed as being spent on online

reading of the CCNA content, with access cost-free if offered through the curricula

outlined and if not, charges ranged from £120 to £2300 for the entire programme for

EU students. By and large, the ethics of this researcher were not compromised during

the fieldwork, but at times the frankness of the data, the periodic requests by some

students to meet outside of the institutions to divulge controversial areas of concern,

and the formality of the examination settings presented conundrums. Careful

mindfulness in maintaining the confidentiality of these narratives and settings was essential, particularly in terms of balancing management and tutors' areas of concern with those of the students. It was as a result of these three parties' strength of articulation that the focus on sites of tension emerged, and the parameters of the research question set.

4.6   Conclusion

The versatile interpretivist research tool of narrative methodology will provide descriptive accounts of government, business and pedagogic backgrounds of legitimisation, as expressed in related policies and strategies. Giving context to how social existence is epistemologically informed, narratives also offer insight to the daily ontological lives of the socially excluded engaging in the CCNA programme. As such, this methodology suits phenomenological investigation, and enables greater clarification of the statistical data on women's low membership to the ICT domains that was presented in the Literature Review. The official set of overt narratives will be matched with those of the often unheard, covert voices of the students, and supplemented with the opinions and sentiments of the tutors and managers responsible for delivering the CCNA module. In shaping the research methodology in such a way and observing 'what' is significant and important to the institutional players, the goal is to critically note with feminist lens how this manifests for students. How this epistemological background to inclusive citizenship is secured and challenged, and how those endowed with less power experience this shaping of their ontology.

Mindful that the tapestry of epistemological backgrounds of legitimisation influence the experiences of both researcher and researched, the formulation of the investigative perspectives and the results, the research proceedings have been managed with ethical and reflexive sensitivity that openly declares prejudicial leanings. As a hallmark of feminist exploration, this prejudice privileges the voices of women, and in recounting their experiences seeks to critically expose the injustices and inequalities that shape their lives. Polemical and under-utilised in IS research, feminist theorising is a complex minefield in itself and weaves theory and practice by drawing from either epistemological backgrounds to pay attention to gendered systems of legitimisation; or from individual experiential performative dramas to recount concrete experiences of gendered relations; or, to a lesser extent, from the tensions between both.

In seeking to blend this contested space of feminist epistemology and ontology, this research turns to phenomenology. Largely absent from studies on gender, its expressions are relegated to archetypal Cartesian theorising, with Heidegger and Arendt's seminal contributions on our relation to technology and the public societal world under explored. Yet, a critical feminist perspective may reposition their zeitgeist formulations to encompass modern analyses on how women's ontological relation to society and to ICT is shaped by the epistemological backgrounds of legitimisation or reference. With judicious reflection on how this manifests in reality, the goal is to reveal how lone women parents experience otherness in relation to the three citizenship inclusion criteria of active responsibility, employability through ICT skills and relational expertise. By so doing, this research will address another omission of IS research: the lack of feminist epistemological reflection on technology (Adam 1998), specifically information and communications technology.

This approach of matching epistemological systems with ontological experiences will be supplemented with another theoretical tool largely absent from present day gender research, a neo-Marxist formulation of productivity. The cultures of inclusion, outlined in the Literature Review and developed in the previous chapter in terms of epistemological background points of reference and ontological formulations of citizenship, will be narrated to convey the assumptions and practices embedded in networked ICT productivity. Analysed with reference to the valorisation of ICT and how this is shaped by the politico-economic forces of government and business, these cultures of inclusion will be critically reviewed in terms of the gendered injustices that may emerge. Bearing in mind the initial research question of how the what-ness of ICT inclusion background policies shapes the who-ness of individual socially excluded people, the task is to explore whether ontological security or insecurity arises from this epistemological and ontological enframing of the socio-economic relations of lone women parents. By exploring how their otherness is experienced in relation to the parameters of their inclusive citizenship, this reformulation of the concept of Gestell may unfold pointers to empowerment.

This research will use the term 'empowerment' rather than emancipation to convey the grounding of change in the choices and needs of the socially excluded, whose narratives need to be heard in ways that they themselves express. Through this self-definition they may choose what constitutes empowerment and not the researcher, for one person's route toward this goal may be another's toward subjugation. It reflects an attempt to provide a more specific, non universalistic interpretation of the notion of emancipation, one that encompasses both the complexity, subtlety and diversity of its structures and daily practices that has until recently been missing (Adam and

Richardson 2001; Adam 2002; Howcroft and Trauth 2005). It is not the task of this research to specify the routes of change for those oppressed. However, by giving detailed accounts of how their ontological in/security manifests in the three Gestells that follow, introduced in the previous chapter, their voices may reveal sites of tension that institutional practices, shaped by policy formulation, give rise to. By so doing, and being reflexively sensitive to the range of narrative expressions, this investigation offers structural support to their choices and needs by providing a multidisciplinary and multi-methodological approach. Responding to the call for a wider range of research tools to be incorporated in IS study, the thesis provides some understanding of how our technological systems are viewed by institutional actors and how this perspective shapes the lives of ordinary people.

In focusing on both the epistemological and ontological shaping of these lives in relation to ICT productivity, with specific attention to gendered dimensions of exclusion and inclusion, this eclectic fusion of theories in the concept of Gestell offers a powerful tool for exposing constraints on empowerment. By drawing on this synthesis, women's exclusive ICT legacy is explored in greater detail, and their inclusion viewed in terms of the concrete reality of their existences. With equitable membership to society and the ICT communities the focus of the British government's attention, a major US corporation also shares this goal and the next chapter introduces the reader to Cisco Systems and its virtual networked business model, outlining the structure and ethos of the CNAP and the CCNA.

Networking business and training solutions

5.1   Introduction: network solutions

Cisco Systems Inc., with its headquarters in California's Silicon Valley, is a major US corporate that has performed remarkably well during the last decade. Its success is based on three key variables of its growth: core products that provide end-to-end networking solutions; virtual business modelling and e-learning solutions; and strategic partnerships or 'ecosystems'. The chapter outlines these variables, and then introduces the reader to the corporation's view of philanthropic activity that takes the form of greater ICT inclusion, although the language used is the digital divide. In providing its equipment at reduced rates to non-profit organisations, Cisco's social responsibility centres on enhancing socio-economic empowerment for disenfranchised local communities through access to its network engineer curricula.

The chapter proceeds by giving a background of US education reform to this philanthropic endeavour, in which the Cisco Networking Academy Programme (Academy), responsible for the training of instructors and students, plays a pivotal role. A hierarchical public/private organisation, the Academy is structured in three tiers and provides a range of modules, of which the Cisco Certified Network Associate (CCNA) is the first rung on the ladder to a network engineer career. The e-learning platform on which the provision is run is developed by the Cisco Learning Institute, another public/private body that Cisco established to improve its pedagogy. Concerned about the gender imbalance on the Academy's courses, Cisco set up the

Gender Initiative whose key task is to research the causes of this imbalance and address it.

Much of the information outlined in this chapter has been gathered from a range of sources: from meetings with Cisco representatives; from internal reports (GI 2001; Taggart and Needham 2001; Milgram 2002; Selinger 2002a, 2002b, 2004); from three Cisco annual reports (Cisco 2001, 2003, 2005); from one Cisco Learning Community conference (CLC 2002); from the online CCNA programme and its Companion Guide text books (CNAP 2003d, 2003e); and from hundreds of Cisco websites and assorted links to others (Cisco 2002c; CLI 2003a; GI 2004a). This latter collation was unavoidable, since any request for documentation led to referral to the relevant organisation's websites which have subsequently changed. Access was predominantly before 2003, and in February 2003 the entire collection of Cisco sites was restructured, with many earlier hyperlinks now untraceable. Furthermore, open access to the Academy was by permitted through restrictive log-in which has since been disabled, and whilst attempts have been made to update the links, this has largely proved a pointless task. Many businesses and other organisations post this 'grey' information on their websites, and academic reference to it presents reliability problems. Websites are by nature transient and difficult to identify, yet this short-life span provides a historical picture of a company if recorded, so information presented in this chapter largely relates to a snapshot of Cisco policy and initiatives before 2003. However, recent research has confirmed that these priorities appear to have changed very little.

5.2   Cisco Systems Inc.: a business ecosystem

Founded in 1984 by two Stanford University computer scientists[1], Cisco started off

with a US$2 million venture capital investment, and by 1990 its annual revenue was

around US$69 million, reaching US$25 billion by 2005 (Castells 2001; Cisco 2005).

This success has led to Cisco being regarded as the archetypical expression of the

internet age as Ford was to the industrial period (Castells 2001). Part of this success is

due to the company maintaining its leading-edge in networking technology, but also to

US productivity doubling largely in response to heavy investment in ICT

infrastructures during the early 1990s (Mullaney and Cox 2003).

Capital investment and growth in public services expenditure in IT infrastructures

contributed substantially to the expansion of the technology market, with the US

annual revenue increasing from US$70 million in 1990 to US$19 billion in 2000, and

companies like IBM, Toshiba and Fujitsu dominating this market (Kraemer and

Dedrick 2002). The global market for ICT networking equipment grew from US$11

billion in 1992 to US$50 billion in 1999, with corporations such as Cisco, 3Com and

Bay Networks cornering the key products for local area network (LAN), metropolitan-

area network (MAN) and wide area network (WAN) technologies (ibid.). With

industries investing in IT and ICT infrastructures during the early 1990s said to have

experienced the greatest productivity gains during the latter part of the decade (CNAP

2001a), this growth of the technology industry has enabled "America to make

technological bets that would crush other nations", and to lead the global way in its

design and use (Mandel 2003).

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[1] Sandy Lerner and Len Bosack.

Cisco's global operations are centralised in terms of product development, manufacturing, finance and human resources, but its customer services and product marketing are decentralised and local (Kraemer and Dedrick 2002). Customer relations are central, and this is reflected in one of the company's often quoted mottos: "'Listen' – to customers for guidance on the production, development, sales, implementation and servicing of its products; 'Share' – ideas and knowledge; and 'Deliver' – the products and the services" (Cisco 2001). Communication is Cisco's ethos, for it regards three of the biggest business problems as: an inconsistent global methodology to identify, prioritise and address complex business problems; a lack of cross-functional communication; and an absence of resolution in these two vital strategies (Baron 2003). For Cisco, global organisational strategies fail to communicate knowledge, decision making and implementation of solutions quickly and efficiently, largely a result of unresolved issues of 'ownership' and 'accountability' (ibid.). With these notions undefined by the company, communication is viewed as a process and not a function, and the corporate worker of today is seen to be vitally engaged in building solutions for their company. In thinking innovatively, sharing that procedural knowledge, listening to customers' requirements and executing decisions efficiently and effectively, increased 'ownership' and 'accountability' is said to be reflective of a C21st 'knowledge' worker.

Cisco believes its corporate infrastructure reflects this business culture, and provides dynamic and cutting-edge network solutions to resolve commercial problems. Through its virtual business model, corporate e-learning programmes, and strategic partnerships, the company markets emulation of its successful organisation and its

core products. With centralised business activities predominantly automated these days, the requirement for ICT infrastructures to be robust, secure, mobile, wireless, and able to seamlessly transmit media-rich traffic, Cisco's key products are tailored toward these networking functionalities.

5.2.1   Core products and partnerships

Cisco launched into the network market with a core hardware device, the router, and the software for its configuration, Cisco Internetwork Operating System (CIOS). A router is a device used for directing data traffic across optimal networked paths, acting as an interface, or gateway between different systems. As boundary objects (Bowker and Star 2000; Hanseth 2000), routers are important artefacts for enabling a heterogeneous conglomeration of parts and processes to present a homogenous presence through dynamic and patch-like activity (Hanseth 2000). Optimal configuration of these routers is through the CIOS software which extends to all products under the CiscoFusion network architecture, providing scalability, compatibility, stability and security for a wide variety of protocols, media, services and platforms.

In holding the international specifications of these two products, Cisco sets the benchmark by which all other similar products are matched (Mansell 1993; Hawkins 1996). The company's standardisation of network products complies with the International Organisation for Standardization (IOS) recommendations and greatly facilitates multi-vendor interoperability. Utilising the IOS reference model for network compatibility and conformity, the Open Systems Interconnection (OSI) seven layered framework for network architecture, Cisco's router technology piggy-backs on

the 'lingua franca' of the Internet, the open standards of the Transmission Control Protocol/Internet Protocol (TCP/IP[2]) suite. Both the OSI and the TCP/IP suite are outlined in Appendix B. Until it went public in 1990, Cisco solely produced routers, but customers wanted LAN devices, or switches, that bridge connectivity between their internal network segments and provide a cheaper medium of communication than telecommunications systems. So Cisco licensed its proprietary CIOS to switch vendors, thus furthering compatibility, adoption of its operating system and transforming itself from a router to a networking equipment company (Kraemer and Dedrick 2002). Building on its ICT infrastructure of routers, switches and the CIOS in relation to the TCP/IP suite of protocols, Cisco moved from using the network as an information sharing tool toward using its applications to link core business systems.

The company's success is, in part, built on buying into specialist smaller companies that develop cutting-edge products or leasing these new technologies, and on financing these acquisitions or partnerships through the currency strength of its own highly valued stock. Corporate leadership is strategy driven (Kraemer and Dedrick 2002), with Cisco gambling on high technological solutions that require adoption of its network standards. Extensive partnering with businesses, government, non-government, international, charitable and educational stakeholders adds value and support to its network activities, and in supplying its formal or informal partners' complementary assets with its core products, Cisco's business ecology is diverse (ibid.). This closely woven collaboration is referred to by the company as an

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[2] The TCP was originally designed by Americans Vinton Cerf and Robert Kahn, and was later being split into two Internet protocols to become the TCP/IP suite.

'ecosystem', and creates a dynamic and reinforcing web of critical stakeholders; as they thrive, so does Cisco.

The converse is also true; yet whilst its corporate strategy for domestic expansion was curtailed in 2001 after the bursting of the technology bubble lead to the company's stock market value falling, Cisco expanded into the emerging 'tornado' markets. To capitalise on the rapid uptake of new technologies in wireless and mobile communication, voice and video over IP[3], fiber optic cabling, and location positioning radio frequency identification chips (RFID[4]) for example, the company is diversifying its products. With an innovative approach, reflected in a healthy Research and Development budget that accounted for some 14.3% of its revenue in 2000 but reduced to less than 1% in 2005 (Kraemer and Dedrick 2002; Cisco 2005), Cisco is speculating on a broad range of products dedicated to a global demand for end-to-end, high technology networking solutions for its survival.

With a diverse customer base, Cisco supplied 90% of routers and switches to the world in 1999 with 55% of sales to corporate networks, and by 2001, despite the downturn, Cisco was positioned ahead of its competition (Castells 2001; Kraemer and Dedrick 2002). This was achieved, in part by locking in customers to its particular

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[3] Voice over IP (VOIP) is an Internet based communications system that handles phone (voice) traffic, and was originally tested in Italy in 2004, but is now an increasing component of static and mobile network technology.

[4] Radio Frequency Identification chips, for example, are increasing used by the retail sector to monitor supply and demand of products, tracking goods all the way from the factory to the checkout counter. They work by transmitting a low range radio signal to scanners and sending a unique ID or EPC (electronic product code) that is stored in databases. Minute antenna are implanted in credit and ID cards and may become part of our future. Seen by some as the hottest thing, they involve engineering of materials down to atomic level, where 'smart' dust, or tiny radio equipped sensors, can network each other, generating a sub-atomic world wide web, a 'digital skin' that covers the face of the earth. RFID offers automated profiling, an electronic frisk without knowing it has happened. Interestingly, this technology has recently been implanted in two humans for enhanced security access (Monbiot 2006).

products and services (Star 1991; Hawkins 1996; Hirst and Thompson 1999; Dahlbom

2000). Through a variety of contractual commitments, loyalty programmes and brand-

specific training, for example, lock-in is reinforced as high switching costs may tie a

buyer wishing to minimise technical risk to a vendor offering mission critical

reliability (Hutton 1996; Dahlbom 2000). As existing functionality fails to keep pace

with changing requirements, supporting the transition from old to new technology

becomes an important factor in this reliability.

Much of network traffic then currently passes across Cisco technology, and the

company's goal is to build on its 'wired' network of interdependent stakeholders who

hold a joint interest in each others' success. Cisco's vision is of a global e-community,

and constitutes an essential part of its business acumen that is shared by governments.

Bolstered by increases in public expenditure on civic, health, tax, education and

transportation networked systems for example, this vision is unfolding. With

aggressive sales pitched at improved commercial performance through its integrated

products and services, Cisco presents its virtual business model as the future of

economic relations.

5.2.2   A virtual networked organisation

Cisco's corporate philosophy is e-solutions and its own organisation and commerce is

virtually structured, providing downsizing, accountability, efficiency and reliability to

its business processes; 95% of all Cisco applications are web interfaced (Kraemer and

Dedrick 2002). Extranets coordinate registered suppliers, provide product

development details and automated testing processes; and intranets update, link and

respond to its employees. With the company's CEO, John Chambers, boasting the best

trained sales workforce, he maintains that the company 'walks the talk' and pioneers use of its technologies as a 'historic economic change agent' (ibid). As he further states (Chambers 2003), the virtual networked organisation is the most basic organisational and manufacturing change since the assembly line, involving fundamental alterations in business processes that continue to evolve.

This perception of the networked virtual organisation as the future is, in part, because it presents one coherent entity to the customer base. Defined as consisting of "one core firm and a number of other firms with whom the core firm contracts to carry out its business functions" (Kraemer and Dedrick 2002: 7), Cisco views it as an:

> "any size company that strategically uses information and communications to build a network of strong, interactive relationships with all its key constituencies, opening the corporate information infrastructure and leveraging the network to achieve a competitive advantage" (ibid.: 7).

Such a virtual model improves marketing by integrating external customers, suppliers and partners into its own information systems, blurring its corporate boundaries with stakeholder constituency, and allowing Cisco to concentrate on product innovation whilst outsourcing non-core functions.

An increasing trend to outsource non-core activities, the perceived 'evils' of corporate trading such as pay-rolling, administration, inventory, manufacturing and delivery services, to external expertise can take around two years for corporate culture, processes and skills redeployment to re-orientate (Kraemer and Dedrick 2002). These non-fundamental tasks are of no direct strategic value, and companies that successfully identify these functions are regarded as being in a better position to gain competitive advantage (Kamssu et al. 2003; Willcocks and Plant 2003). Virtual

organisations are also said to provide increased competency in moving information and materials; significantly reduce time and distance constraints by enabling real-time collaboration; provide seamless services and better control of resources to speed up project implementation; minimise risk and complexity; maximise cost-effectiveness; and enhance customer relations.

Utilising this web-efficient foundation, Cisco offers network solutions in six areas: e-commerce, e-services, e-workforce optimisation, e-supply chain management, e-publishing and e-learning (Kraemer and Dedrick 2002). By applying networking logic to its own operations, the company has generated very successful e-commerce operations that drove its productivity by 10%, fuelled expansion into new markets and generated a 3.5% growth for 2002 (ibid.). In 1999, 83% of its orders and 80% of its customer services were over the Internet, estimated to have saved Cisco over a two year period between 1997 and 1999 around US$500 million (Castells 2001). Having helped weather the late 1990s recession, the company seeks to dominate its 'e-culture' value of business operations (CLC 2002; Willcocks and Plant 2003). Its aim is to succeed with its products, particularly the CIOS and its expertise as a virtual organisation, as Microsoft has with Windows, and its end-to-end architecture has positioned the company as the bellwether for the network technology sector (Kraemer and Dedrick 2002).

One way to further this e-culture, Cisco maintains, is through e-learning, seen to have the potential for training existing staff in changing work practices that are emerging as companies adopt ICT infrastructures and require different skill bases. E-learning for Cisco is "about offering learning choices: live, self-paced and collaborative solutions"

(Cisco 2002d). If e-sales are Cisco's bread and butter, e-learning is an important flavour of its supplemented spread; quoting a 40 to 60% reduction in training overheads, an Internet-enabled training model provides a reliable, robust, cost-effective and flexible solution to changing market trends and skill requirements. Not only will the workforce be proficient in ICT skills, but companies can expect optimisation in their market activity and improved communication. Seen as a core element of a successful business strategy, Cisco advertises e-learning solutions for business transition to e-commerce and the knowledge economy, and regards those with the "greatest knowledge, skills and ability to efficiently create and share knowledge [as having] the best chance at success" (Cisco 2002a). An organisational commitment to using the Internet to solve these business developments will broaden the learning potential of employees, for "knowledge is power and those that hold the key to technology, hold the power in society"; such knowledge workers will become the centre of a company (Castells 1996; CNAP 2001b; Kaminkow 2001).

E-learning, Cisco maintains, levels the playing field by providing access and opportunities for lifelong learning, offering a dynamic and stimulating forum for the sharing of information between management, employees, customers and companies. The new multimedia internet technologies that enable e-text to be more imaginatively conveyed through simulation and animation for example, have made e-learning increasingly viable as a global and local mechanism for improved collaboration, interaction and empowerment. In an annual report in 2001 (Cisco 2001), Cisco wrote of a "commitment to dealing with the world the way it is and not the way we wish it were". This way, Cisco believes, is one of global technological infusion to sustain

market viability, and by improving its stake in the emerging economies, where a

reliance on the European (25.2%) and Asian-Pacific (9%) markets in 2000

supplements two thirds of its revenue from the North and South American continents

(Kraemer and Dedrick 2002), the company is keen to expand its e-learning solutions

as part of its strategic market dominance. Building on strong productive, customer

government and non-government ecosystems, Cisco is committed to ensuring global

ICT infusion and as part of this strategy it believes it has a social responsibility.

5.2.3   Corporate social responsibility

Cisco's corporate culture is one of partnership through use of network technology, not

only in terms of business but also communities, and the company is proud of its

symbiotic ecosystem relation with its localities. Built into its business model is the

integration of corporate community involvement, where a culture of volunteerism is

encouraged in its workers who are expected to participate in their neighbourhoods

(Rochlin and Boguslaw 2001). Cisco does not separate its corporate philosophy from

its social philanthropic participation; business and social welfare are intertwined, with

profit and benevolence two sides of the socio-economic coin. It offers concessions in

hardware and sub-contracting arrangements for use of its networking technologies to

foster reform and economic rejuvenation in areas that need a boost.

The 'Cisco Impact Philanthropy' is about:

> "...building strong and productive global communities, in which every
> individual has the means to live, the opportunity to learn, and the chance to give
> back...[it] takes all three to set in motion an enduring cycle of health and
> prosperity" (Cisco 2004a).

Cisco's philanthropic goal is to identify non-profit endeavours that do work in one or

more of the above segments in the cycle, and help expand "their long-term capacity by

encouraging the innovative integration of technology into their operational strategies"

(ibid.). As part of this goal, the Cisco Systems Foundation was established as a 'gift'

from Cisco in 1997, acting as a "corporate philanthropic primary cash investment

vehicle" to give grants to organisations in communities where Cisco has a significant

business presence (Cisco 2004b).

This philanthropic leaning is not unique to Cisco; many other major corporations are

using the language of social responsibility as part of their commitment to social

reform. Corporate social responsibility (CSR) is being encouraged by governments to

help reduce hunger and poverty through the building of global partnerships on socio-

economic development (The Guardian 2004[5]). The British government, for example,

created its first CSR minister in 2000, with the launch of a CSR Academy later in the

year, and this move reflects a redefinition of how companies socially conduct their

business, both domestically and overseas (Cowe 2004). The top ten companies on the

London stock exchange gave 0.97% of their pre-tax profits to charities and

community projects between 2003 and 2004, amounting to £872 million and a 7% rise

from the previous year (Armstrong 2004). For Cisco, its philanthropy is positioned as

the social grounds upon which it may give something back to local communities, since

it is keen to "help bridge the [digital divide] gap between those who can effectively

use new technology and communication tools, such as the Net, and those who cannot"

(CNAP 2003a). The company's literature conveys a commitment to ensuring digital

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[5] No author supplied.

equity, committed to assisting local people in learning the ICT skills they need to join the global knowledge economy. Its aim is to leave no child behind, with a long-term vision of preparing people for 21st century skills through its Academy's programme of network engineer modules.

5.3   The Cisco Academy: a training ecosystem

5.3.1   A background of US pedagogic reform

The 1990s was a decade of educational policy reform in the United States (Murnane et al. 2001). Many High School graduates were entering the employment market without basic cognitive skills in maths, reading, writing, problem solving, communication and group work, with 'children of color' fairing the worst, and this was seen to pose a serious risk to the nation's competitiveness (Murnane et al. 2001). In response to the Glen Commission Report which flagged national inconsistency in these skills, and to the Clinton initiatives which focused on greater network connectivity, science and technology expertise, US federal pedagogic policy reforms embarked on a set of strategies[6] (Berghel 1996; Murnane et al. 2001). Pitched at standardising these cognitive skills, the imperative was to meet the workforce shortage of quality supply that employers were signposting (Murnane et al. 2001).

A federal government directed ICT infrastructure was viewed as extremely beneficial for meeting this supply, kick-starting the economy and addressing the socio-economic

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[6] State variances in educational processes and credentials meant that reliability of skills acquisition at High School level were problematic in terms of employability across states. Reforms to address this focused on: the need for standards-based curricula where a common specification of skills provided consistency; professional development of skilled teachers to ensure high quality instruction; development of critical skills and credentials for students; and improved assessment procedures (Murnane et al. 2001).

and technological exclusion of sections of the population. The US Department of Education approached Cisco to develop a network engineer programme for 'empowerment zones'[7], or economically challenged regions which were marked for rejuvenation (Rochlin and Boguslaw 2001; Cisco 2002f; Warner 2002). These zones were generally populated by ethnic minority socially disenfranchised groups, with a history of high unemployment and low-income. With educational opportunity seen as the route out of poverty through economic inclusion, in a concerted response to provide reform, collaboration between Cisco, federal and educational establishments was instigated.

Government would ease the way with policy reforms and rejuvenation funds; educators would be responsible for implementing the reforms; and Cisco would provide its network equipment at subsidized rates to organisations working in these empowerment zones. However, expertise on how to use and apply it was lacking (Milroy 2001; Rochlin and Boguslaw 2001; Willcocks and Plant 2003). Since 1993, in response to a request from a large customer base - schools, Cisco had been providing practical, cost-effective networks, with students trained in their design, installation and maintenance. This student expertise could be utilised in the zones, with Cisco providing a standardised and consolidated network engineer set of skills via its e-curriculum, the training of instructors and support. The company now had a market that was federally endorsed and subsidized.

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[7] In the US, 204 empowerment zones had been identified, along with 75 Hispanic serving institutions, 19 Black colleges, and 21 Native American schools and Tribal Colleges (Rochlin and Boguslaw 2001).

So was born the Cisco Networking Academy Programme, perceived by one leading representative as 'pedagogic philanthropy' where the student is always at the core. The Academy's brief was to instigate a well-rounded online curriculum with standardised assessment procedures, well-trained instructors, and regular updates to content. Providing an industry recognised, vendor-specific qualification in network engineering, this skills base involves the design, implementation and management of network infrastructures and products (Kolding and Milroy 2001; Valenduc 2003). Informed in the specifications of Cisco hardware, CIOS configuration of router and switch functionalities, and computation of tricky algorithms for maximising and managing IP network addressing, this knowledge is regarded as providing lucrative employability since network engineering comes in the top five percentile of ICT jobs in the US, accounting for some 10%[8] (ITTA 2001, 2002).

5.3.2   Network engineering: digital opportunity

The Academy, launched in 1997, is a private/public ecosystem, involving the "collaboration between business, government, education and community organisations that delivers a broad range of services and support needed to grow tomorrow's workforce." (Cisco 2002e[9]; CNAP 2002b). Its brief is to "ensure that the Internet brings digital opportunity to every corner of the earth...e-learning eliminates barriers of time, distance and socio-economic status...allowing people to take charge of their own lifelong learning" (CNAP 2002b). As part of its corporate community involvement, Cisco finances the Academy to the tune of some $50 to $120 million,

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[8]Within the ICT sector are also Systems Engineer 39%, Systems Administrator 29%, Network Administration 7%, Network Manager 8%, and 7% classified as 'other' (ITAA 2002).
[9] This educational ecosystem encompasses a wide range of American and international sponsoring organisations which cover civic, business, pedagogic and social arenas (CNAP 2002b).

depending on what one hears[10]. With a brief to harness the power of network

technology and knowledge to create opportunities for people and nations by providing

a trained network engineer workforce for the knowledge economy, the Academy is

viewed as integrating Cisco's socio-economic assets into local communities. As the

Academy prepares this workforce, from which about 5% of graduates are hired by

Cisco (Warner 2002[11]), it educates a new market in Cisco products; provides testing

laboratories for Cisco's new merchandise; offers Cisco customer servicing; and

cultivates technical literacy and economic opportunity. A central component of this

latter benefit is the Academy's role in tackling social and unemployment concerns by

"transitioning welfare recipients into jobs, retraining displaced workers and

rehabilitating juvenile offenders" (Rochlin and Boguslaw 2001). This philanthropic

responsibility to provide employability skills to the socially excluded is reflected in its

underlying philosophy:

> "The world is changing. Technology is revolutionising almost every aspect of our
> lives. The only thing holding us back is knowledge. Companies all over the world
> need a talented workforce with the skills to drive their business into the 21st
> century Net economy. The CNAP can provide students with these skills, to
> prepare them for higher education, and a gateway to a rewarding career" (CNAP
> 2003c).

With a vision of a global 'technology savvy' community, economically better

positioned to assist businesses in increasing their competitive advantage and

profitability via Cisco networks, the Academy's e-learning programmes will transform

the way people live, work, play and learn (Cisco 2005).

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[10] It impossible to extrapolate the exact amount from Cisco personnel; none had the figures, with some
suggesting that this researcher look on the websites which proved unfruitful.
[11] Alumni status, as of 2002, was 20% in part time employment, 53% in full-time work with 25% not
responding to the survey (CLC 2002).

5.3.3   Structure, provision and ethos

The Academy is a hierarchical, decentralised organisation that is structured in three

tiers - Local, Regional and Central, to ensure accountability, control and

manageability. Initially created to prepare students for the CCNA certification, widely

acknowledged as one of the best in industry standards, the Academy has expanded its

curriculum to include a wider range of courses relevant to ICT careers today.

Programmes such as IT Essentials I and II, Web Design, the Cisco Certified Network

Professional (CCNP), Java, Unix, Wireless Technology, and Network Security for

example, are offered. Acting as preparatory or progression routes, each combines

web-based learning with instructor-led tuition and practical hands-on laboratory

sessions. This research centres on the first rung of the networking expertise, the

CCNA qualification, specifically CCNA v3.0[12] released in June 2003, which is a four

semester module comprising of some 280 hours of curriculum exposure, and the first

two modules of the first semester are overviewed in Appendix B.

The Central tier of the Academy consists of the Cisco Academy Training Centres

(CATC) whose brief is to provide support and training for instructors in the Cisco

Certified Internetwork Expert (CCIE) qualification, covered in 4 weeks over a period

of several months or more. They also monitor the delivery of the Academy

programmes; contribute to curriculum content; and quality control a network of second

and third tiered Academies. The UK CATC is in Birmingham and outlines in a Quality

Assurance Plan (QAP) the roles and responsibilities of each academy and instructor,

holding both accountable for high-quality and consistent delivery of the programmes

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[12] In January 2006, the current version was CCNA v4.31.

(CNAP 2002a). The QAP overviews Cisco policies and standards for success; identifies strategies to enhance student progression; and stipulates regular assessment and monitoring of teaching. To be a CATC, an organisation must recruit at least two Regional Academy instructors, charging £800 per instructor for each module taught plus an annual membership fee.

At the second tier are the Regional Academies which manage a geographical area and are directly responsible to their country's CATC. They provide training in the higher level network qualifications (such as the CCNP, Unix, Java and wireless technology), with some offering the CCIE instructor certificate. Their brief is to recruit, actively manage and support a minimum of ten Local Academies for each curriculum they offer, with an estimated running cost in the range of £36,000 to £50,000 for Cisco equipment alone. General overheads such as salaries, terminals, room hire etc. augment this expenditure, but an income of £60,000 plus can be expected from student fees, around £800 per student compared with private sector fees of £4,000 or more, in addition to the annual charge to each of the Local Academies, around £3000.

At the third tier are the Local Academies which usually provide the lower level qualifications to students (such as the CCNA, IT Essentials I and II). In addition to providing network engineer skills, problem-solving and team work are developed in some Local Academies as necessary complements to a viable ICT career. The initial investment of such an Academy is a minimum of 5 Cisco routers and 2 switches (approx. £10,000) and the cost of membership to a Regional Academy. Extra equipment such as cables, testing tools etc. and a service contract with Cisco means that a budget of around £15-20,000 has to be found to cover the initial start-up costs,

but fees ranging from £120 to £2,500 could be charged for each domestic or European

Union student respectively. If situated in an empowerment zone, then the cost is

covered by US federal money, and if in the developing nations, by UN sponsored

initiatives[13].

The Academy's ethos is rooted in three pillars of education: curriculum, instruction

and assessment (CNAP 2002b); and the CCNA has a comprehensive set of e-

management tools for monitoring student progression and providing accountability.

These tools are regarded as enhancing the delivery and quality of its programmes,

supplemented with an instructor and student-centred pedagogic approach that places

an emphasis on team work and practical hands-on laboratory assignments. The

curriculum materials of the CCNA, essentially online but also supplemented in

traditional book form (CNAP 2003d, 2003e)[14], are aligned to US national skills

standards[15] (CNAP 2001c; Rochlin and Boguslaw 2001). Initially, it was pitched at

US ninth grade level[16] to meet the abilities of American high school kids between 14

and 19 years old and, in line with the US pedagogic reform agenda mentioned above,

at people who didn't have a college education (Selinger 2002a). Subsequent versions

convey a more in-depth content suited to the widening sophistication of its student

body.

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[13] For example, the United Nations Development Programme and the US Agency for International Development. Research to ascertain the UK government's financial involvement proved fruitless since no manager or Cisco representative had the figures, and no government literature referred to it.
[14] In the UK, the price of each book was £27 in 2002; for many students this price was prohibitive, a factor found by Selinger (2002a) in her survey of the Europe, Middle East and Africa branch of Cisco Systems.
[15] The Academy is mapped to criteria outlined by the US Secretary's Commission on Necessary Skills (SCAN), the framework which encompasses the soft skills that are seen to translate into career skills, such as writing or working in a group or showing leadership quality (Rochlin and Boguslaw 2001).
[16] Approximately equivalent to the UK GCSE 'O' level standard, or to BTEC level 2.

The second pillar of education is the instructor, a key cornerstone in developing the effectiveness of the pedagogic process, who must be trained in the CCIE and the CCNA, with the latter renewable every three years. Instructors come from all walks of life; some may have a teaching background but little knowledge of networking, or others are network professionals with little teaching experience (Murnane et al. 2001; Selinger 2002a). This polarity of expertise presents a challenge in blending both sets of skills for effective delivery, so one strategy recommended for developing technical teaching skills is through use of Bloom's taxonomy which incorporates knowledge, comprehension, application, analysis, synthesis and evaluation (Murnane et al. 2001). It prescribes how instructors may attain each level with their CCNA students; for example, knowledge of the number of bits in an IP address and evaluation of the types of cabling required within an intranet would be pointers toward application and synthesis. Advice is also given on presentations skills, or how to foster critical thinking and problem-solving skills around network installation and maintenance. The onus on lecturing is seen as less critical than team work and hands-on practical laboratory experience, with instructors briefed not to use technology as a substitute for pedagogic practice.

The third pillar of education, assessment procedures, is designed through interactive, online multiple choice informal quizzes and formal testing, comprehensively and regularly monitoring students' skills acquisition progression. The Academy's 'seven Cs of assessment' are: claims and curriculum - which cover integration and co-ordination between the broader outcomes for the student (claims) and the specific teaching objectives to reach that goal (curriculum); collaboration – between the

students and the instructors to develop the learning process; and complexity – state-of-the-art e-learning content and examination that is computer-scored with immediate and impartial results. The remaining ones are: computation – to keep track of, and analyse, the number of times students log-in and the exam results; communication – reports for the academies on students' enrolment, completion and progression; and co-ordination – of curriculum with the certified exams.

This set of objectives is reflective of Cisco's business ethos, as an ex-CEO of Cisco, John Morgridge[17], explained:

> "...Cisco's cultural traits are ingrained in the program...we measure everything. Quality is a fundamental part of everything. So this program has a whole series of measurements. It's got a quality-control mechanism...it's automatically applied...we get feedback from the students because we test them" (Rochlin and Boguslaw 2001: 6).

Bolstered by a strict corporate acumen, the Academy has grown exponentially and provides one of the largest e-learning environments in the world. Through this endeavour, Cisco is seen as a prime example of how business practice can be directed to meet economic, social and pedagogic requirements. The Academy's cutting-edge provision provides a cocktail of traditional tutoring with interactive e-functionality, and the goal to "enhance the way people teach and learn by integrating and advancing educational technology" (CLI 2003b), is realised through 'blended' learning.

The Academy is emphatic that e-learning does not replace the teacher-student relation, for in providing the benefits of personal instruction and combining them with the media-rich potential of e-platforms, the aim is to offer versatile, leading-edge instruction that does not lecture, but coaches students to engage in learning together

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[17] CEO of Cisco Systems from 1993 to 2001 and currently Chairman of the Board.

and take responsibility for their own learning process (Selinger 2002a). With the web's ability to facilitate instantaneous two-way communication and feedback, the Academy regards its pedagogic practice as innovative, going beyond traditional computer-based instruction by providing critical thinking and team work, and integrating practical knowledge and skills in laboratory environments which closely resemble the real ICT world. Presenting this methodology as social constructivist, elaborated in the Network Engineer Training Gestell, the Academy maintains it has the mechanisms in place to provide comprehensive guidance and support for its students and staff.

Backed up by an extensive range of websites, the Academy provides for example, up-to-date news on changes in or problems with the curricula; additional learning notes and tools such as a link to a subnet masking calculator (used to calculate the number of bits in sub divisions of IP addressing); guidance on examination; general industry and alumni information; and employment prospects, comprehensive support is seen to be available. A monthly newsletter is emailed to all participants, providing information on new Cisco Press books, flagging emerging networking technology and events, with regular competitions offering free Cisco minor products, for example. This online information provides a strong sense of community, where a feeling of belonging reflects a Cisco identity steeped in interaction, knowledge sharing and teamwork awareness. This sense of community also extends to the local business districts, and Local and Regional academies are encouraged to build strong links to develop critical real-world training experience and career development for students. The 'win-win zone' is this matching of business requirements with education and

training (CNAP 2003f), yet whilst networking skills are posed as a route toward

digital equity, Cisco's philanthropic ecosystem recognises that economically and

socially challenged groups of people require additional support.

5.4   A pedagogic and gender ecosystem

To address this support and improve understanding of how learning occurs, Cisco

launched the Cisco Learning Institute (CLI) in 1999, a non-profit making

public/private research based organisation. The CLI's brief is to further pedagogic

research by producing and supporting leading-edge technology for educational and

charitable institutions using the Academy's programmes (CNAP 2003b). As part of

this mission, it develops the content delivery tool, CLI Virtuoso, on which the e-

learning programmes are delivered and provided at a reduced rate to non-profit

charitable organisations. In focusing on best practice in social constructivist pedagogic

methodologies, the CLI ecosystem[18] seeks to equalise the way people teach and learn

by cultivating digital literacy via networking expertise. Underlying the logic that

networking skills for 'at-risk' people will improve their circumstances is a belief in

commanding a high salary. One report suggests that salaries between US$46-70,000

could be reached for a new recruit with a CCNA qualification (Kaminkow 2001), on

par with or higher than the average US wage of US$49,000 (Rochlin and Boguslaw

2001).

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[18] A substantial conglomeration of American based strategic partners, involving ICT software and web-based businesses, educational establishments such as the Academy for Educational development (AED) and the Institute for Women in Trades, Technology & Science (iWiTTS), and an eclectic assortment of others.

Research by the US Departments of Labor and Commerce indicates that the computer industry is the fastest growing sector for wage enhancement accounting for some 14% of the workforce, with technical support one of the largest subcategories (ITTA 2001). It is estimated that half the US workforce will be employed by industries that are either major producers or intensive users of ICT products and services (DoC 1999; Cisco 2001). Consequently, if those 'at risk' develop their ICT skills lucrative job opportunities will arise. However a gender imbalance has been flagged in terms of the recruitment to, and retention in the Academy's programmes: in 2000, only 8-10% of those who pass through the programme were women (Millar and Jagger 2001); by 2002 internal reports suggested that 26% of the global intake were women (CLC 2002). Yet many of these women were dropping out during the first semester of the programmes, especially the CCNA, reinforcing what the Cisco pedagogic ecosystem regards as particular vulnerability to ICT exclusion. Encapsulating its sentiments in the following comment as:

> "Information technology has become a powerful force for transforming social, economic and political life around the globe. However, women throughout the world often run the greatest risk of being excluded from the opportunities offered by the field of IT. Without proper recruitment strategies and training, women...will continue to be left behind unless we take action now" (GI 2004b).

With Cisco's female profile of 17% executives and 18% directors in 2000 (Kolding and Milroy 2001), the company wished to improve upon this profile, particularly in relation to its Academy's programmes. In the same year, Cisco and the CLI launched the Gender Initiative (GI) project, responsible for specifically researching inhibitory factors to women's enrolment, recruitment and performance in the Academy's programmes, and to provide compensatory strategies. In proactively seeking to promote greater participation of women worldwide, the GI develops additional gender

awareness materials and resources for instructors to foster gender equity in the classroom. In this spirit, a Gender Module has become an appendix component of some Academy's programmes, and is designed to equip instructors with a heightened awareness of, and best practices in, gender sensitive pedagogic requirements, such as acknowledgement of different styles of learning and strategies to address them.

This gender ecosystem's[19] goal is to specifically address western women's greater risk of ICT exclusion compared with their Asian, Eastern European and African counterparts. A series of reports were commissioned by the CLI and the GI (Taggart and O'Gara 2000; GI 2001, 2002; Kolding and Milroy 2001; Taggart and Needham 2001; Milgram 2002), and a wide range of US articles referenced, summarised in the Literature Review chapter, section 2.2.4.1; for example (Frenkel 1990; Pearl et al. 1990; Etzkowitz et al. 1994; DeBare 1996; AAUW 2000a, 2000b). Published on earlier websites or referred to during fieldwork meetings, their analyses point to a legacy of inhibitory cultural factors which reflect a masculine techno-culture "stuck in a time warp"[20] of how network technology is perceived, and stereotyped assumptions about who engages with it. The gender ecosystem advertises the immense benefits of ICT and network engineering careers for women, encapsulated in a Cisco conference presentation by Selinger (2002c). She outlined a list of positive knock-on effects such as: access to cutting-edge IT skills and industry-standard certification; unprecedented career opportunities; economic development through increased participation in the

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[19] This ecosystem comprises of numerous national and international governmental, business and educational representatives and research forums, such as: the Academy for Educational Development (AED); the Institute for Women in Trades, Technology and Science; and United Nations Economic Commission for Africa/World Bank INFODEV.

[20] A comment made by a Cisco representative during a research meeting.

workforce; personalised training with independent study; and contribution to the development of the IT sector in their community and country.

The CLI and GI commissioned research recommended a number of strategies, and these have been implemented in the form of: careful use of Academy marketing imagery by showing women in action-orientated roles in networking; and conveying a broader perception of ICT to reflect the range of options within the field. In the words of one Academy key player, we need to "educate people on how to be educated". Other strategies suggest reducing fees or pointing to funding; marketing in places women are assumed to frequent such as shopping malls, nursery and health centres; and setting of quotas for recruitment. To address women's reluctance in entering the ICT field, more conducive and supportive environments are advocated, such as women-only classes or situating programmes in more diverse academic departments where female enrolment is higher. Geographical location also plays a role, and Local Academies are requested to ensure their programmes are in safe, well lit areas, with easy access and at times that fit with childcare responsibilities. Other retention strategies include provision of preliminary programmes that provide additional skills, such as business communication and basic maths to help to bolster their confidence and employability, with a major focus on 'success stories' where personalised accounts of women students reflect a 'can do', successful image.

The CLI and GI are independent from, yet closely linked with, Cisco as one Academy member reflected on the CLI:

> "...completely separate from Cisco obviously...they work together...they're in the same building and the same offices, they work very closely...I think Cisco must pay CLI for hosting the curriculum...Cisco is a customer of CLI" (C1).

The relation between the Academy and its benefactor is also reinforced as an independent one, as the same representative requesting confidentiality commented:

> "It's nothing to do with Cisco, it's separate, part of the corporate philanthropy you see in the States. It's not aligned to business…[it's] very typical in the States…it's an independent organization, not for profit…that's been set up…by Cisco…with Cisco funds…private funds …[and] funds from Cisco Foundation as well. It's about putting something back into the community. Every major US firm is doing it, every company is expected to have some programme, some community activity. It's about branding, you know, Hoover; Cisco is networking…It is aligned with Cisco's business strategy [and] the CNAP is central to Cisco…Cisco develop the curriculum…[and have] ownership of curriculum" (C1).

This comment reflects a confusion that was endemic in the field; on the one hand it is 'not aligned to business', yet on the other it is 'aligned with Cisco's business strategy'. This blurring of boundaries between the ecosystems suggests symbiotic relations; people frequently referred to each of the organisations mentioned in this chapter as 'Cisco'; Cisco Systems itself refers to all its subsidiaries as part of the Cisco network, and all staff interviewed had Cisco Systems Inc. as the last line of their calling card. Cisco's branding and business acumen is emphatically reinforced in the Academy's literature and conferences which, for example, frequently quote the motto of Cisco's CEO: "the internet and education are the two great equalizers of the 21st century". Furthermore, the Academy proudly advertises Cisco's humanitarian pursuits, providing illustrative links such as a quote by the then Secretary of State, Colin Powell: "What Cisco is doing is helping our children find a better future in this great land of ours" (Cisco 2002b). Efforts to unravel this symbiotic relation proved a sensitive and controversial pursuit, triggering strong responses from two key players who became impatient and angry with this researcher's questioning, and emphatically reinforcing their independence from Cisco. Diagram 5.1 below presents a basic structural overview of the gender ecosystem's relations that are by no means complete,

but represents bits and pieces of information threaded together. The extensive cluster of related organisations is too numerous to expand upon here, and so just a few directly related ones have been referred to.

Diagram 5.1: The Cisco gender ecosystem
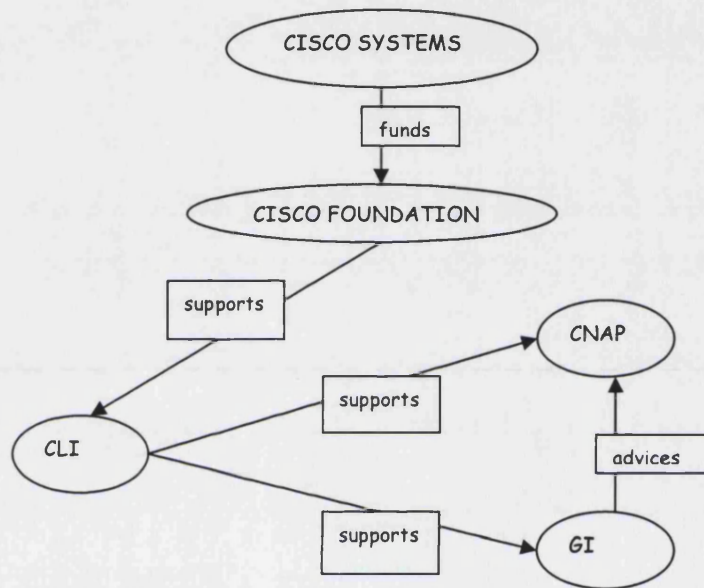
5.5   Conclusion

A US corporate virtual business model which specialises in networking technology and based on an extensive ecosystem of strategic partnerships, is positioned as the quintessential network-era company. Its successful business ecology and extraordinary growth has enabled the company to dominate the industry and sustain high growth rates throughout the 1990s. Its economic and philanthropic partnership with a range of profit and non-profit making consortiums, its core products, e-learning engine and Academy programmes are dedicated to providing network solutions and a network engineer workforce for ICT infusion. With a specific focus on ICT exclusion and gender parity, the company's pedagogic and gender ecosystem believes it has the

right strategies in place to position those 'at risk' in empowering employment, yet

puzzlement is expressed as to why even fewer women are coming into the Academy,

and why many are continuing to leave[21].

This confusion was the main reason for the CLI being interested in this research, and

its attempt to form the initial parameters of the research was outlined in the

Methodological Approach chapter. However, negotiations broke down, in part

because funding did not materialise, but also because this researcher experienced

reticence in answering certain questions as this chapter has conveyed, and because

two key representatives were reluctant to be interviewed. Surmising that Cisco would

rigidly set the research criteria, it was decided to proceed independently with the

support of the remaining freelance representative.

Having completed the varied settings of the problem domain of exclusion and

inclusion to the ICT arena in relation to women, the thesis now proceeds with how the

three epistemological cultures of inclusion – ICT productivity, ICT employability and

the feminisation of ICT, are narrated in policy. They are then analysed by narrating

the experiences of students and staff on the CCNA with regard to the ontological

cultures of inclusion as formulated by the citizenship reconfigurations of active

responsibility, ICT skills acquisition and relational expertise. Beginning with the

Network Technology Gestell, this chapter sets the scene, outlining the networked

technology frames of reference mentioned in the Methodological Approach chapter.

As epistemological points of reference, the background assumptions that underpin the

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[21] This was mentioned at a fieldwork meeting between two Cisco representatives: one from the CLI and the other from Cisco.

knowledge and practices surrounding ICT infusion are explored and then scrutinize using academic research since no empirical data existed. This Gestell provides the structural format for the following two and shapes their logic. The second analysis chapter, a Network Engineer Training Gestell, covers the knowledge and practices which provide the background to ICT employability, with empirical data offered to support the analytical position. The final analysis chapter, the Gender Gestell, builds on these preceding chapters by describing in more detail the practices in relation to women, using empirical data to sustain the argumentation.

ICT policy and social welfare tension

6.1   Introduction: ICT valorisation and productivity

Utilising the Gestell formulation of backgrounds, experiences and sites of tension as outlined in the Theoretical Framework, this chapter begins by describing the background of British ICT policy. Its aim is to show how the what-ness of this policy steers the nation toward inclusion to the new, global economy and how it is shaped by the valorisation process. Motivated by how capital accumulation, in the entrepreneurial sense, is mitigated by the partnership between two forces of productivity, government and business, the focus is on the cultures of change. Critically appraising, as stated in the Methodological Approach chapter, how two epistemological and ontological cultures of inclusion, ICT productivity and active responsibility, enframe the labour process for people classified as socially excluded, its purpose is to flag a fundamental site of tension.

As outlined in the Theoretical Framework chapter, section 3.4, Marx's valorisation process took two forms, and of interest here is the speeding up of productivity or the accruing of relative surplus value (RSV). With the politico-economic forces of productivity promoting ICT real-time communicative, transactional and integrative functionality, its RSV is narrated as enhancing competitiveness and inclusion into a 'new economy' that has an unprecedented 'global' reach. Seen to emulate what steam did for the 19th century and electricity and the combustion engine did for the 20th century (Bolter 1984), the transformative vision of ICT infusion sees companies specialising in ICT infrastructures heralded as harbingers of socio-economic revitalisation. With global trade and strategic multidimensional partnerships on the

rise, the centrality of networked interconnectivity assigns high value to its commodities and standards.

In setting the pace of innovation and the scene for transformation, this Gestell's specific instantiation of ICT valorisation is positioned as instrumental in addressing Britain's legacies of low productivity and high levels of social exclusion mentioned in the Literature Review. Keen to ensure that Britain keeps pace with this transformative setting, policy is directed toward scientific, engineering and technological (SET) innovation. By encouraging the inclusive cultures of entrepreneurship and partnership to facilitate economic growth, also outlined in the Literature Review, the market rationale is an "arms-length" regulatory stance toward industries specialising in SET related products and services. With adjustments in micro and macroeconomic management geared specifically toward increasing demand for, and supply of, ICT products and services, the removal of regulatory constraints is seen to facilitate greater cross-border trade and entrepreneurial capital flow.

In presenting this background what-ness of ICT valorisation, the chapter proceeds to analyse it using the social shaping perspective outlined in the Literature Review chapter, section 2.2.4.2. Blending this approach with phenomenology, situations of non-obviousness or breakdowns in the background narratives are explored, as referred to in section 3.2.4 of the Theoretical Framework chapter. Four interwoven political economies emerge where one appears to act as a central site of tension, for the application of these theories suggests that the current restructuring of welfare provision, as a social structure of entrepreneurial capital accumulation, may be

controversially linked to an international ecosystem of ICT productivity which influences the regulatory stance.

Placed within the context of current market settings which reflect volatile and bearish activity, corporate expenditure is consolidating and ICT commodity values are dropping. Yet, assumption in the sustainability of this value is mediated, in part, by a political economy of ICT standards. With the British government keen to attract foreign entrepreneurial capital, the charting of a flow of foreign direct investment (FDI) exposes a strategic partnership in the form of the Triad. Contrary to an open, global economy, a tightly woven international and multidimensional ecosystem emerges that is indicative of a political economy of FDI. Tenuously putting forward the hypothesis that ICT companies are key actors substantially influencing this flow of FDI, it is argued that the "arms-length" regulatory stance of the British government's macroeconomic management is shaped by this political ecosystem of ICT valorisation. As a political economy of regulation formulated, in part, to encourage inward FDI flow, an active workforce is required to realise this goal.

The chapter proceeds to review the implications of this international background for these people who are on the frontline of reform. Bearing in mind the main research question of how the what-ness of ICT inclusion background policies shapes the who-ness of socially excluded people, this chapter addresses the subsidiary research question of what is the background of ICT policy and how does it shape the who-ness of individual socially excluded women. In reflecting on the ontological enframing of their citizenship, as outlined in the Theoretical Framework chapter, many are unemployed, with care responsibilities and dependent on welfare benefits. With the

Literature Review positioning the democratic reconfiguration of societal membership as involving greater active responsibility and employability, that which emerges in this Gestell is a political economy of welfare which has a gendered dimension. The replacement of unconditional rights to benefits with conditional responsibilities positions their inclusion in an equity model of entitlement and citizenship which de-valorises their specific circumstances. Assuming an epistemology and ontology of sameness, their otherness or difference, referred to in the Methodological Approach chapter, section 4.3.1, is paradoxically reinforced by this model.

Mitigated by the terms and conditions of entitlement, this reform is part of the management of the socio-economic relations of production (labour process) designed to enhance labour market participation and generate greater equity. Arguing that this reform reinforces the vulnerability of lone women parents, the chapter presents a Network Technology Gestell where the socio-economic and political enframing of "arms-length" regulation furthers the valorisation process of ICT productivity, but constrains the gendered experiences or who-ness of the unemployed. It concludes that the goal of inclusive citizenship may be compromised for sections of the population, for their ability to give expression and meaning to their spaces of possibility is restricted by a key site of tension in which the terms and conditions of welfare benefit entitlement.

6.2   An ICT policy background

6.2.1   The growth of networked communications: a socio-economic boost

In 1998, the ICT industry contributed £93 billion to the UK Gross National Product[1]

(GNP), accounting for nearly 7% of total revenue and predicted to expand by 10%

each year (DTI 1998a, 2000; Millar and Jagger 2001). This growth is a welcomed

phenomenon for Britain's legacy of low productivity, for a healthy GNP cushions

against risk and unpredictability in times of market instability. With trade in

information intensive services the most dynamic, it is predicted to become

increasingly central to productivity in the coming decade. E-commerce for example is

forecasted to have the same exponential growth as the Internet, generating some $12

billion revenue for related industries in 1998, and predicted to reach $500 billion by

2002 and $1 trillion by 2005 (DTI 1998b, 2004a; Castells 2001). Resting on high and

medium-high technology manufacturing[2], these services have precipitated a doubling

of Net-related jobs between 1998 and 1999 (DTI 1998a).

This exponential economic potential of 'information superhighways' was first

envisioned by the US Clinton administration in the early 1990s. Federal policies

encouraged supply-side economic management of integrated, high-capacity and

interactive telecommunications and information networked infrastructures to kick start

market recovery, and provide a productive foundation for the post-industrial world

(Castells 1996; Dahlbom 2000; Webster 2003a; DTI 2004a). Viewed as

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[1] As a benchmark for comparing spending levels across national boundaries, it reflects the capital value of final goods and services produced in a country over a given period of time (Gough 1979).

[2] Information services constitute telecommunications; computer and information services; finance; insurance; royalties; other business services. Medium technology industries are professional goods; motor vehicles; electrical machines excluding communications equipment; chemical excluding drugs; other transport; and non-electrical machinery. High technology industries are aerospace; computers and office equipment; radio, TV and communications equipment; and pharmaceuticals (DTI 2004a).

transformative socio-economic engines, ICT systems will radically alter the way we

do business, work and communicate, with Britain keen to emulate the US success by

positioning the nation as "the best environment in the world for electronic trading"

(DTI 1998a: 1[3]), for:

> "Information spins round the world at an ever-faster rate, in ever-greater quantities
> and much more cheaply with implications for every type of economic activity.
> Entirely new products...and services...have been created and more sophisticated
> production processes developed" (DTI 2004a: 3).

With enhanced speed, efficiency, reliability, security and real-time functionality, the

relative surplus value of ICT systems lies in opening up global integration of e-

markets; improving customer, supplier and competitor relations; enabling firms to

diversify and decentralise their operations; and offering multifaceted e-solutions for a

range of socio-economic problems (DTI 1998a, 2000, 2001c, 2004a).

Sophistication of such an 'e-economy' is measured by the notion of 'e-Maturity',

reflecting not just the commercial potential but also holistic concerns of fairness,

equality and social inclusion (DTI 2001c, 2003c; Booz Allen Hamilton 2002: 8).

Through greater flexibility, variability, accessibility and choice, a range of civic,

business and educational ICT-based services are narrated as enabling citizens to select

that which best fits with their personal circumstances and needs (DTI 1998a, 2001c).

These online services will encourage citizens to embrace the digital age and in

providing easier access to information, opportunities for learning will enhance their

employability and thereby address the nation's legacy of high levels of social

exclusion (DTI 2000, 2001b, 2001c). "Our world is being transformed" and our daily

existence are in the process of immense change as this what-ness of ICT policy

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[3] "Forward" by Peter Mandelson, then Secretary of State for Trade and Industry .

becomes the vehicle for national and social economic inclusion (Castells 1996; DTI 2003c: 1).

6.2.2 A new global economy: ICT commodity value

This Gestell's background valorisation of digital transformation is said to herald a 'new economy', one that emerged during the latter part of the twentieth century, and its two essential features of networking and globality are narrated as radically shifting productivity and socio-economic relations (Castells 1996, 2001; DTI 1998a, 2003c, 2004a; Bauman 2000). Believed to represent a swing from Fordist mass production, where most of the Anglo-Saxon world was characterised by reliable and centralised customer bases that were provided with the same products, ICT networked infrastructures are said to herald a Post-Fordist mode of production (Castells 1996, 2001; Bauman 2000; Myles and Quadagno 2002). Central to this new economy are services, SET related products, information or knowledge-based work and distributive customer-oriented e-sales organisation (Zukin and DiMaggio 1990; DTI 1993; Dahlbom 2000; Hanseth and Braa 2000). Regarded as being instrumental in generating politico-economic momentum by fostering favourable business environments; boosting new jobs; and opening government services; ICT functionality is said to 'put the world at your fingertips' (COM 2000a, 2002b; SEC 2002; DTI 2003c). "Collaboration is easy and transactions are instant and secure", as a British Telecommunications TV advert proclaims, and this real-time functionality of high-speed processing and transmission of networked data is viewed as enabling the opening up of new 'global' markets (Castells 1996, 2001; DTI 1998a, 2004a).

A 'global' economy is one where the base components have "the institutional, organisational and technological capacity to work as a unit in real time, or in chosen time, on a planetary scale" (Castells 1996: 102). ICT networked ability enables integration of heterogeneous functionality with homogeneous unity and gives rise to a sense of 'globalisation', where space-time compression and the unification of vast arrays of systems, users and usage of electronic space provide a fluid yet consolidated interface for transactions, trade and entrepreneurial capital movement around the world (Giddens 1999; Walsham 2000, 2001; Webster 2003a). Since the 1980s, the pace of globalisation has grown rapidly with world trade doubling compared with GNP (Castells 1996; DTI 1998a, 2004a).

This valorisation of ICT productivity has strengthened the interconnectedness between business, governments and an array of 'global' agencies (Walsham 2000), such as the World Trade Organisation, the International Monetary Fund and the International Organisation for Standardization (IOS). Greater reliance on ICT network infrastructures requires technical information to be open and pooled, with common standards and communication protocols agreed by agencies such as the IOS. Established to provide one-for-all, centralised and universal specifications to reduce inconsistency, incompatibility and redundancy of ICT networked systems, and to facilitate seamless cross-border and cross-organisational networked activity, this and other private regulatory agencies are viewed as independent adjudicators providing greater coherence to the array of ICT standards (Hancher and Moran 1989b; Mansell 1993; Hawkins 1996; Silverstone and Mansell 1996; Sassen 2004).

The growth in corporate amalgamation, acquisition and strategic alliances with these 'global' agencies and nation-states reflects an increasing trade and entrepreneurial capital accumulation interdependence between multidimensional partnerships (Hirst and Thompson 1999; Kraemer and Dedrick 2002; Webster 2003a). With a small number of corporate giants such as IBM and Cisco moving from national to transnational or multinational[4] business infrastructures, the trend is to pool resources; reduce costs by unifying procedures and diversifying management of lengthy and complex ICT developmental processes; reach consensus on trade activity, labour regulatory frameworks and skills required; share technical expertise and consolidate ICT standards (Mansell 1993; Hutton 1996; Hirst and Thompson 1999; Hanseth and Braa 2000; Webster 2003a).

Cisco's router and switch products provide critical standardization points for networked integrated functionality, and its Internetwork Operating System software providing configuration, scalability and security for all products under the CiscoFusion network architecture. This enables organisations adopting such technology to have a consolidated, standardised foundation on which to develop and market their products and services (Hanseth 2000). By increasing the "number of adopters in its installed base" through locking customers into a path dependency on products and services, and by buying into or leasing complementary network technology, an ICT company's valorisation augments (Star 1991; Mansell 1993; Hawkins 1996; Dahlbom 2000; Hanseth 2000: 106; Hanseth and Braa 2000). The

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[4] A multinational business model is one that builds a strong local presence through local sensitivity and responsibilities, operating foreign subsidiaries autonomously in a decentralised federation of assets and liabilities. A transnational business model is one which attempts to combine the need for centralized integration and control whilst maintaining local flexibility and sensitivity (Hirst and Thompson 1999; Hanseth and Braa 2000).

more stable, pervasive and dominant a product or standard is, the more it is shared, the

more open it becomes and the more its value increases, and this technologically

determinous economic process has considerably contributed towards Cisco's

entrepreneurial capital accumulation. For a short period in 2000, it sustained the

largest market capitalisation of any company in the world, in part due to the lucrative

profit margins associated with standards dominance (Kraemer and Dedrick 2002).

Keen to capitalise on the growth in ICT services and the commodity value of their

products and standards, the British government is narrated as being ill-equipped to

take advantage of this new, global mode of production. As the highest per capita

exporter of ICT technologies compared with other G7[5] nation-states in 1998 (DTI

2000), the government seeks to strengthen this position. By realigning its SET policy

toward greater innovation and adoption of networked activity, and emulating the US

by encouraging demand-led and supply-side economics, it hopes to turn round its

legacy of low productivity performance.

6.2.3   Scientific, engineering and technological innovation

Britain's productive strength is regarded as residing not in raw materials or cheap

labour, but in its residual knowledge, its skills and creativity or human capital, for this

is perceived as the main creator of wealth (DTI 1998a, 2002). Explained in the

Introduction chapter, human capital represents an individual's productive assets and

today its value is said to reside in science, engineering and technology (SET) related

expertise, specifically in high technology fields, with policy formulation positioning

these arenas and their human capital at the forefront of economic development (DTI

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[5] U.K., France, Germany, Italy, U.S., Canada, and Japan.

1993, 2000, 2002, 2004a). With research indicating a direct link between innovation

investment and future improvements in productivity (CBI 2000; Roberts 2001; OECD

2003), the British Prime Minister reinforces the notion that "the science base is the

absolute bedrock of our economic performance" (OST 2004), for it is seen to widen

people's choices and allow:

> "people to learn, travel and communicate more freely than ever before...Science is
> a driving force for progress...[it] will soon breed new families of products and
> with them new global markets...new industries and jobs will be created, and
> existing industries...will be transformed in the process" (DTI 2000: 1[6]).

Overall, Britain's business expenditure in SET innovation has fallen to 5th place in the

G7 nations (DTI 2004a), amounting to a mere 1.27% of the nation's GNP on research

and development between 1997 and 1999, compared with the US's 3% (Roberts

2001). Hence, government as a politically motivated agent of productivity is directing

considerable funding[7] to increase supply of SET related pioneering products, for the

narrated imperative is that nation jump on this 'conveyer belt' of opportunity and do

so speedily (DTI 1998a, DTI 2003c; 2004a).

Seeking a competitive edge in the new global economy's e-market environment,

government is gearing its policies toward making:

> "the U.K. [become] a world-class place to do business in the next
> millennium...[through] working with and listening to the views of the business
> community" (DTI 1998a: 4[8]).

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[6] Executive Summary (DTI 2000).
[7] A £1 billon programme to renew science infrastructures and £250 million to boost its research (DTI 2000).
[8] Overview section.

In listening to this force of productivity, government is managing its microeconomics[9] toward building capabilities through SET innovation; encouraging collaboration and partnerships; promoting competitive internal markets by fostering a culture of entrepreneurship; offering greater financial rewards to investors; giving productive incentives to labour; and generating consumer demand (DTI 1998a, 2000, 2002; Dahlbom 2000). Part of this demand-led microeconomic strategy toward ICT valorisation is for government to act in the 'right way', for so managed its economy and citizens will prosper:

> "in the right way, science [will] bring prosperity, improve the quality of life and extend life choices for all...[for] the successful economies of the future will be those which excel at generating and disseminating knowledge and exploiting it commercially" (DTI 2000: 1-2).

The 'right way' to exploit SET innovation, foster ICT productivity and enhance demand is to adopt an "arms-length" neo-liberalist regulatory position and encourage supply-side economics.

6.2.4   A loosening of ICT regulation

The loosening of regulation is in part, an earlier reaction to fiscal pressures of the 1990s recalcitrant recession, the growing complexity of the new global economy and increasing labour market segmentation (Rhodes 1989; Walby 1990; Lloyd 1999; Bauman 2000; Webster 2003a). This "arms-length" regulation, a key challenging-forth background of this Gestell, must be conducted by "independent" regulators to reduce the risk of "ad hoc political intervention":

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[9] Microeconomic is the study of the behaviour of small economic units, the individual parts of the economy, such as individual consumers, the household, firms and industries and the distribution of income among them, how prices are determined, the use of goods or sub sections of the service industry. Microeconomics seeks to analyse the market form or other types of mechanisms that establish relative prices among goods and services and/or allocates society's resources among their many alternative uses.

"We continue to support the principle that regulation must be conducted on an arms-length basis by independent regulators. Without this, the risk of ad hoc political involvement in economic regulation will increase regulatory risk and costs capital, and reduce the ability of companies to invest and operate in a settled climate...it has long been rightly accepted that government must be seen to stand back from the controls" (DTI 1998b: 36).

This strategy to facilitate a "settled" market environment is central to boosting

productivity by reducing unnecessary constraints and nationally specific legalities. As

part of a government's relationship with markets, regulation entails the specification

of rules and their public management over the course of private economic activity, and

its frameworks standardise and quality-assure the production and distribution of goods

and services (Hancher and Moran 1989a, 1989b). Such rules or statutes, economically

viewed as continually compromised between restriction and no restraint at all, are

applied through adjudication where their creation, purpose and power may be in

conflict with global trade, entrepreneurial capital flow and foreign investment. By

removing selected restrictions on the forces of productivity, innovation and labour

protection in order to encourage more efficient operation of markets, the government

seeks to align domestic supply-led macroeconomic[10] management with global settings

and ensure "the regulatory frameworks for telecommunications and broadcasting keep

pace with the Information Age" (DTI 1998a, 1998b: 7, 2000, 2003c, 2004a).

This macroeconomic strategy for ICT valorisation is narrated as reversing the

'Achilles Heel' legacy of low productivity if incentives to corporate investment are

induced, such as: reductions in tax rates; transaction tariffs; dismantling cartels and

trade embargos; and other forms of legislative protection. Lifting of these restrictions

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[10] Macroeconomics is the study of the entire economy in terms of the total amount of goods and services produced, total income earned, the level of employment of productive resources, and the general behaviour of prices. Macroeconomics can be used to analyse how best to influence policy goals such as economic growth, price stability, inflation, employment and the attainment of a sustainable balance of payments.

to production is argued to keep inflation and interest rates low; generate higher levels

of productivity and employment; lower product and services prices; and have positive

knock-on consequences for cross-border ICT trade, capital flow and foreign

investment (OECD 2003; DTI 2004a). In opening its borders to competitive trade and

promoting universal access, plurality, diversity and choice in ICT goods and services,

"greater coherence" to self-regulation is the government's market rationale:

> "greater coherence in economic regulation across all digital delivery
> media...[means] effective self-regulation will have an important role...the
> presumption that broadcasting and communications should be regulated should
> therefore in general be reversed" (DTI 1998b: 4, 23).

With too much regulation held as embedded in the practices of an interventionist state,

limiting choice and increasing costs, and not conducive to the openness of the new

global economy, a more liberal approach will unleash a range of new opportunities in

the fields of commerce, research, entertainment, education and employment (DTI

1998a, 1998b). In removing the bottleneck of restrictive regulation, the global

diffusion of network communication is stimulated, given free and self-regulatory reign

to competitive market dynamics, and an open door for the export and import of ICT

products and standards (Hancher and Moran 1989b; Mansell 1993; Bauman 2000;

OECD 2003).

With Britain one of the more deregulated environments in Europe (Lloyd 1999), the

what-ness of ICT policy formulation is mitigated by the RSV of ICT functionality and

the commodity value of its related innovations, requiring alignment of domestic

economic settings with global ones through an "arms-length" regulatory stance. This

Gestell's background valorisation of ICT productivity sees a greater laissez-faire

coherence to the 'natural' equilibrium of a self-regulating market (Hancher and Moran

1989a, 1989b; Mansell 1993; Hutton 1996; Hirst and Thompson 1999). Driven by the phenomenal growth of networked infrastructures, a deterministic and optimistic assumption in their market strength is held as bringing about national inclusion in the new global economy, higher levels of productivity, greater employment opportunities, social inclusion and thereby ontological security. This epistemological policy setting of networked ICT enframing of production and society rests on the premise of a settled market, yet that which emerges is instable; ICT commodity values are dropping and the US and British economies precariously yo-yoing between intermittent downturn and recovery.

By showing that these economies are borrowing heavily and increasingly dependent on a capricious flow of entrepreneurial capital (FDI) which is surpassing trade transactions, a closed and fragile international economy rather than an open, dynamic global one emerges. In suggesting a tentative link between this growth in foreign direct investment and ICT companies, the chapter puts forward the analysis that the valorisation process is mitigated by this capital flow and as such acts as a powerful force of ICT productivity. Making a controversial link between this international force and domestic socio-economic relations of the socially excluded, it is suggested that this key situation of non-obviousness influences the institutional ontological enframing of inclusive citizenship as active responsibility. Requisitioned for use to further economic rejuvenation, this tension is obscured by the narratives of opportunity and empowerment, and manifests in the current changes to welfare benefit entitlement. Potentially having profound consequences for the socially excluded, particularly lone women parents, this convoluted valorisation process compromises their who-ness.

6.3   A site of tension: deregulation and social policy

6.3.1   'Global' market instability

With only marginal growth procured in Britain, its macroeconomic strategy of extensive corporate and fiscal tax reductions has considerably increased the national deficit, and its microeconomic management to reverse the long term employment market glut has yet to recover from a recession during the early 21st century (Hutton 2002). Industrial production, 27% of the economy, fell by 1.9% at the end of 2001, with a knock-on effect on the service sector (Pain et al. 2002). More than half of the GNP in 2002 was used by government investment in public ICT infrastructures in the hope of raising the GNP by 0.2% (ibid.). Furthermore, deregulation in financial transactions has enabled government, corporations and individuals to borrow heavily, based on the economic narratives of increased productivity through investment (Hutton 1996; Hirst and Thompson 1999). With borrowing exponentially increasing and key sectors of the British economy struggling, weighted down by overcapacity and reduced profitability, exports are falling further behind imports, and military and domestic security expenditure escalating (Hutton 1996, 2002; Hirst and Thompson 1999). This mismatch of economic reality with predictions reflects a major breakdown in policy narratives, raising the question of whether the assumed earlier growth rate of 10% and the more recent one of 5% will be realisable, and whether 93% of the GNP that is non-ICT production will begin to embrace the new economy (Gilman 1998; Hirst and Thompson 1999; Millar and Jagger 2001; Webster 2003; Elliot 2005).

Economic recovery is proving recalcitrant, not just for Britain but also for the 'global' economy which also experienced a marked downturn in activity during the early 21st century. World GNP rose by an average of 1.9% during this period compared with

4.7% in 2000, constituting the third lowest annual growth rate over a thirty year period

(Riley et al. 2002). A legacy of market volatility in the 1990s means that the 21st

century is struggling to recover from a decade of world-wide economic recessions that

were particularly pronounced in the Organisation of Economic Cooperation

Development (OECD) countries[11], driven, to some extent, by weak corporate

expenditure; the 'dotcom'[12] collapse; and bearish East Asian emerging markets (Riley

et al. 2002; Moore 2004; Brignall 2005). The US market slumped by 30% in the mid

1990s, but Cisco's market didn't collapse until 2000 when the company failed to

anticipate the slowdown and was left with US$2 billion in unsold inventory,

experiencing its first loss since it became a public company in 1990 (Kraemer and

Dedrick 2002; Riley et al. 2002).

ICT productivity presents a paradox in that despite massive investment in its own

infrastructures, no perceivable increase in associated knowledge-intensive service

industries, or indeed other areas of production, has been generated (Brynjolfsson

1993, 1998; Gordon 2000; Brödner 2003). This lack of growth in the very sector that

develops ICT infrastructures points to another distortion in policy, and is reflected in

the downturn of the market value of companies such as Cisco where their

multidimensional and interdependent ecosystems of partnership mean this paradox has

knock-on consequences. From a high of US$82 in early 2000 to US$17.70 and $20.80

in the first quarter of 2005 and 2006 respectively, Cisco's share price is reflecting

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[11] The OECD consists of twelve member states, essentially comprising of the key nations of N. America, Europe and Australasia. A list of them may be found at http://www.oecd.org.

[12] A frenzy in the stock-buying of companies that traded solely on the Internet precipitated the phenomenal growth in "dotcom" enterprises, built largely on venture capital, in the late 1990s. This proliferation of inflated e-commerce stock found individual companies, with little or no profits, with a market capitalisation of hundreds of millions in pounds or dollars. The exaggerated bull market that was rising on public interest bubbled to a peak in early 2000 and in March 2000 crashed with a vengeance, causing many 'dotcom' companies to fold.

market fluctuations in the networking technology sector, indicating that the valorisation process is over-hyped, tenuous and subject to investment moods.

The phenomenal growth of corporate ICT infrastructures during the 1990s underwent curtailment at the turn of the century in an effort to control expenditure by consolidating the bewildering array of telecommunications technology. Corporations were no longer slavishly following the 'silver bullet' of ICT infusion as optimistic promises of capital accumulation failed to materialise, and the not uncommon experience of ICT failure rocked their faith (Brynjolfsson 1998; Hirst and Thompson 1999; Mitev 2003; Avgerou and McGrath 2005). Downsizing and outsourcing peripheral activities; restructuring management and labour; and waiting for price reductions and enhanced functionality were typical corporate strategies (Brynjolfsson 1998; Hirst and Thompson 1999; Delong 2003; Inman 2003).

The 'global' self-regulating market has reflected a high risk, volatile setting, particularly vulnerable to unpredictable events such as the Islamic political activity in New York during September 2001 and the Asian tsunami disaster of December 2004. Economically shaken by these and other global catastrophes, the US was bolstering predictions that its economy would grow stronger than expected in 2004, above 2.5%, by augmenting federal expenditure to some US$76 billion in 2003, 25% higher than in 2001, largely through military exposure in Afghanistan and Iraq (Barro 2003). With every real dollar of military spending raising the US GNP by about 75 US cents, the nation's GNP rose by 0.6% in 2003, but to finance this expenditure and improve national and Internet security, US federal and international borrowing has increased by the tune of some US$8 trillion and augmenting by some $2 billion each day

(Hutton 1996; Barro 2003; Klinger 2005; Pratley 2006). Yet the US economy continues to teeter as its currency fluctuates and federal reserves continue to be drained by a neo-conservative global war on 'terrorism'. Excessive borrowing has also fuelled ICT productivity (Hutton 1996), but the market remains bearish on its commodities' value at present, with downward fluctuations linked to confidence in a company to generate future profits and improve its performance (Warner 2004; Teather 2005; Wray 2005).

The market, as a core institution of capitalism, reflects not the 'natural' exchange and value of products and services value but rather socio-political and economic decisions (Block 1990; Mintz and Schartz 1990; Edwards and Wajcman 2005). Different markets have different needs and history reflects share prices subject to fashions and episodic changes (Edwards and Wajcman 2005), such as the 'dot-com' phenomenon. This yo-yoing is, in part, because confidence in a company to generate future profits alters in relation to politico-economic forces of supply and demand (Warner 2004). Prices rise or fall through two key mechanisms: loans and shareholders (Mintz and Schartz 1990). The former takes the shape of financial institutions such as banks, insurance and investment companies who, alongside the latter, hold considerable hegemony over the terms, conditions and direction of capital flow (Mintz and Schartz 1990; Edwards and Wajcman 2005). As influential actors, they shape the activities of large economic and political organisations such as firms, industrial sectors and increasingly nation-states, by regulating their economic management (Mintz and Schartz 1990). With a legacy of heavy borrowing during the 1973-1974 energy crisis, these organisations are burdened with capital deficits and increasingly dependent on

this financial hegemony to maintain or develop a presence in the volatile world

integration of markets.

With productivity in general, and ICT specifically, difficult to measure, based as it is

on the amount of output generated per unit of input and the value assigned to the

commodities by customers, this value increasingly depends on the quality of the

product, the degree of customisation and 'smarter'[13] working, for example

(Brynjolfsson 1998). Companies must also factor in time spent on retraining staff and

restructuring organisational management to best utilise their ICT investment, which

takes, on average, 3 to 5 years (Brynjolfsson 1993, 1998; Riley et al. 2002; Mullaney

and Cox 2003). The further away the profit, the less the short-term gain and the lower

the current value of the ascribed product, service or standard. If the value of a

commodity relies on confidence and trust in expected trajectories of supply, demand

and price, these variable attributes are based on nebulous risk assessment and reduced

to mathematical calculus. Such abstract reduction influences loan agreements and

shareholder faith, but they can only reflect short-term economic or socio-political

factors that may change in the long-term (Hutton 1996, 2002; Hirst and Thompson

1999; Britton 2002; Edwards and Wajcman 2005).

With ICT stock market value fluctuating and many underlying factors obscured from

negotiating partners, predictions of future assets and sustainable growth are hard to

calculate with much approximation and guesswork (Dalhbom 2000; Warner 2004).

Yet, such calculations are, in part, bolstered by a political economy of standards

(Hancher and Moran 1989b; Mansell 1993; Hawkin 1996), where an assumption of

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[13] This term reflects the streamlining of the productive processes, such as outsourcing and optimisation
of resources.

their valorisation encourages deregulation of ICT productivity that contributes toward market instability. Yet despite this setting of heavy borrowing and unpredictable volatility, it is regarded as a temporary hiccup and the open-border US model, which in itself is a debateable prototype, is narrated as contributing toward its earlier economic success and underpins the British government's rationale for engaging with the new global economy. However, contrary to the narratives of an open market, a closed, highly interdependent system emerges between three key economies and this can be seen by charting a flow of capital, foreign direct investment.

6.3.2   A political economy of Foreign Direct Investment

Said to have contributed toward the energy crisis and uneven world growth, entrepreneurial capital's mobility is increasing through ICT interconnectivity (Zukin and DiMaggio 1990). The reformulation of macroeconomics by many nation-states in response to this mobility positions their politico-economic interests alongside those of multidimensional, transnational players, such as the G5[14], G7, G8[15], G10[16], G22[17] and the G30[18], not to mention the World Bank, the World Trade Organisation, the International Monetary Fund, the European Union and the OECD. Since the 1970s, these powerful actors are said to influence national policies which have shifted focus from managing domestic productive relations to representing domestic interests internationally in an effort to attract foreign investment (Zukin and DiMaggio 1990; Mansell 1993; Walby 1997; Hirst and Thompson 1999; Sassen 2002).

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[14] G5: France, Germany, Japan, UK and US.
[15] G8: G5 countries plus Canada and Italy.
[16] G10: G8 nations plus Belgium, The Netherlands, Sweden, Switzerland – in fact eleven nations.
[17] G22: an informal group of the key players in an international financial system.
[18] G30: an informal group of the key players in the developed and developing world.

The movement of Foreign Direct Investment (FDI) has surpassed that of trade, becoming a significant player in an economy in which the Triad nations of N. America, Europe and Japan, often referred to as the G3, are key players (Mansell 1993; Hirst and Thompson 1999; Hay 2005). The Triad sets the parameters of membership, market and tariff regulation, trade and capital flow and standards development, with each key economy having its own subset of strategic partnering. Accounting for some 66% of FDI movement in 1996, the Triad alone generated 75% of the world's GNP (Hirst and Thompson 1999). Over the past two decades FDI has grown significantly faster than trade flows; in 1999 it was 70 times larger than world trade, representing a 7-fold increase on 1983 (Markusen and Venables 1999; Sassen 2002). With a third of FDI going to the service sector, its mobility is possibly a driving factor behind ICT transnational corporations, substantially contributing to the growth and structure of Triad economies and intra-firm world trade, the latter estimated at 30% (Markusen and Venables 1999; Hirst and Thompson 1999; Edwards and Wajcman 2005). The real-time networked ease of available, flexible, virtual and negotiable FDI ICT capital means its path is hard to follow, and further research is needed to verify this link by clarifying the 'service sector' and breaking down the origins, flows, controls and directions of FDI, perhaps focusing on specific companies such as Cisco or IBM.

This Triad configuration reflects not a global economy, but a highly selective international one that is influenced by an array of politico-economic alliances (Mintz and Schwartz 1990; Zukin and DiMaggio 1990; Hirst and Thompson 1999). Reflective of a complex, interdependent world of non-autonomous, international corporate, legal, financial, labour, national and other agency activity, partnerships tied

to FDI contracts are formed that influence trade and tariffs. Perhaps the term 'globalisation' may be more realistically understood as an 'open' international economy (Mansell 1993; Hirst and Thompson 1999). Yet it appears to be a closed, centralised, hegemonic financial and regulatory system restricted to key economies, for this concealed political economy of FDI excludes one half to two thirds of the world (Hirst and Thompson 1999; Edwards and Wajcman 2005). This co-dependency and inequality in FDI flow not only closely aligns the Triad nations to each other's economic performance, therefore embedding them in each other's success or failure, it polarises the global setting in terms of economic and socio-political discrepancies (Zukin and DiMaggio 1990; Edwards and Wajcman 2005).

In revealing this hidden political economy of FDI flow, it points to a breakdown in the powerful narrative of 'globalisation'. With its homogenisation of the global, the variances in political and economic management and the non-inevitability of planetary ICT infusion are belied (Mansell 2002; Walby 2003; Edwards and Wajcman 2005). It further belies the expansion period between 1870 to 1914 when the world was opened through railway construction and telegraph technology, enabling markets to share real-time information (Hutton 1996; Hirst and Thompson 1999; Gordon 2000; Britton 2002). With today's economy perhaps less integrated than during that period, entrepreneurial capital has a tendency to flow worldwide at certain times and between certain places; a space-time continuum that, if charted, would offer a snapshot of historical manifestations and cultural variances of its accumulation and movement. Worldwide operation of markets is not a new phenomenon, contrary to much of the 'globalisation' and 'new economy' narratives which lack historical depth. Holding to an Anglo-Saxon ethnocentric view of productivity, the focus is on a relatively small

proportion of ICT industry, 7% of the GNP (Hirst and Thompson 1999; Millar and Jagger 2001; Webster 2003a). Perhaps the Post-Fordist narrative is less a shift than an emphasis on ICT valorisation (Edwards and Wajcman 2005).

Given free-reign by a laissez-faire market environment, this valorisation is perhaps mitigated by the fluidity of ICT FDI capital and may be said to constitute a political economy of regulation that is concealed behind closed doors (Mansell 1993; Silverstone and Mansell 1996; Sassen 2002), in which aspects of governance are perhaps influenced by this setting. If this international enframing of FDI capital shapes the politico-economic form of regulation, rather than the pure economic logic of whether or not to intervene (Edwards and Wajcman 2005), then this controversial relation between a nation-state and international forces of ICT productivity perhaps does not so much underpin national polities, but rather complexly influences its multiple activities (Zukin and DiMaggio 1990; Walby 2003; Edwards and Wajcman 2005).

For politics today are polycentric, with nation-states presenting only one layer of governance in a complex, multi-layered web of international alliances and agencies. This web has an interest in steering national economic management toward ICT growth and FDI flow, and by so doing may present a key situation of non-obviousness: relegation of national governance to local authority status, reducing it to a municipality of the world arena that provides the local domestic services and public infrastructures vital for international capital (Mansell 1993; Silverstone and Mansell 1996; Hirst and Thompson 1999; Sassen 2002).

If governance is viewed as no longer the sole province of a nation-state, but the territory of a wider blend of "public and private, state and non-state, national and international institutions and practices", then national authority reflects a plurality that may represent a challenging-forth by these agencies (Cawson et al. 1989; Hancher and Moran 1989a; Hirst and Thompson 1999: 269). This view is polemical, with some advocating that strong nation-states influence the path and direction of globalisation; are motivated by interests other than capitalists; and that their role has yet to be consigned to the history books (Lewis 2002; Walby 2003; Edwards and Wajcman 2005). Whilst others maintain that there is a causal link with social reform, for example (Faulks 1998; Mishra 1998; Hirst and Thompson 1999; Taylor-Gooby 2002), those who argue against remind us of factors other than the economic that shape policy, such as political activity and the need to protect employment and income security (Walby 1990; Yeates 1999; Headey et al. 2000; Myles and Quadagno 2002; Edwards and Wajcman 2005; Hay 2005).

Governments, however, must pivot their own public priorities alongside this web of international interests, with tension possibly emerging in the balance between attracting FDI flow and managing public social policy. In making this controversial link between domestic policy and FDI capital flow, the point is not to underplay a range of other influences, but rather to show that social policy sits precariously alongside politico-economic national and international forces of productivity. By suggesting that Britain's microeconomic management of socio-economic relations is woven in this complex web of ICT valorisation, a tenuous connectivity between macroeconomic deregulation, ICT FDI flow and the labour process is established, and argued to detrimentally shape the experiences of socially excluded people.

With corporations moving their interests to faster-growing, even more lightly regulated environments such as the old Soviet block, FDI flow to Western Europe dropped by almost 50% in 2004 to $65 billion and weakened its economies (Matlack et al. 2005). Furthermore, 'transformational' diplomacy is seeing many nations opening or reopening embassies in countries such as Iran, Afghanistan and North Korea in an effort to counter rising 'terrorism', illegal migration and drug trafficking (Borger et al. 2006), begging the question of whether FDI will continue to relocate. Whilst Britain's economy is stronger than many of its European counterparts, its escalating debt, risk of rising interest rates, currency instability and the uncompetitive high cost of its historical labour regulations and social policy are not attractive to this capital. Keen to draw this fleeing, capricious foreign investment through developing SET industries and its base public infrastructures assets such as telecommunications and energy on which entrepreneurial capital piggy-backs, British governance is focusing on other capital attractions such as the size of the labour market and the welfare management of its labour force. By restructuring the terms and conditions of welfare benefit entitlement, the government hopes not only to reduce public expenditure by fostering greater responsibility for employability, but also increase the volume of the workforce.

6.3.3   A restructuring of welfare benefit entitlement

A government also has a regulatory role in managing the welfare of existing or potential labour by safeguarding conditions of employment and wage rates; ensuring safe and standardised housing; making available adequate education and healthcare facilities; and providing comprehensive benefit provision when not in employment. Yet, the spiralling expenditure of liberal social policy is precipitating further

restructuring of these welfare institutions, and the British government is keen to reduce passive reliance on them. By extending the market culture of entrepreneurship toward its citizens in general and the socially excluded in particular, it hopes to inculcate active responsibility through changing the terms and conditions of the latter's benefit entitlement. Transformed from a universalistic right to an individualised package, this challenging-forth of claimants sees a shift toward tailored, justifiable and provisional claims based on actively seeking employability and retraining.

The formulation of the welfare state during the early 1940s in Britain emerged from extensive political campaigns by organised labour and women reformers for social legislation to guarantee of a minimum standard of living for all citizens (George and Wilding 1976; Gough 1979; Walby 1990; Haney 1998). Based on a socialist value system, a post-war Labour government formulated a series of social policies to cover universal entitlement to adequate health, education, housing and benefit services. Outlined in the Beveridge Report (1942), a minimum benefit income was stipulated to help abolish poverty, promote equity and social cohesion, and provide a protective economic cushion for the workforce in times of market restructuring or downturn (George and Wilding 1976; Gough 1979; Schuyt 1998). Typifying social policy in a number of European nation-states, this socialist value system could be subsidised by a large presence of nationally owned industries; a feature less common in the US (Hutton 1996). The post-war period between 1945 and the early 1970s was an era of economic growth and full employment for many advanced capitalist economies, and the British welfare state flourished under Keynesian macroeconomic management (Gough 1979; Walby 1990; Hutton 1996; Hirst and Thompson 1999).

The energy crisis, against a background of heavy US engagement in Vietnam, surged

inflation rates and destabilised Anglo-Saxon market activity during the 1970s (Block

1990; Hutton 1996, 2002; Hirst and Thompson 1999). Rocked by recession, Britain

took action by cutting back on its public ownership of industries such as mining and

rail, with a series of concerted trade union strike activity to thwart ensuing

unemployment. Rising exclusion from the labour market, alongside increasing

international competition and slowing productivity are argued to have contributed

toward the curtailment of public welfare spending (Myles and Quadagno 2000;

Taylor-Gooby 2002; Hay 2005). Yet, if welfare as a social structure of accumulation

does not per se impair capitalist valorisation, and if the economy is always "the

product of a combination of state action and the logic of individual or institutional

economic actors" (Block 1990: 297), then perhaps the root of the welfare crises lies

between the specific instantiations of state activity and economic logic (Block 1990;

Zukin and DiMaggio 1990; Edwards and Wajcman 2005).

The specific instantiation during the 1980s saw successive restructuring of social

policy, as in most advanced economies with a liberal outlook, but it varied immensely

across each nation (Mishra 1998; Powell and Hewitt 1998; Headey et al. 2000; Lewis

2002). In Britain, under the Conservative ethics of market enterprise, welfare

restructuring saw the emergence of a culture of individualisation and self-reliance in

which citizens were encouraged to be freed from the fetters of state reliance and

passivity (George and Wilding 1976; Faulks 1998; Mishra 1998). Today, the

narratives are of entrepreneurship and active responsibility, escalating health care

expenditure and costly socio-political demographic shifts such as an increase in the

elderly population and lone parents (Mishra 1998; Taylor-Gooby 2002; Hay 2005).

Reflecting the Conservative legacy of autonomous individualism and market inclusion as opposed to state collective support, citizenship for the socially excluded today lies in the ontological challenging-forth of their rights and responsibilities (Faulks 1998; Lewis 2002). To combat rising socio-economic inequalities, employability is the narrative and the 'nanny state' with its dependency culture should no longer be encouraged, with public expenditure streamlining requiring welfare benefit recipients to be individually accountable for their well-being (Beck and Beck-Gernsheim 1995; Walby 1997; Faulks 1998; Powell and Hewitt 1998).

The imperative to spread costs sees the British socialist welfare model repositioning citizen rights in the private sector (Lister 1990b; Taylor-Gooby 199; Hutton 1996). Welfare benefit provision has been gradually removed from Local Authority and Parliament control to decentralised, independent, private/public sector agencies, with the logic of greater dissemination of information and services (Powell and Hewitt 1998; Hirst and Thompson 1999; Taylor-Gooby 2002; Hay 2005). Through partnerships with these agencies motivated by capitalist cost/benefit returns, government policies encourage affirmative action, equity programmes and a range of welfare-to-work schemes; and the agencies handle benefit provision through allocation of fringe, means-tested entitlement (Powell and Hewitt 1998; Lewis 2002; Powell 2002; Taylor-Gooby 2002).

Blurring state and non-state welfare management, this restructuring distorts the traditional universal right to welfare benefits (Lister 1990b; Turner 1990; Hutton 1996; Hirst and Thompson 1999). By weaving the social rights of the socially excluded into inclusive membership, this ontological enframing of their citizenship

sees benefit entitlement becoming less straightforward, more conditional and beset

with restrictive conditions that make it harder to attain (Lister 1990b; Walby 1997;

Powell 2002). Based on bureaucratic classifications of eligibility and desirability

(Mishra 1998), the implications for certain socially excluded groups are immense.

Whilst benefits have risen for some sections of the population such as pensioners, they

have been cut or non index-linked for 'less-deserving' groups such as lone parents and

those on incapacity benefits (Powell and Hewitt 1998). The national minimum rate of

benefit, an important mechanism for social inclusion, has been increasingly replaced

by means-testing which is designed to reduce expenditure by spreading benefit

provision more thinly among the poorest, separating the needy from the not so

deserving (Powell and Hewitt 1998; Powell 2002). Focusing on the individual as the

unit of welfare benefit entitlement (Sainsbury1996; Mishra 1998; Powell and Hewitt

1998), and already visible in the 1970s, means-testing:

> "deal[s] with one particular facet of an individual's total problem...[it has] no
> recognition that the problem may lie not in the individual but in the
> system...solutions are piecemeal, inadequate and personal" (George and Wilding
> 1976: 122).

Replacing the earlier unit of the male breadwinner family, this welfare paradigm shift

commodifies social relations under the umbrella of equity, and replaces unconditional

rights with conditional responsibilities (McIntosh 1978; Lister 1990b; Walby 1990;

Sainsbury 1996; Powell 2002). Whilst potentially offering more promise for women in

terms of individual autonomy (Lewis 2002), in reality means-testing masks the

ontology of women since the conditions of employability may not so easily be

attained, putting them under greater pressure. Employment for many women may be

restricted by the unequal gendered division of care and the low value assigned to their private and public labour.

Reflective of particular instantiations of epistemological and ontological enframing of otherness, the gendered challenging-forth dimension of welfare restructuring and citizenship inclusion assumes sameness, and its de-valorising manifestation is the neutrality of the equalising conditions, meaning that women, particularly lone parents, may take the brunt of the reforms (Lister 1990a, 1990b; Walby 1994; Faulks 1998; Powell 2002). That which presents, that which is beneath and beyond the surface appearance of the what-ness of this welfare reform, is further jeopardising of their ontological security since the complexities of their circumstances are ignored. Very little has been done in providing alternative care arrangements to support this shift, with access to a comprehensive wage that supports not only themselves but also their dependents not so easily found (Lister 1990b; Walby 1990, 1997; Sainsbury 1996; Lewis 2002; Walby and Olsen 2002). In reality, the labour market setting for many women, covered in the Gender Gestell chapter, is characterised by flexible, part-time employment, low pay, occupational segregation and discrimination.

The driving market ethics of hard-working, self-reliant and competitive citizenship reflects a politico-economic morality inherited from the Conservative government, for if such women can not conform to this objectified enframing of inclusive citizenship, benefit stigmas of scrounging and laziness may facilitate a deepening sense of blame, failure, lack of self-esteem and hope. If these feelings are essential to a capitalist value system in which obedience and conformity shape inclusive citizen membership, then the socially excluded may be viewed as objects not subjects of active citizenship

(Lister 1990a; Faulks 1998). Today's welfare tension reflects an uneasy truce between alleviating poverty by increasing incentives to work and compromising public support; a tension that was noted during the 1970s (George and Wilding 1976). Reflective of US social policy (George and Wilding 1976; Hutton 1996, 2002; Mishra 1998), and as part of the emulation of this economy's heralded success as outlined in the Introduction chapter, such alignment airbrushes a fundamental variance between the two nations, with the cost/benefit analysis of citizenship welfare possibly in conflict with the actual circumstances of claimants (George and Wilding 1976; Gough 1979; Kofman and Sales 1996; Shin 2000).

The higher productivity performance of the US economy lies, in part, in its larger integrated domestic economy, minimal capital regulation and labour protection (Hirst and Thompson 1999). More open to trade and capital flow, US companies have been able to diversify and decentralise their operations, and relocate to cheaper production areas that offer broader, more flexible pools of labour. Freed from the constraints of protective legislation and collective bargaining, US patterns of work are more casual, with a high percentage of part-time and short-term contracts which help to reduce costs and appease demanding shareholders (Rhodes 1989; Hutton 1996). Profit targets are high and time horizons short, and this US strategy has been pursued at the expense of long-term objectives such as social cohesion through employment stability and comprehensive welfare provision (Hutton 1996; Hirst and Thompson 1999). The US social setting is one of high job insecurity, wages below inflation, income inequality and 'cowboy capitalism' that exploits migrant labour (Hutton 1996, 2002; Barro 2003).

In emulating the US by focusing on short-term capital gain, deregulation of trade and capital flow and downsizing the welfare state, we risk sharing these social settings. As socio-economic polarisation has increased in the US, so has it in Britain (Hutton 1996; Sainsbury 1996; Kofman and Sales 1996; Mishra 1998). This polarisation points to a tension between the socialist and capitalist welfare value systems, and argued to indicate a fundamental conundrum of capitalism: the balance between maximised entrepreneurial capital gain and the welfare of the workforce (George and Wilding 1976; Gough 1979; Mishra 1998). With fluctuations in market stability requiring social policy to ensure more efficient use and maintenance of the labour force, the control of sections of the population out of work becomes paramount (Gough 1979; Mansell 1993; Hawkins 1996; Lewis 2002).

Yet the welfare system, designed to act as a prop for the flotsam of labour spillage in times of recession or market restructuring, offers a mechanism without which labour or indeed entrepreneurial capital could survive (Gough 1979; Walby 1990; Bauman 2000). If a state subsidised welfare platform shelters not only 'dysfunctional' labour but also capital, then this capitalist tension presents an uneasy alliance between the politico-economic forces of production and the socio-economic welfare relations of inclusive citizenship. If the social structures of accumulation have outgrown their effectiveness and new social structures are established only when there is 'dramatic' politico-economic deterioration, then welfare provision is decaying not because of pure economic logic, but because of political decisions (Block 1990). Shaped to some extent by ICT infusion, Britain's expanding international role appears to play a role in the de-valorisation of welfare support through the management of the labour process to attract FDI flow, in part by improving labour market participation.

The positioning of liberal welfare provision as an unproductive burden, a key determinate of Britain's legacy of low productivity that adversely influences the rate of domestic and international capital accumulation (Hutton 1996, 2002; Hirst and Thompson 1999), is misleading for it belies political intervention. That this legacy is thought to have started in the late 19th century (Gough 1979), well before the welfare state, perhaps the short-term capital gain patterns of the British economy are more contributory to low productivity than the burden of the welfare state (Hutton 1996; Gilman 1998; Hirst and Thompson 1999; Lloyd 1999). Today, the focus on FDI flow is part of this pattern, yet with 25% of British manufacturing owned by foreign companies employing 16% of the workforce, this considerable investment is contested as being linked to enhanced domestic productivity (Hirst and Thompson 1999; Markusen and Venables 1999).

With companies downsizing, this foreign revenue is vulnerable to outward flow if the British market does not pick up or interest rates rise, raising the question as to whether the aspired returns will be generated, with the British Chancellor's predictions of 5% having recently been reformulated to less than 2%, in line with the OECD forecast (Hutton 2002; Elliot 2006). The long-term reality of destabilisation in the public welfare foundation, based as it is on a deterministic assumption of self-regulating markets and the transformative power of the very small sector of ICT productivity, may mean that inclusive citizenship for sections of the British population remains a policy vision unrealised in practice.

6.4   Conclusion

As the networked ICT epistemological enframing of production and society, Britain's current policies and strategies to foster economic growth, equality and social cohesion sit alongside an ontological challenging-forth of traditional mechanisms for socio-economic support. Based on the vibrancy of a new global economy's valorisation of ICT productivity that involves, in the first instance, the relative surplus value of its commodities in which standards ownership plays a key role, this assumption is nebulously calculated on predictions of sustainable growth but RSV is dropping. With ICT stock over-valued, markets highly volatile and exposed to considerable risk (Kamssu et al. 2003), the reality of economic rejuvenation is uncertain and this setting may mean we are creating "value out of our belief in the value we create" (Castells 1996: 159). Whilst capitalism has shown considerable resilience in the past and may well recover, the daily realities of those classified as socially excluded are perhaps less buoyant.

With a key background politico-economic enframing of "arms-length" regulation to spark economic activity, that which is revealed in this Gestell's background is a selective international Triad web of multidimensional forces. Playing a central role in the adjudication of a capricious drift of FDI capital, mitigated perhaps to some extent by ICT multinational companies, this 21st century background to British ICT policy is reflective of a technologically determinous paradigm. Privileging a one-dimensional, linear and global trajectory of ICT infusion, this Network Technology Gestell's instrumental rationality and simplified reductionism carries assumptions surrounding scientific and technological progress that will turn round Britain's legacy of low productivity, generate employment opportunities, and provide solutions to an array of

socio-economic national problems. But, networked technologies do not produce new economies or societies, rather politico-economic alliances do and reconfigured socio-economic relations may.

Suggesting that these international alliances considerably contour domestic macro and microeconomics, a polemical link is made between this complex web of interests in ICT productivity and an emerging site of tension that takes the form of social welfare restructuring. As part of the drive to increase labour market participation which perhaps may help to attract FDI capital, the what-ness of inclusion for socially excluded unemployed people is positioned as that of taking greater responsibility for employability. By adjusting the welfare management of the labour process through reconfiguring the terms and conditions of benefit entitlement, economic opportunity and equity for all that "empowers, and does not provide", are the vision of the current Prime Minister Tony Blair[19]. Perhaps this may be realisable for some, but as the following chapters will show, this political economy of social welfare is based on shaky premises, and such capitalist morality serves to jeopardise humanistic aims for better ICT productivity and international presence (Hutton 1996; Jalusic 2002).

Tailored by ICT valorisation and free-market principles, this ontological enframing of citizenship inclusion is beset by a number of breakdowns in policy narratives, and is indicative of a Heideggerian challenging-forth of people as standing-reserve where their socio-economic relations are manipulated for economic rejuvenation. In so obscuring or masking their ontological experiences, this Anglo-Saxon capitalist strategy relocates unconditional rights of the socially excluded in conditional

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[19] Labour Party Conference. Brighton. September 2004. BBC News 24.

responsibilities, and as such can not produce equalitarianism. Precipitated by exclusion narratives of low productivity and a digital divide, and inclusion ones of global technological and entrepreneurial driven change, these narratives are acting as agents of panic (Slater and Tacchi 2002; Mansell 2002; Wajcman 2002; Edwards and Wajcman 2005). In this panic hides the inessential essence of this Gestell: an ongoing authority that objectifies and seeks to control the lives of those on the fringes of society. By so enframing the horizons of meaning for 'inactive' sections of the population, the socio-political and economic dimensions of this Gestell infuses market values into public services, blurring and destabilising the traditional safeguarding of unemployed citizens' rights.

Through an institutional knee-jerk enframing of "arms-length" regulation and citizenship, today's specific instantiation of ICT valorisation reflects socio-economic relations in opposition to public support. Positioned as able to maximise their opportunities by acting as entrepreneurial engineers of their personal circumstances, citizenship today is about capitalist strategies and resources for survival, not about social protection (Hutton 1996; Powell and Hewitt 1998; Hay 2005). The socialist value system recognised that these circumstances are often beyond the control of individuals, but public welfare protection historically reflects a tenuous pivoting between economic stability and instability, and appears to run counter to a capitalist, laissez-faire economics that valorises ICT productivity. The logic of active responsibility for employability to spur a vibrant economy hides the personal cost of this what-ness of inclusive citizenship for sections of the socially excluded who may not so easily adjust, such as lone women parents.

Summarised in the table below, this Gestell, as the socio-economic and political enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity, is shaped by an interwoven array of background political economies. Mediated by the epistemology of ICT productivity, the production of ICT capital through the ontology of entrepreneurial, actively responsible citizenship exposes a site of social tension that may be influenced by an "arms–length" regulatory stance. Detrimentally enframing the socio-economic relations or experiences of the unemployed, the practice of allocating conditional responsibilities for benefit entitlement appears to severely restrict their experiences and expressions of who-ness.

Table 6.1: A Network Technology Gestell

	Valorisation of ICT productivity	**Political economies**	**Inclusive cultures**	**Enframing of capital**	**Tension**
NTG≡	Relative surplus value of commodities	Standards Regulation FDI flow Social welfare	ICT productivity through entrepreneurial, active responsibility	Deregulation of ICT entrepreneurial capital	Social welfare and benefit control

In response to the subsidiary research question of what is the background of ICT policy and how does it shape the who-ness of socially excluded women, the chapter concludes that for lone women parents the equalising logic of welfare entitlement and citizenship inclusion assumes an epistemology and ontology of sameness. By de-valorising their specific circumstances, this model of equity is at serious risk of reinforcing their otherness by jeopardising their spaces of possibility and placing greater strain on their own imaginative strategies for survival. In unpeeling the gender dimension of this Gestell, the citizenship enframing of their inclusion assumes a simple application of individual moral responsibility, de-valorising care commitments,

personal needs, aspirations and experiences. As a result, their who-ness is further restricted by misleading notions of equality, and whilst economic doors may open for some, protective compassionate welfare ones that provide a range of support for others may close, compounding not enhancing their ontological security.

This challenging-forth of their ontology points to solutions in which the importance of public support for the socially excluded, and the formulation of citizenship that recognises the importance of care (Lister 1990b), are necessary policy considerations for avoiding further sinking into hardship, disillusionment and disenfranchisement. Narratives of fraudsters and work-shy tighten regulation but they are the minority, and with insufficient subsistence forcing claimants to fiddle the system and supplement their income, perhaps what is more realistically needed is a radical rethink of welfare provision that provides amoral and comprehensive financial support to enable the unemployed to regroup their resources and start afresh.

By aligning social policy with market values, inequality may be modified but it is not eradicated, since analysis of the roots of poverty focuses on income variances and not on wider aspects of exclusion such as segregation, discrimination, violence, abuse, care responsibilities and lack of confidence (George and Wilding 1976; Walby 1990). The effect on the problem domain of women's exclusion and inclusion of this Gestell will be explored in the following two chapters, for government continues to maintain that greater labour market participation, particularly in the ICT sector, is central to socio-economic prosperity and digital membership.

Supported by multinational corporations who are increasingly becoming social actors through their philanthropic activities, companies such as Cisco offer employability

schemes through work placement and vendor specific training, government is keen to utilise these schemes as means by which to realise inclusive citizenship and labour market growth. With the Cisco Certified Network Associate vocationally oriented e-learning programme providing a workforce of network engineers and addressing a perceived shortage in such labour, government encouragement of this and other like training programmes seeks to turn round another legacy underpinning its poor productive performance, low skills levels. This background of employability though ICT skills acquisition reflects a further reshaping of the labour process and provides the substance of the next chapter, a Network Engineer Training Gestell.

ICT skills policy and pedagogic tension

7.1   Introduction: ICT valorisation and skills

With ICT productivity and entrepreneurial active responsibility constituting the epistemological and ontological enframing of the nation and its unemployed socially excluded citizens' path toward inclusion to the new economy, greater labour market participation is presented as providing equitable opportunity. This chapter looks at the British government's narratives for realising this participation through ICT employability and the pedagogic acquisition of associated skills, as introduced in the Literature Review chapter. In describing the related epistemological policy background, the chapter utilises the same structure as the previous one to explore the ontological experiences of those trained in these skills. Steered by how entrepreneurial ICT capital is produced and how the politico-economic forces of productivity mitigate this valorisation process, the aim is to critically review this shaping of human and social capital through vocational training. Relating these two terms to 'pedagogic capital' to reflect this production, the chapter looks at how these additional epistemological and ontological cultures of inclusion enframe the labour process for socially excluded people and what fundamental site of tension emerges.

With the three greatest priorities for Tony Blair "education, education, education" (Edwards et al. 1997; Payne 1999, 2000), self-improvement is said to offer the chance to succeed in life, aspire to higher ideals and provide the grounds for equity. Believed to bring about greater social cohesion, "whereby a sense of solidarity and common interest bind a healthy society" (Fryer 1997: Part Two: Challenge 7: 1), the government is restructuring a sector of pedagogy, Further Education. Seeking to turn

around a second British legacy referred to in the Literature Review chapter, low skill

levels, its goal is to train sections of the population in digital expertise and thereby

provide access to ICT's transformative potential. With the new economy a

'knowledge-based' one, core employment demand is for streamlined, multi-tasking

and e-skilled employees able to engage with 21st century ICT technologies. As another

aspect of the relative surplus value (RSV) of ICT productivity, the speeding up or

improvement of the productive process is linked to the quantitative demand for these

workers which is said to be outstripping supply. Also reflecting a critical qualitative

mismatch between what employers need and what the present labour force offers, a

skills crisis is narrated as emerging which is particularly pronounced in network

engineering. With non-core employment activity currently viewed as becoming

peripheral to areas of production, those without knowledge expertise such as the low

skilled are regarded as being more at risk of unemployment and social exclusion.

In an attempt to counter this, pedagogic policy is directed toward restructuring and

widening participation in Further Education vocational education and training (VET)

provision. Providing a blend of academic and work experience for the low skilled, a

further package of "meta-skills" is incorporated in community-based education

provision to improve their marketability. In line with the epistemological inclusion

culture of partnership where government listens to the needs of the business

communities, outlined in the Literature Review chapter and developed in the previous

one, two key requests of one force of productivity, business, are: consolidation and

standardisation of ICT qualifications, skills and courses; and vendor specific awards.

With a further inclusion culture of flexible lifelong learning, also referred to in the

Literature Review, regarded as being enabled by e-learning programmes, government

as the political force of productivity seeks to more tightly align ICT VET provision with these industry trends through virtual pedagogic environments. The Cisco Certified Network Associate (CCNA) programme provides all three of these requirements, offering standardised skills in network engineering and incorporating a social constructivist pedagogic model that is presented as enhancing student empowerment. By proactively targeting those regarded most at risk of unemployment and social exclusion, in particular women, the government believes such an ICT VET model will not only address the skills crisis, but also the legacies of low skill levels, the low participation of women in the ICT domain and, by extension, low productivity.

In presenting this policy background of 21st century ICT skills acquisition and employability, the chapter proceeds to analyse it using both the social shaping and social constructivist perspectives drawn from the Literature Review. Merging these approaches with the phenomenological focus on situations of non-obviousness or breakdowns in the background narratives, the experiences of students point to a political economy on which the central site of tension pivots. The application of these theories suggests that the current restructuring of vocational education, as a social structure of pedagogic capital accumulation, may be linked to social control in which ICT VET standardisation plays a crucial part.

Contrasting the narratives of employability and empowerment with the concrete experiences of students and staff on the CCNA programme, that which emerges from fieldwork data is a catalogue of problems. Contradicting the narrative of labour market opportunity, these breakdowns point to a political economy of skills in which

many students encounter limited work prospects. With reality not matching the rhetoric, these situations of non-obviousness point to a central site of pedagogic tension. Trained in personal behaviour deemed acceptable for employability and socialisation into mainstream culture, the additional supplement of meta-skills for the low skilled has an appearance of socio-cultural control in the form of 'emotional' labour. Pivoting around a techno-economic 'banking' paradigm of e-learning, this site of tension reflects a standardisation of pedagogic capital which functionally reproduces the low skilled for the lower end of the labour market.

In the light of the main research question of how the what-ness of ICT inclusion background policies shapes the who-ness of socially excluded people, this chapter considers the subsidiary research question of what is the background of ICT vocational training policy and how does it shape the who-ness of individual socially excluded women. With the ontological enframing of their citizenship involving purely standardised ICT skills acquisition for inclusive employment, that which emerges in this Gestell is a number of gendered dimensions. This equity reconfiguration of their societal membership once again assumes an epistemology and ontology of sameness which is reinforced by the ICT VET pedagogic model of inclusion. Lone women parents' otherness or difference manifests as discrimination and experiences of domestic violence and abuse. Lacking of consideration of their particular personal circumstances and compromising their who-ness by curtailing pedagogic and personal exploration, feelings of demotivation and frustration accrue.

The chapter proceeds to outline an alternative model where the common oppressive experiences of low skilled women are comprehensively addressed, and suggests that

this offers a viable pedagogic approach. It concludes that this Network Engineer Training Gestell presents a socio-political and economic enframing of pedagogic standardisation designed to valorise the new economy's labour process, but does not meet the concrete needs of the socially excluded. By epistemologically moulding their pedagogic capital in such a form and controlling their ontological expressions, further amplification of exclusion may arise since the ability to give expression and meaning to their who-ness is restricted by the form and substance of current ICT VET practice.

7.2   An ICT vocational training policy background

7.2.1   Knowledge production: ICT skills for employability

We are said to be living in an age where the generation, storage, processing, retrieval and transmission of information have become fundamental aspects of productivity and social engagement, giving rise to the notion of an 'information society' (Castells 1996, 2001; DTI 1998a, 2003c, 2004a). Reflective of science and technology being structured into all areas of society, the growth of ICT functionality has generated an information-based mode of production (Zuboff 1988; Castells 1996; Knorr Cetina 1999; Dahlbom 2000). This shift is said to characterise post-Fordist economics, where the focus is less on quantity and more on the ability to qualitatively transform increasingly complex levels of information into knowledge commodities (NTO 2001; Roberts 2002; Leppimäki et al. 2004). It is for this reason that the new economy is sometimes referred to as the 'k-economy', where "knowledge has become perhaps the most important factor determining the standard of living...our most powerful engine of production...Today's most technologically advanced economies are truly knowledge-based" (DTI 2004a: 27-28).

The over-riding asset in this k-economy's valorisation of ICT productivity is said to be human capital, a term used to express the generation of commodity value by human production (CBI 2000; DTI 2004a) that was introduced in the Introduction chapter. Workers today are valued less for their manual labour than for their individual ability to creatively and flexibly manipulate information, to generate high-value knowledge-based products and services that will ensure effective, quick, smooth and competitive adjustments to production fluctuations (DTI 1998a, 2001c, 2004a; Dahlbom 2000; Hanseth 2000; Webster 2003a, 2003b). These 'knowledge' workers, regarded as vital for today's flexible and virtually organised firm, must hold a range of skills that encompass ICT literacy, team work, problem-solving and communication (DTI 1998a, 2004a; O'Mahony and de Boer 2002). These qualitative skills are sometimes referred to as 'e-skills' (DfEE 1999; e-skills NTO 2001; DfES 2003; Valenduc 2003); or 'soft' skills (Payne 1999; Millar and Jagger 2001; NTO 2001); or 'relational' skills (Webster 2003b). Such 21st century abilities, reflect a range of expertise that is seen to improve productivity and labour market flexibility in the changing work conditions and relations of the new economy (Rochlin and Boguslaw 2001; Webster 2003a; DTI 1998a, 2004a). Arguably part of the relative surplus value of ICT accumulation, this what-ness of human capital is in short supply.

7.2.2   The skills crisis: a quantitative and qualitative shortage

A survey (NSTF 2000) of UK employers found that over one third of them felt they were short on these ICT skills, a finding that is backed up by other government research (DfEE 1999; CBI 2000; DTI 2000, 2002; NTO 2001; Roberts 2002; LSC 2004b). Whilst it is acknowledged that predicting labour market forecasts is an uncertain endeavour, projections estimate that 50 to 75% of future jobs will require

use of computers and render obsolete many present skills (NTO 2001; Rochlin and

Boguslaw 2001; Zhang and Numaker 2002). This forecast, based on US trends which

are deemed to be 3-5 years ahead of Europe, predicts that the requirement for

knowledge workers will substantially grow (DTI 2001b; Kolding and Milroy 2001;

Millar and Jagger 2001).

Overall, a 27% to 32% shortfall between demand and supply of these skills is

anticipated, with network engineering high on the list (CBI 2000; DTI 2000; Milroy

2001; Cisco 2005). This deficit is seen to not only threaten Cisco's business

ecosystem, giving rise to the notion that "someone with a Cisco accreditation is worth

their weight in gold"[1], but also productivity levels in general. With a large proportion

of employers experiencing difficulty in meeting recruitment targets, serious economic

difficulties arise as workloads for existing staff are increased; ICT implementation

delayed; production timescales jeopardised; and desired levels of customer services

compromised (NTO 2001; Roberts 2002; LSC 2004b). The net result is loss of

business, augmenting operational costs, and a trend toward outsourcing or sub-

contracting non-core tasks abroad to curtail expenditure and access a wider pool of

labour (DfEE 1999; Hirst and Thompson 1999; Webster 2003a; Leppimäki et al.

2004). For, not only is there a quantitative shortfall, but also a qualitative mismatch

between the skills that employers need and the ones the labour force provides (DfEE

1999; DTI 2000, 2004a; NTO 2001; Roberts 2002).

With Britain lagging behind the US, France and Germany in ICT skills, the new

economy's shift from manufacturing, where low skilled employees produce low

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[1] Taken from "Comment: The next skills shortage?" http://siliconrepublic.com/news/ (accessed August 2005).

valued-added products, to services requires a better educated, skilled, multi-tasking and flexible workforce (Rees 1992; Hirst and Thompson 1999; Lloyd 1999; O'Mahony and de Boer 2002). With the valorisation of ICT productivity restructuring the labour process, and the governmental manipulation or enframing of ontological security for the socially excluded repositioning their citizenship as active responsibility through employability, the catalyst of this Gestell's background is the accruing of RSV through ICT skills acquisition, or the production of specific pedagogic capital. For whilst today's labour market is generally reflective of a more highly educated population[2], large sections remain below basic educational standards and this is said to be contributing toward the mismatch in qualitative skills (Kennedy 1997; CBI 2000; DTI 2002, 2004a; LSRC 2003; Steedman et al. 2003a). This legacy of low skill levels, outlined in the Literature Review, is put forward as having serious consequences for Britain's productivity and to jeopardise the employability of the low skilled, particularly if they are without the prerequisite ICT skills (Fryer 1997; Kennedy 1997; DfEE 1998; DTI 2001c; DfES 2003; LSRC 2003).

As employment patterns evolve, people may be required to adapt and possibly change their career several times in their lifetime, move to where employment is and retrain to keep pace with changes in labour requirements (DfES 2003; Webster 2003a). With low or semi-skilled work such as data entry or bank rolling shifting from core to non-essential periphery areas of work, demand for non-central or non-knowledge-based employees in many advanced capitalist economies is narrated as diminishing (Fryer 1997; Roberts 2002; Webster 2003a; DTI 2004a). Anticipating rising levels of

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[2] In 2000, 5.4 million graduates entered the labour market compared with 3.5 million in 1992 (DTI 2002).

unemployment which undermine the state's capacity to raise taxes and place further

demands on welfare provision, this quantitative and qualitative skills crisis points to

an inability of education to produce a skilled ICT workforce (DfEE 1999; NTO 2001;

Roberts 2002; DfES 2003; LSRC 2003).

As part of the inclusion culture of partnership ecosystems, and in an effort to address

the skills crisis by widening the pool of recruitment, government is encouraging

education to listen to the needs of the business communities and ensuring its citizens

are digitally literate, as a Cisco representative commented:

> "Education is beginning to listen to industry and address the skills shortage.
> Education systems are not providing people for the IT society. Companies are
> saying to government and education that their systems not producing the goods,
> we need a skilled IT workforce...citizenship equals digital literacy" (C1).

So, to improve the employability of the low skilled and ensure the nation keeps pace

with employment changes, government is restructuring vocational education and

training (VET) provision which is based in Further Education. Reflective of the

emulation of the US's pedagogic reform mentioned in the Cisco Systems chapter,

section 5.3.1, two central goals are to ensure that such education becomes more

aligned with the business force of productivity's requirements and predicts labour

market trends, as one community education manager narrated:

> "Government funding is targeted at outcomes, therefore we need to predict labour
> market trends and talk to employers - what do you need? Tell us what skills you
> need...[it's] a business deal...[what] we are trying to do is to make our *provision*
> more *employer-led* and to get employers to identify what the skills are that they
> are looking for, and customise the training programmes to accommodate that"
> (N_M1).

Two business trends emerge: a need to consolidate and standardise ICT skills, and an

increase in vendor specific qualifications, with a further government emphasis on e-

learning tools. The vision of a "modern, fairer and more prosperous Britain...means

harnessing the skills and potential of every member of society" (DTI 2004b: 'Forward' by Tony Blair), and e-learning is said to enable this by widening access to education, thereby raising the skill levels of the nation and equalising society. As a fundamental component of the inclusive epistemological culture of lifelong learning, online training provision such as the CCNA programme meets these politico-economic forces of productivity's requirements. Marketed as providing in-demand industry recognised certification and digital literacy, the CCNA module is positioned as a viable VET route toward employability. By epistemologically and ontologically enframing the pedagogy of the socially excluded in such a VET model, this Gestell sees government hoping to emulate the success of such programmes in countries like Germany, where improved distribution of social capital and adjustment to labour market transformation is viewed as a consequence (Hirst and Thompson 1999; Steedman et al. 2003a, 2003b).

7.2.3   Pedagogic restructuring: vocational training

The reorganization of education that took place in the early 1990s, where sections of Further Education (FE), such as polytechnics gained Higher Education status, was an attempt to level the academic playing field and widen pedagogic participation, but it omitted the bulk of FE provision (Kennedy 1997; UVAC 2002). A large and fertile sector, FE currently covers adult and community education and training, sixth form colleges, employer and trade union provision and independent training providers (Kennedy 1997). It is the first choice for many who have been caught in the downward spiral of absenteeism from schooling, labelled as 'failures' and trapped in low or semi-skilled work or unemployment. Offering a second chance and an alternative and more flexible route toward education and better employment, a key

reshuffle focuses on vocationally based pedagogy (Fryer 1997; Kennedy 1997; DfEE 1998; DTI 2001c, 2004a; DfES 2003; LSC 2003a).

This concentration on VET provision is not a new phenomenon. In Britain, the Modern Apprenticeship scheme (MA) was introduced nationally in 1995 with the explicit aim of improving the labour market stock of skills to address shortages and introducing young people to the world of work (Cassels Report 2001; LSC 2002a, 2003a; Steedman et al. 2003a, 2003b). However, the MA scheme "appears to have made only a marginal contribution to increasing the ICT skill supply in Britain" (Steedman et al. 2003b: 31). The continual change in ICT skills definition made recruitment and training problematic in terms of matching courses and skills with employment demand, for a commonly agreed classification for the plethora of jobs or expertise required to perform them is absent (Kennedy 1997; NTO 2001; DTI 2001c; Steedman et al. 2003a, 2003b; QCA 2004).

7.2.3.1   Consolidation and standardisation of ICT provision

Consolidation and standardisation of the vast array of ICT skills is seen to ensure consistency in delivery and quality, yet educational institutions have struggled to keep pace with the speed of change in planning and adapting curricula (Millar and Jagger 2001; DfES 2003; Steedman et al. 2003b). The National Vocational Qualification (NVQ) framework was introduced to facilitate this with MAs mapped to NVQ level 2 or level 3[3], the standard at which basic education is pitched (Kennedy 1997; DfEE 1998; Roberts 2002; DfES 2003). Designed to ensure clear progression routes and multiple access points, the NVQ framework also blends academic knowledge with

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[3] NVQ level 2 is equivalent to 5 GCSEs (General Certificate of Secondary Education) at grades A to C, and level 3 is equivalent to two A-level grades.

practical work experience, incorporating key skills held as integral for learning to

work (Kennedy 1997; DfEE 1999; e-skills NTO 2000; DfES 2001b; QCA 2004).

First identified in the Dearing Report (1996), key skills[4] are the linchpin of VET

policy and share characteristics with the qualitative soft skills outlined above (Payne

1999). Because the low skilled may lack employment experience, self-esteem and

awareness of their options (Faulkner 2004), these key skills have been further

developed by community education to incorporate "meta skills", as one manager

explained:

> "Part of our mission is to prepare learners for rewarding employment and lifelong
> learning...It is actually the ability to give them the knowledge and skills, and...to
> work on some intangible benefits: improved self esteem, the confidence...learning
> to learn, the meta-skills...the competencies to actually be able to go out and...sell
> oneself...to be more aware of what their options are, and to be able to demonstrate
> to potential employers that they can do it, that they meet those requirements...It
> can't really be divorced totally [from the provision]. [These intangibles] go hand in
> hand [with it]" (N_M2).

As a critical component of this Gestell's background, these meta-skills involve

baseline intangible, tacit skills that cover a range of interpersonal and personal

behavioural characteristics, values and dispositions such as time management,

commitment, reliability, appearance and attitude (Knorr Cetina 1999; Payne 1999;

Leppimäki et al. 2004). These are characteristics that VET educationalists found

employers were looking for when recruiting the low skilled, and are pitched at

empowering people unused to work with a degree of employability 'maturity',

enabling them to successfully compete in the labour market as another community

education manager expressed:

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[4] There are six key skills identified in telecommunications NVQs: communication (by far the highest
rated skill by employers – 57%); application of number (4%); information technology (6%); working
with others (14%); problem solving (rated 9%); and improving their own learning and performance
(12%) (LSC 2002a).

"...it's around their maturity, their commitment, their motivation, their organizational skills, their timekeeping, their attendance, everything" (F_M1).

In addition, a number of other obstacles were flagged in FE provision that compromised the key skills agenda by qualitatively mismatching course content with real world demand. Central concerns were the quality of teaching, under-resourced learning environments, too much emphasis on academic content with little relation to practical situations, and lack of support for the socially disadvantaged (Fryer 1997; Kennedy 1997; DfEE 1999; NTO 2001; Roberts 2002). Furthermore, employers had a preference for more independence and flexibility in training that reflected their own patterns of work and skill deployment (Kennedy 1997; UVAC 2002; Steedman et al. 2003a, 2003b). To address these shortcomings, the introduction of vendor-specific awards into FE provision is currently regarded as a practical way forward (e-skills NTO 2000; LSC 2001, 2002b; Steedman et al. 2003b; QCA 2004).

7.2.4.2   Vendor-specific awards: the CCNA e-learning model

Universally tailored, vendor-specific awards are marketed as providing job-related specific skills, improving employability and, if on e-learning platforms, increasing flexibility of access to learning (DfEE 1999; Payne 1999; e-skills NTO 2000; NTO 2001; LSC 2001). By so sharing training costs with employers, the government is looking toward such schemes to consolidate and standardise ICT knowledge and programmes. The CCNA is a specific vendor qualification in network engineering, with an emphasis on work placement schemes and in-class hands-on maintenance or configuration of networks; both of which are considered essential for introducing students to the practical tricks of the trade (Pannabecker 1991; Herschbach 1995; e-skills NTO 2000). As such, it fits neatly into the VET model and NVQ framework, is

in the process of being mapped to NVQ level 3 and offers its provision in an e-learning environment. Appendix B offers an overview of the first two modules of the first semester of the CCNA.

The most common understanding of e-learning is that it involves the use of Internet technologies to enable the learning process (COM 2001; Jansen et al. 2002; Zhang and Nunamaker 2003). Regarded by many as the future of pedagogy, both private and public, the benefits are narrated as fostering greater initiative, responsibility, autonomy and flexibility in lifelong learning endeavours (Leidner and Jarvenpaa 1995; Alavi and Leidner 2001; Zhang and Nunamker 2003; DfES 2004a). With attributes such as equalising, broadening, improving, standardising and consolidating the learning process, e-learning is said to bring about a profound change in the way education is developed and presented (Laurillard 1993; Hiltz 1995; Collis 1996; Kennedy 1997; Selinger 2002b). Its leading edge is seen to reside in multimedia e-functionality, enriching open access to a personalised learning experience where individuals may take greater responsibility for managing their progress (Fryer 1997; Kennedy 1997; LSC 2004a). Students may:

> "feel empowered, and take more responsibility for their own future...when an individual has clear personal goals, tenacity, an ability to overcome obstacles and a determination to succeed, they are more likely to do so" (LSC 2002a: 14).

Underpinning this pedagogic principle is a common model of e-learning practice that was referred to in the Cisco Systems chapter, social constructivism (Alavi 1993; Laurillard 1993; Alavi et al. 1995; Leidner and Jarvenpaa 1995; Zhang and Nunamaker 2003). Based on the Russian pedagogist Vygotsky's (1962) analysis of

learning[5], pedagogic pursuit is seen not as a solitary or passive didactic[6] process, but a

scaffolding of understanding and insight fostered through active collaboration with

others (Laurillard 1993; Gokhale 1995; Jansen et al. 2002; Jelfs and Colbourn 2002;

Selinger 2002a, 2002b). If online tuition is supported by practical activities and tutor

support, this notion of 'blended learning' which Cisco is keen to impart will place

students in the driving seat (Selinger 2002b; Smith 2004; Cisco 2005). This approach

is said to represent a shift from emphasis on 'what' constitutes a body of knowledge

(explicit) to how it is generated and acquired (tacit) (Rees 1992). With these

mechanisms built into the design and ethos of the CCNA programme and supported

by a standardised online assessment procedure, it is regarded in-house and by many

British educational institutions as exemplary (Selinger 2002b, 2004; CNAP 2003h).

Argued to be sufficiently comprehensive to enable any student to engage with,

regardless of their educational or technical backgrounds, the standardised English-

language based curriculum runs world-wide with a limited number of translations[7].

Appearing to be mitigated by the RSV of ICT productivity, this what-ness of ICT

employability and associated skills acquisition policy takes account of the skills

requirements of business by training the low skilled and unemployed in specific

pedagogic capital. As part of the valorisation process, the CCNA programme is

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[5] Vygotsky's theoretical framework is that social interaction plays a fundamental role in the development of cognition, and that the potential for cognitive development is limited to a certain time span which he terms the 'zone of proximal development' (ZPD). Full development during the ZPD depends upon social interaction, with a range of skills developed by adult guidance or peer collaboration. Vygotsky's theory was an attempt to explain consciousness as the end product of socialisation that he believed was not developed in isolation, for 'social speech' was primary and from this developed 'inner speech', or internal contemplation (Duarte 2001).

[6] In didactic learning, the subject matter is preceptual knowledge or knowledge of precepts, givens, facts, rules and principles for that which is knowable in external reality (Laurillard 1993). Akin to explicit knowledge, it is usually the traditional approach for teaching students in pre-university and undergraduate education where the tutor aims to deliver this constructed knowledge to the student, assisting her to learn the givens of the subject's precepts (Laurillard 1993).

[7] To date, it is translated into nine different languages.

positioned as an inclusive citizenship route toward employability, opportunity and digital literacy to turn around Britain's array of legacies and meet the acute skills crisis. But how does this manifest in practice? How are the epistemological and ontological cultures of inclusion of this Gestell experienced by socially excluded people? Does ICT employability match with the citizenship enframing of their socio-economic relations as suitably skilled, and how does the nature of this matching affect their expressions of who-ness? In recounting the narratives of some students and staff on the CCNA and in positioning them against this background, a catalogue of problems emerge where the reality of employability and empowerment appears to fall short, particularly so for lone women parents. Indicative of situations of non-obviousness in policy narratives, the tension between business-led ICT instruction and education as an exploratory, self-developmental, holistic process lies in the standardisation processes. Mitigated by a socio-political and economic enframing of pedagogy, the business force of ICT productivity has a vested interest in marketing and training people in company products and services, and the political force an interest in the socio-economic control of people on the fringes of society.

7.3   A site of tension: standardisation and holistic pedagogy

7.3.1   A conundrum: qualification or work experience

An essential ingredient of the ICT VET model is the production of qualified students, equipped with industry linked certificates that verify their attainment levels. Qualifications are the baseline, in part to provide employers with assurance that students have learnt the basics, as one community education manager narrated:

"...clearly the sort of risk factors involved for *employers* needs to be supported with a *qualification*, I'd suspect for them to feel, for them to have any confidence. ...the qualification is the baseline really" (N_M1).

They also help to provide students with confidence in their ability, as a FE tutor

commented:

> "...qualifications...are very, very important because at the end of the day...having a qualification means that you might not have the experience, but you have an idea of what you are doing...It just says that this person is...willing to do this, is eager enough to say "I want to this, and I can do this"" (H_T2).

Yet, a paradox emerges in this Network Engineer Training Gestell: the labour market

is not "particularly bothered" with qualifications or indeed the NVQ qualification, as

the above community education manager continued to explain:

> "The labour market doesn't necessarily agree with the qualification, not necessarily the qualifications we deliver but the qualifications in general...not particularly bothered about NVQs" (N_M1).

Reinforced by another manager in community education, he believed that

qualifications are not the sole purpose of VET provision:

> "...those employers are telling us they are not interested in qualifications...doesn't matter, don't care...qualifications were of no relevance what so ever...just having a qualification is not the be all and end all by any means" (N_M4).

This situation of non-obviousness in the background epistemological and ontological

cultures of inclusion centres on the common mistake of equating learning with

qualifications alone (Fryer 1997; LSRC 2003). But they are insufficient in finding

work, particularly in the ICT industry, as a FE manager narrated:

> "...it's no good thinking that you're going to come out after two years and get a job. You won't you know, there's [no] way...you won't get a job that's actually commensurate with the amount of effort that you put in" (H_M1).

Recalcitrant in the value of qualifications and undeterred by this Gestell's mismatch

between students' and educationalists' experiences, government and Cisco maintain

that the enframing of socio-economic relations towards ICT employability for the

socially excluded is augmented by the CCNA's work placement scheme. Attracting

students to the programme, the importance of this scheme was articulated by a lone

parent female student:

> "I came in with no work experience...that was me, thinking I'm going to get the
> CCNA, [and] I'm probably going to get a job. That's what they were all told, and
> that's what they all expected, cos work experience was there...which was going to
> give me the backing to say I've got the work experience, so now I can go and get
> the job" (N_S5).

However, in reality another mismatch or breakdown emerged where the promise of

work placements materialised in only one of the sites visited, for they proved

problematic in setting up:

> "...[there was] a *company* last week who want[ed] to offer work placements
> but...it was only a two-man show. I don't want to send the students out
> somewhere they're gonna be used as the junk man, dogs-body basically, make
> them a cup of tea...*It's quite hard* getting them to say "yes, we want to do
> placements"...you can't blame them...for not saying "yes, we're going to take
> some to come and mess about in our network" who have never been in the
> environment before, their security comes first" (N_T2).

This community education tutor and other staff across the sites visited found that

employers were reticent in taking on trainees, in part because of the extra work

involved and baffling bureaucracy (LSRC 2003; Steedman et al. 2003a, 2003b). But

yet another situation of non-obviousness unfolds in this Gestell's site of tension

between the epistemological forces and ontological relations of pedagogic

productivity. It takes the form of the risk factor of letting an inexperienced person

tinker with critical networked infrastructure, elaborated by another community

education manager as:

> "The reality of the situation is *most* employers will *not* let the newly qualified
> person anywhere *near* their network system...employers are worried about [the]
> risk...to systems cock ups...[there is a] general fear of failure...*Not*

surprisingly...It's very difficult to find appropriate work experience for somebody doing a Cisco qualification...we can't...nobody will let them *near* a network...[it's] very difficult to get the experience, very difficult to get your foot in the door, and without that it's very, very difficult to get a job...it is a real catch 22...This is indicative of the *low risk* attitude that we are finding, that the private sector is efficient and *risk*-taking...I find [that] laughable...they're immensely conservative...and in a way you can appreciate why...cos if you've got somebody with ten years experience and somebody who has just come out of college...On the one level, you can understand them playing it safe...on the other level, perhaps they ought to be looking at potential rather than actual...The two things are very, very different" (N_M4).

With employers "playing it safe", students had to "sell" themselves, as a female student experienced:

"I have a feeling of a lot of them [students] think you get a qualification...that will get them a job. Does not work like that...The qualification *might* get you the job if you're the right personality...It's up to you, it's life for heaven's sake, everything is up to you. Life just isn't because [I'm] doing this qualification, reward me for doing it. I have to go out there and knock on a hell of a lot of doors to get that [job]...You have to sell yourself" (N_S6).

Part of selling yourself is recounting the years of practical and relevant work experience you have, for what employers look for most is experience in the specific skills required and the ability to learn on the job, particularly in the ICT industry (Rees 1992; DfEE 1999; Steedman et al. 2003a, 2003b). Before 1999, the scarcity of ICT professionals meant that anyone with an interest, or some experience in the area, was recruited and trained in-house, hence many ICT staff today have no professional qualifications (NTO 2001; Steedman et al. 2003b). What is increasingly required is a minimum of two years experience in the field (NTO 2001; Steedman et al. 2003a), and this additional situation of non-obviousness caused concern for a number of students, as one male university undergraduate voiced:

"...a lot of the students are...actually worried cos they don't have the experience, and most of them [employers] actually want one year experience, [or] two years experience...There isn't any work...the companies who are looking for people actually need x amount of years in experience which...none of us I think [have].

[You] learn more from practical experience then actually just theory, learning from books...[you] actually learn by your mistakes" (LM_S2).

The lack of qualification recognition and the inability to guarantee employment or work experience to acquire the critical ingredient for being able to sell yourself, present a fundamental conundrum for VET provision. Some community education managers recognised this conundrum, but it was further compounded by one more distortive breakdown: a dearth in ICT jobs suitable for their student body despite this Gestell's background narrative of a crisis, as one outlined:

> "...we weren't confident, we're still not confident, that what we're providing from the daytime group is actually...in a position to avail themselves of that shortage...data we were given of...the huge job shortage in this area, 80,000 vacancies...okay, that changed, partly because of the downturn in the economy... which did hit IT obviously...I think the shortage is certainly a lot less severe than it was" (N_M4).

This narrative is reflective of FE enduring a deep-rooted prejudice of providing low skills for the academically challenged (Kennedy 1997; Payne 1999; DTI 2001c; UVAC 2002; LSC 2003a), and underpins the rationale for training in meta-skills. To prepare the socially excluded for work, these additional skills are tagged onto the CCNA module in community-based centres, yet they are about pedagogically enframing acceptable, normative forms of personal and behavioural presentation. Reflective of emotional labour, alongside an over-emphasis on the skills crisis, a hidden political economy of ICT skills is revealed which moulds the socio-economic relations of the low skilled toward conformative employability.

7.3.2   A political economy of ICT skills

The skills crisis has been attributed, in part, to the masculine culture of the industry that was outlined in the Literature Review. It is also attributable to the gender gap in qualifications which is reinforced by the cultural production of knowledge that assigns

hierarchical values to, and discriminates against, skill sets (Rees 1992; Adam 1995; Walby and Olsen 2002; Webster 2003b). This production is embedded in backgrounds of gendered perception that de-valorise many women's levels of ability, pay and status. However, the crisis is believed to have peaked between the late 20th and early 21st centuries (Leppimäki et al. 2004). As market instability and industry consolidation precipitated a halt to the phenomenal growth of ICT infusion, with Cisco alone reflecting a drop of some 75% in demand of network engineers, some maintain that the worst of the crisis has passed (NTO 2001; Roberts 2002; Leppimäki et al. 2004; e-skills UK 2005). With little concerted action actually having been taken by companies to address it, a growing trend has been to outsource non-core work to developing countries where there is limited or no protection in the form of organised labour, and production costs are lower (Poynter and de Miranda 2000; Keep and Mayhew 2001; Steedman et al. 2003b; Webster 2003a).

Furthermore, the underlying assumption that employers are shifting to knowledge-based products and services is unfounded in much of British industry. Less than 2% of industry has high-capacity ICT infrastructures, with many firms not requiring ICT skilled employees nor are they trading internationally, and much of the workforce is still involved in routine, low skilled jobs (Johnson 1991; Rees 1992; Payne 1999, 2000; Keep and Mayhew 2001; LSRC 2003). With downsizing and outsourcing instrumental in cost-cutting, demand is not matching ICT skills supply (Greenbaum 1995; Payne 2000; Keep and Mayhew 2001; Lloyd and Payne 2002). This breakdown in policy narratives points to the underpinning political economy of this Gestell's site of tension between the politico-economic forces of productivity and their pedagogic enframing of socio-economic relations.

Not only does the rhetoric of employability not match with practice in reality, as a critical mismatch or breakdown between the epistemological culture of inclusion and the everyday experiences of students, this current British skills profile exposes the nexus of necessary socio-economic relations as a political economy of ICT skills. It positions those with ICT skills in a highly competitive labour market in which they must vie for a relatively small number of highly trained core knowledge workers (Rhodes 1989; Hirst and Thompson 1999; Payne 1999; LSRC 2003). As such, the narrative of enhanced employability for the low skilled in terms of ICT skills acquisition is somewhat misconceived, since those with low level related qualifications and little or no work experience can not compete, as the above narratives and growing unemployment perhaps reflect[8] (Rhodes 1989; Lloyd and Payne 2000; Rozenberg 2005a, 2005b). Restricted to low skilled peripheral work, this pedagogic political economy distorts their ontology through an economic model of human capital where individuals are said to be rewarded for investment in their education or job training (Igbaria and Chidambaram 1997). Yet, the reality of this model appears to equate with little career advancement or higher wage gains, or indeed increases in productivity levels (Greenbaum 1995; Lainema 2003; Feinstein et al. 2004).

Furthermore, this Gestell's political economy of ICT skills reveals a hidden socio-cultural and moral dimension where the augmentation of low skilled students' marketability takes the form of training in meta-skills. By providing such preparation, it amounts to behavioural and presentational relations that govern how a person looks,

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[8] The Office of National Statistics revealed that between August and October 2005 the number of people claiming welfare benefits rose by 2,500, from 834,200 to 836,700 (Rozenberg 2005a), with 21.5% of the working age population in September 2005 economically inactive (Rozenberg 2005b).

talks, thinks, behaves, and sells herself. These attempts at ontological socio-economic integration may be said to shape those on the fringes of society into deferential, acceptable forms of emotional labour which are modelled on the corporate image (Payne 1999; Cornford 2000; Pimlott 2000; Cajas 2002; Webster 2003a). As such, it is constitutive of the commodification of their ontological expression which reinforces the inequity of relations between an employee and the employer or customer (Edwards and Wajcman 2005). Encouraged to internalise these values, it is indicative of social control and the more personal skills become, the more issues of race, class and gender stereotyping are brought to the fore (Bourdieu and Passeron 1990; Payne 1999; Poynter and de Miranda 2000).

This Gestell's moral political economy of socio-cultural enframing of normative ontology is saturated with biases and assumptions of ability that has gendered (Cockburn 1983, 1985a; Rees 1992; Henwood et al. 2000b; Poynter and de Miranda 2000), and ethnic connotations, as a community education manager clearly narrated:

> "…most employers would [employ]…graduates…in preference to a *black*, lone parent" (N_M4).

This revealing of deep-rooted prejudicial preference is reflective of negative associations with FE provision, but more importantly it is indicative of a class, racial and parental positioning of an individual's identity in terms of her assumed background (Arendt 1958(1998); Fanon 1967; Lane 2001; Levison 2001). It is based on stereotyped perceptions of 'what' a person is, that is "the givens of one's life: the axes of his or her identity by location, gender, circumstances of class, ethnicity and religion, sexuality, and private attachment to others" (Lane 2001: 157). It is not based on 'who' that person authentically is or may wish to be seen as. This politics of

identity is concealed by the narrative of equality and greatly restricts employability for those who do not fit normative models of ontology, skills ability or employee profile. Nullifying cultural and individual preferences or variations and blocking awareness of the diversity of existence, this politics of identity reinforces a sense of otherness or difference. Hidden behind this Gestell's background epistemological narrative of equitable inclusion, it distorts the ontological reality of how human phenomena proceed forth, the manner in which they exist and experience life; it negates, in this case, experiences of discrimination.

By providing meta-skills as part of the narrative of inclusive employability, and by cementing the parameters of vocational pedagogy in unsubstantiated economic requirements, the acquisition of ICT skill sets and prescribed ontological expressions for the low skilled run the risk of reducing their autonomy or discretion in terms of work, and their cultural and personal development in general (Rees 1992; Payne 1999, 2000; Lloyd and Payne 2000, 2002; Webster 2003b). This is further amplified by the view that network engineering is not a particularly high-skilled area of expertise (Steedman et al. 2003b). Shared by employers, academics and educators, a community education manager narrated this consideration as:

> "the type of jobs that come up for our particular students, the base level is quite low in terms of what they're looking for in qualification, they're not looking for graduates, not looking for higher qualifications" (N_M1).

In offering training in such work, this socio-political and economic enframing of skills deployment points to the CCNA based VET provision as socialising the low skilled into mainstream culture and peripheral, poorly paid, dead-end jobs, challenging-forth their ontology by further polarising their relation to the labour market (Rees 1992; Payne 1999, 2000; Lloyd and Payne 2000; LSRC 2003).

Today, we are witnessing a range of knock-on consequences of this socio-political and economic enframing of skills which valorises ICT productivity, in part, as a result of the reduced power of trade unions to act on employees' behalf[9]. Increases in job losses, redundancies, suppressed wages, part-time, temporary, casual, contractual, shift, clandestine or unregulated work typify labour market settings (Borjas 2002; LSRC 2003; Webster 2003a; Harris and Wilkinson 2004; Edwards and Wajcman 2005), giving rise to feelings of uncertainty, insecurity and demoralization. Better understood if we view the present economy as service and not knowledge based, for the latter hides the capacity to put knowledge to work (Edwards and Wajcman 2005), these potentially disenfranchising emotions for the low skilled are said to be addressed through the implementation of a social constructivist, student empowerment model of e-learning.

7.3.3   A reality of e-learning practice

Some maintain that the social constructivist advantages of e-learning are oversold, with little back-up evidence of empirical work to support them (Cukier et al. 2002; Lainema 2003). In providing some empirical evidence that runs counter to the narrative of empowerment, the chapter proceeds to suggest that the CCNA pedagogic practice of this model is flawed in reality, giving rise to student frustration and demotivation. In many of the institutions visited, with the exception of Higher Education, little to no formal instruction was observed. Tutors were either absent, or largely engrossed in administrative work such as enabling exam access, checking the

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[9] Some 33% of workers have pay and conditions determined by collective bargaining today, compared with approximately 70% in 1984 (LSRC 2003).

online results or familiarising themselves with regular updates to the programme. This

lack of formal tuition was explained by one FE tutor:

> "...a lot of the technical stuff is getting information across unfortunately...a lot of
> it is information rather than teaching principles of things...[I] do very little class
> teaching...just extra stuff on things like binary numbers...that I think they need,
> because I think the curriculum [covers it] ...obviously somebody has to be around
> [if] they're having a problem...I tried [a] half hour talk at the beginning of each
> class...but really, I found, felt that a lot of it was not terribly useful to them.
> Basically I was just saying "this is what you're going to come across in the
> curriculum today, now read it", I mean, you know, not much use...I personally
> have given that up...there are certain topics which I know they're going to find
> difficult that I would give them extra work and stuff....but then [I say] "do the
> practicals" [they] are very important" (H_T1).

And by another community education tutor as:

> "Engineering is troubleshooting; you have a problem, you've to track down where
> the problem is, where it's stopped working, and then, what are your options to fix
> it...It's sitting with each person when they have a problem more than standing up
> and talking, cos we don't have that. If there were three or four people at the same
> point, I might go and find a flipchart, but very seldom will [that] happen...It's
> good to learn from each other rather than from...me, cos they'll go in and start, get
> the book, [and think] right we'll figure it now...how do we do that, and one will
> say "I know how to do that"...you can't do things for them...Sometimes you feel
> you hover, cos they've all got on fine, so if you're hovering, move out the way,
> cos all you do is look over their shoulder and you don't [want that]" (F_T2).

Because the theoretical aspects were felt to be adequately covered by the online

curriculum, most tutors saw their role as residing in assisting trouble shooting or

elaborating on more complex concepts. By taking this background stance however,

tutors run the risk of compromising their collaborative role, reducing active dialogue

with students and leaving the software to define the goals (Freire 1972a, 1972b;

Walton 2000; Feenberg 2001; Cukier et al. 2002). With technical e-learning seen as

requiring a greater, not lesser presence of tutors, this ad hoc implementation of the

social constructivist methodology contradicts the goals outlined above and in the

Cisco Systems chapter, section 5.3.3, and was perhaps because few tutors were trained

in its ethos, were overworked and under-resourced (Alavi at al. 1995; Millar et al. 2000; Alavi and Leidner 2001; Selinger 2002a; Lainema 2003).

As yet one more breakdown in the epistemological culture of inclusive e-learning, the pedagogic practice of background tutoring left many students to their own devices and this was observed in most of the institutions visited, with much of the students' classroom time given to online reading and assessment procedures. Some students resented this practice, seeing it as a waste of valuable time and extremely boring, with the content repetitive, unchallenging and low-level. The endless drill and repetition in problem solving network configuration reflected the standardized, functional aspects of these courses and did little to inspire many students (Hacker 1990; Faulkner 2001). The CCNA was originally devised for the school-leaving age group, as mentioned in the Cisco Systems chapter, with the current language and design still reflecting this and was articulated by one female lone parent as:

> "A lot of it was based on 16 to 18-year-olds, and that was a little bit irritating and frustrating, because surely they should [pitch] the level a little bit [higher] if you're talking to adults" (N_S5).

Frustration was also voiced regarding the CCNA's intensive use of the American trend for multiple choice testing which provides three to five answers for each question, and was narrated by female student as 'baby-talk':

> "...there's the Cisco course that we're being taught which is baby talk...you can pass the semester tests without really knowing what you're doing, quite easily, so much repetition, you can learn the questions...that's multiple-choice...even though I've done x, y and z, and I've observed things. I don't really know what I'm doing, I don't really know what's involved" (N_S6).

This high degree of repetition is seen as part of a 'spiral' curriculum in which new concepts are introduced within the context of previous ones (Selinger 2002b), but many students did not appreciate this narrowly conceived methodology (Smith 2001;

Young-Bruehl and Kohn 2001). They preferred instead to familiarise themselves with

the format and logic of the assessment questions, and tailored their absorption of the

information accordingly. This utilitarian, constricted approach to learning (Lax 2001;

Watson 2001), combined with the volume of online reading, was equated with

"spoon-feeding", as another female lone parent student narrated:

> "...what they're trying to do is...push the students in the class to read and do the
> exam, but it's almost like babysitting people...spoon-feed[ing] you to study...[if]
> you've had no IT experience, you've never worked with computers, I think...you
> would probably make the exams, but you...will not really understand the full
> concept...also...because when you work in IT...you can take your book and you
> can always check up...if it's a theory, it's like what does this word means. You
> don't necessarily need to know it, you need to know how am I going to it, that's
> more important I think" (LM_S4).

With repetitive content specifically geared toward assessment, students were tested on

'what' they have learnt, leaving little space for deeper comprehension of how

networks function. In part, this is a reflection of the traditional, constricted

representation of technical information in general, where volumes of highly

prescribed, decontextualised and prepositional facts are presented in a dry,

unimaginative manner (Star 1991; Alavi 1994; Herschbach 1995; Bowker and Star

2000; Henwood et al. 2000b). Rarely incorporating the social, economic, political or

philosophical aspects of technology (Dahlbom 1996; Henwood et al. 2000a), such

didactic, explicit, true or false representation has a high focus on binary and

algorithmic computation to ensure students are cognisant in optimising speed,

reliability, portability and precision (Denning 1991; Nonaka 1994; Hedesstrom and

Whitley 2000; Machamer 2002). Perceived as equipping students with neutral and

pure tools geared toward the formulation of fixed, abstract and generalised network

laws and theories, this functional and standardised enframing of technical education is

thought to be detached from subjective processes (Hacker 1990; Grundy 1996; Dahlbom and Mathiassen 1997; Watson 2001).

Whilst this style of delivery may facilitate the acquisition of specific knowledge drawn from expert members in various communities of network practice (Dahlbom and Mathiassen 1997; Wenger 1998; Bowker and Star 2000; Hanseth 2004), as such it offers limited pedagogic exploration. This was observed in the field where there was little space or time for personal interpretation, reflection, integration, or indeed flexibility in working at one's own pace, since students had to regularly demonstrate through the assessment procedures that they had got the cognitive domain 'right' (Hawkey 2000; Henwood et al. 2000b; Islam 2002). But whilst students may have selected the 'correct' answer that did not necessarily mean they had understood the concepts, as the "baby-talk" narrative highlighted. This representation of network information, combined with the above narratives, reflects one major breakdown in e-learning delivery if it is not sensitively and imaginatively delivered. It can be reduced to e-reading, where traditional text book content is simply transferred online (Laurillard 1993; Alavi 1994; Hamid 2002; Hunt 2002; Islam 2002), as one female instructor commented:

> "...there's loads of content out there and it's crap, it's e-reading, why read from a screen if not from a book!...that's why we're not keen on the e-learning style. It's good as a tool that you take home, but nothing beats going out, cos e-learning, if you push the next key, it tells you the answer" (F_T2).

A risk in replacing the tutor with a surrogate teaching machine and using highly prescribed precepts of the networking world is that the learner fails to actively engage in the learning process, but rather linearly, docilely and routinely progresses through menu driven options (Laurillard 1993; O'Riley 1996; Islam 2002; Lainema 2003).

This style of learning not only inhibits browsing and exploration that books facilitate, but also can contribute toward isolation of the student (Millar et al. 2000; Feenberg 2001; Hunt 2002). This was also observed in the field where most students sat on their own, worked through paper manuals on instructions or exercises and followed the prescribed procedures automatically. The promise of choice and active, collaborative learning was dispelled by these narratives and observations.

These practices were sufficient to turn many students away which the high drop-out rate of the CCNA during the first semester reflected, and was particularly pronounced in terms of women[10]. Exposed to confusing binary and algorithmic fundamentals of networking during this period, some female students expressed anger and frustration with this style of pedagogic delivery, feeling they had been enrolled on the CCNA purely to up the numbers, as one female lone parent strongly expressed:

> "...the course is geared to attract single mums but...they're obviously targeting women who haven't got a clue until they get halfway through the course, and they realize 'hold on a minute'...if they start investigating on jobs and issues and what's realistically out there...they'd given you false information because they wanted *bums on seats*...it's money...*a computer conveyor belt*...don't throw me in at the deep end [to] drown basically...I need a job that isn't going to take up much time as I don't have the support...they knew my situation, *this is what's so frustrating*, they knew it was difficult for me...I was naïve...it's frustrating when you know you can achieve something...there's no support...they've made me feel shitter than thick, and that's just killed me...these women like me who are thinking of getting out of the rat race...they're de-motivating me...*they're setting us up to fail*...at the end of the day, it's down to us" (N_S5).

This narrative provides a critical ontological challenging-forth of this Gestell for students, where the inadequacies of functional, technologically deterministic training

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[10] The exact drop-out figure is hard to ascertain. It took two years before this researcher could acquire statistical information on students' enrolment and completion and when she finally did, they were incomplete and impossible to draw conclusion from, with Cisco representatives acknowledging it was 'a mess'. One general statistical breakdown of the student body in 2002 revealed 40% attending on a part-time basis, 34% full-time, with 23% not responding to the questionnaire, but no statistical information was provided on those who did not complete the programmes (CLC 2002).

initiatives leave many with a sense of demotivation, failure, disempowerment, erosion of confidence, and little hope for personal improvement. As this lone parent articulated, her what-ness is positioned in the sameness of all socially excluded learners, enframing their learning process as simple transferral of facts and information based regurgitation.

Bringing to mind Freire's concept of pedagogy as a 'banking' system, "the scope of action allowed to the students extends only as far as receiving, filling, and storing the deposits" of information (Freire 1972a: 46, 1972b; Gordon 2001). Presented in a highly standardised manner, mechanistically, meaninglessly and passively memorised, as such the practice of the CCNA VET model sits in contrast to a social constructivist goal of generating a web of understanding and insight by spoon-feeding students with disassociated concepts and baby-talk procedures. Running the risk of perpetuating a culture of silence or disenfranchisement, such a banking depository of technical information does little to enhance the holistic needs of socially excluded people (Freire 1972a, 1972b; Millar et al. 2000). In using pedagogic practices that de-valorise individual forms of expression and presentation, and specifically contouring their skills acquisition, the above mismatches or breakdowns in the CCNA VET provision contradict pedagogic empowerment espoused by the epistemological and ontological cultures of inclusion. For such practices negate a vital aspect of education, one that encourages a more conducive route to authentic self-empowerment through the fostering of inquiry and reflection (Arendt 1954(1961); Freire 1972a, 1972b; O'Riley 1996; Kellner 2001; Levison 2001).

7.3.4 An alternative approach: holistic support

With a pedagogic approach of intellectual and social distance from students that many academics adopt, a further "part of the problem in recruiting female graduates relates to the content of the courses and how they are presented and taught" (Robertson et al. 2001: 115; Greenfield et al. 2002; Steedman et al. 2003a). Reflective of an array of gendered discriminatory experiences, ranging from sexist and hostile male lecturers and students unsure perhaps of how to work with women colleagues to derogatory gossip, lewd innuendoes, bullying, harassment and feelings of isolation, these exclusionary practices of otherness have the effect of systematically undermining and turning away many women (DTI 2002; Greenfield et al. 2002; Selinger 2002a; Guffins 2003). Yet, by broadening computer science based content and preparing students for the realities of the technical working world and its communities of practices, strategies for survival may be more realisable.

If pedagogy shapes how we perceive, understand, interpret and experience the world, the challenge of education is to nurture these processes (Arendt 1946(2002), 1954(1961); Freire 1972a, 1972b; Chafy 1997). For Arendt, this is the essence of education, a term she refers to as 'natality' which connotes a nurturing of a person's state of becoming, her space of possibilities or who-ness (Arendt 1954(1961); Gordon 2001; Levison 2001). Pedagogy, in this sense, is about encouraging engagement with our sense and experience of 'who' we are and how we have become so and whether change has to come from within, or from wider socio-political endeavours. By going beyond calculative, rationalised, one-tracked thinking and opening up its essence to a broader richness of human existence (Heidegger 1954(1968)), this holistic pedagogic

model may enable students to engage with how both technical knowledge and personal experiences shape them and the worlds in which they exist.

Such an approach to the learning experience encourages us to explore our own potential and the backgrounds in which we are positioned as low skilled, socially excluded, black, woman, or 'other' (Arendt 1954(1961); Gordon 2001; Levison 2001). It enables us to respond in a more meaningful manner when we encounter mismatches between 'who' we are and 'what' we are expected to be, and balances our ontological security on more stable, personally meaningful ground. This broader, more democratic framework for inclusive citizenship has the starting point of the actual not perceived needs of the learner, and so affords a real, critical base on which to engage with the world (Arendt 1954(1961); Freire 1972a; Payne 1999).

This holistic approach was observed in one community education establishment, and its success in finding employment and work experience for its predominantly female students was remarkable and unique. The centre's achievement was clearly a result of its staff's highly supportive practices developed in response to a common background of women students, particularly lone parents. Enmeshed in an otherness of violence and sexual abuse, the female community education manager, whose similar background was transcended by feminist awareness, felt the provision had to tackle these experiences for the benefits of so doing were immense, as she explained:

> "...I would say there's at least a third of our women [who] are adult survivors of child sexual abuse, and I think that's conservative...we realized a lot of these women are gonna need very intensive one-to-one, and sometimes psycho-sexual counselling [that] we couldn't provide. If we are truly going to be supportive, and I am looking at the whole woman and this holistic package, then I can't say "look I'm sorry, we can't deal with that bit of it...We get young women, and older women, 50 plus, who come and say "I can come on course so long as I'm home in time to make his tea", amazing! Always second place, always behind everybody

else, always caring for somebody else in their lives, and forgetting to care for <u>us</u> and feeling guilty if we do. When you add sexuality, race, age, disability on top of all of that!...They used to being spoon-fed...they don't know necessarily how to take responsibility for their learning...and also, very much, to having a kind of survival mechanism that they either run like hell, or they're aggressive as hell...they'll turn and run rather than be challenged, or they'll smack you in the mouth...[For] a lot of women, it's the first time...they've felt safe enough, and everything comes out...and it's like...if you try and deal with them holistically, they can't leave their baggage at the front door...the plus for us is the women. They'll come in at the beginning of the training year, can't look you in the eye, or they wanna smack you in the mouth, and they *walk* out negotiating their salaries with the company, talking to the colleges "well, you're not teaching me properly, so you'll have to do better than that!". That is the life changing bit of it...not only just for a single person but the whole family unit: [the] awareness raising, [the] dropping the pebble in the pond and waiting to see what the ripples do...It is knowing when to challenge and when not to challenge...[and] that involves staff time and staff commitment, and staff motivation and understanding, which we haven't always got, and the *willingness* to challenge" (F_M1).

This powerful narrative sums up the benefits of incorporating a comprehensive package that does not solely evolve around qualifications or networked technological expertise, and provides a route to this Gestell's resolution. It presents an opportunity for reflection on a more inclusive model of pedagogy that addresses the otherness of social exclusion and gendered oppression. It gives concrete substance to the notion that technology per se is not the source of blame for the practices outlined in this chapter, rather the ways in which it is used (Feenberg 2001). By adapting such an approach, the who-ness of lone women parents may be developed and the inclusion drive for employability through ICT skills acquisition given greater empowering potential. For if e-learning and vendor-specific qualifications are part of the future of education, and the policy vision for lifelong learning risks valorising its functional, utilitarian methodology, then these women may engage with such strategies in a manner that does not strip away their pedagogic freedom, nor their personal mechanisms for realising their own sense of active responsibility and employability.

7.4 Conclusion

With a knowledge triangle of education, innovation and technology thought to be increasingly essential to prosperity, employment and inclusion in the new economy (Millar and Jagger 2001), the politico-economic forces of ICT productivity are augmenting supply of this triad. In a move to accrue RSV by ensuring the labour force is adequately prepared for this 21st century demand, FE reforms seek to widen participation and turn round the legacy of low skills through virtual training programmes such as the CCNA. Presented as consolidating and standardising ICT skills, inculcating a critical culture of lifelong learning and improving the pedagogic process, the reality of such an ICT VET background is exposed as meeting the needs of business and government, and not those of many students.

Data from the field points to the CCNA vendor-specific qualification and its alignment with NVQ level 3 as not particularly valued by employers. Preferring concrete work experience, this prerequisite for ICT employability remains elusive for the low skilled, in part because the narrated labour profile is based on a very small sector of the GNP in which demand is not matching supply. Struggling to find a footing in a highly competitive labour market, students from socially excluded backgrounds are encountering prejudice and lack of validation of their expertise. As these breakdowns convey, the epistemological narratives of inclusion presented in this Gestell are seriously mismatched in practice, for the simple acquisition of ICT skills appears insufficient for employability. Having pronounced consequences for the ontology of those classified as socially excluded, the exposure of this political

economy of ICT skills sees the allocation of differential and meta-skills to these people according to their perceived ability levels.

The socio-cultural and moral moulding of the low skilled is a key ingredient of the epistemological background enframing of citizenship inclusion and, geared toward the generation of ICT human and social capital, it builds specific low value pedagogic capital. Objectively masking their ontology, the exposure of this conformative enframing reveals the inessential essence of this Gestell: the shaping of docile citizens according to the dominant politico-economic order of our time, and as a mechanism for inclusion it acts as a form of social control. Stereotyped by class, ethnicity, gender and ability, this politics of identity entraps students in the social regulation and pedagogic standardisation of skills acquisition, risking further constriction of their personal empowerment.

Hidden and reinforced by the ICT valorisation process, this socio-political and economic enframing of standardisation and conformity reflects a pedagogic challenging-forth of a quick-fix, techno-economic paradigm of cultural inclusion. Embedded in the technologically determinist model of the CCNA and in its pedagogic style of delivery, this Gestell's background is revealed as a functional, instrumental and authorative means to employability which positions the low skilled in a utilitarian market oriented endeavour. Reducing students' autonomy and discretion, and commodifying their labour in specific ways, the effect is to consign them to further unemployment or poorly paid, dead-end work and risk amplification of labour market segmentation. Falling short of the narrative of empowering social constructivist e-learning, that which is revealed is a narrowly conceived, universalised and

standardised banking practice which explicitly prescribes 'what' and how students must learn in a decontextualised factual manner.

Culturally, commercially and technically specific, it restricts rather than diversifies education to variation in ways of seeing, understanding and acting in the world. By de-valorising these spaces of difference, the quest for uniform solutions presents a one-dimensional pedagogic model, misrepresenting information as knowledge and causing confusion in policy formulation (Newell and Galliers 2000; Watson 2001). Presented as meeting the needs of all, against which students are measured and into which they must fit, in reality many struggle to adapt to its form. "Spoon-fed", left to their own devices and exposed to "baby-talk", their learning becomes a passive, rote process in standardised skill acquisition. As such, the CCNA VET model can not be said to adequately address the legacies of low skill levels or low productivity, nor can it comprehensively meet the needs of those at risk of social exclusion. For the simple acquisition of functional, short-term and emotional skills does not necessarily equate with increased labour market mobility, or indeed translate to higher wage gains or productivity levels.

In restricting their agency or spaces of possibility by refining and reworking citizenship inclusion toward employability through ICT and meta-skills acquisition, current policy does not remove or indeed modify the roots of exclusion. By giving free reign to the business force of productivity to regulate the pedagogic process in its own form, this ICT valorisation of the labour process compromises the opportunities of those exposed to its logic and will. By displacing focus from transforming and understanding 'what' students are and 'who' they may wish to become, that which

emerges is further reinforcement of their socio-economic positioning and feelings of failure and frustration. That such direction perpetuates Britain's policy cycle of launching one skills supply initiative after another, it reflects the displacement of concrete needs of the low skilled in short-term labour market demands (Lloyd and Payne 2004). In blurring the demarcation between business and state sponsored learning students' authentic experiences are turned away from self-discovery and a deeper comprehension of their personal identity and social circumstances.

Summarised in the table below, this Gestell, as the socio-economic and political enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity, is shaped by a background political economy of skills which holds moral dimensions. Mediated by the epistemology of ICT employability, the production of pedagogic capital through the ontology of ICT skilled citizenship exposes a site of pedagogic tension that reflects standardisation of skills and conformity of expression. Detrimentally enframing the socio-economic relations or experiences of the low skilled, the practice of bringing business-led enterprise into education appears to control their learning experiences and articulations of who-ness, and to severely compromise pedagogic exploration and critical reflection.

Table 7.1: A Network Engineer Training Gestell

	Valorisation of ICT productivity	Political economy	Inclusive cultures	Enframing of capital	Tension
NETG ≡	Relative surplus value of knowledge work	Skills	Employability through ICT skills acquisition and meta-skills	Standardisation of pedagogic capital	Vocational pedagogy and socio-cultural control

Deeply entrenched, broader and longer-term dimensions of exclusion can not be challenged within this vocational pedagogic model of inclusion, nor can the problem domain of women's inclusion to ICT fields. With a feeling of "bums on seats" or cogs in the "computer conveyer belt" of capital accumulation, lone women parents are questioning the benefits of such training. Demotivated and with a strong sense of disempowerment, this answers the subsidiary research question of what is the background of ICT vocational training policy and how does it shape the who-ness of socially excluded women. Concluding that for some windows of employability and empowerment may open, for others these feelings may bar them. For in failing to address discriminatory politics of identity and common abusive experiences that many women encounter, and in managing them as if they were malleable objects without power, direction, motivation or ability to think for themselves, the government and business myths of equality hide and reinforce such exclusionary and oppressive practices.

By de-valorising their specific circumstances, this Gestell's model for inclusion is at serious risk of reinforcing their otherness by assuming an epistemology and ontology of sameness. In the first instance, their experiences of abuse and violence are silenced. Often constituting the grounds of divorce or separation, lone women parents require additional support during these instantiations of personal transition and may be particularly dependent on public welfare protection, as the previous chapter outlined. In de-valorising this vital service and this common background of domestic oppression, a gendered dimension of this Gestell is unpeeled as an ontological challenging-forth that hides regulation of 'what' normative family life should entail. Consigned to suppression, individualisation and stigmatisation of their traumas, this

considerable constriction of their spaces of possibility is further amplified by the second instance which is reflected in the catalogue of breakdowns. Struggling to find employment or work experience commensurate with their network engineer skills, the racial, class and gendered politics of identity serve to reinforce, not address, the techno-gender relations as they stand and can only propagate and deepen ontological insecurity.

Yet this tension may present an opportunity for reflection; in tearing away facades and obliterating a "piece of the world, something common to us all is destroyed", but through this annihilation we may come to reflect on current practices (Arendt 1954(1961): 174). If education is not just about formal outcomes - pass rates or grades, but also informal ones - perceived levels of confidence and ability that reflect ownership of acquisition at more personal levels (Henwood 2000; Henwood et al. 2000b), then pedagogic practices that address this offer alternative avenues for inclusion. In being given space and time to express and share a common background of oppression, a more authentic sense of empowerment and personal awareness of social circumstances may give rise to greater confidence and acquisition of strategies for engaging in the world, in a manner that does not evolve solely around employability or ICT skills acquisition. Such a pedagogic essence may generate a domain independency of skill and transferability of experience, expertise and knowledge (Payne 1999), in which control of and responsibility for the choices that are made are more conducive to an authentic sense of spaces of possibility or ontological security. Perhaps by reflecting on this model, the diversity of the techno-gender relations may be further unpacked, their black boxed associations and the what-ness of each variable dispelled.

Despite these shortcomings of this Gestell's epistemological and ontological cultures of inclusion, government and Cisco continue to maintain that they provide the answer to the problem domain of women's low participation in ICT fields. Viewed as particularly vulnerable to ICT exclusion, the following comment posted on a Cisco Academy website outlines the importance of their inclusion:

> "women throughout the world often run the greatest risk of being excluded from the opportunities offered by the field of IT. Without proper recruitment strategies and training, women...will continue to be left behind unless we take action now" (CNAP 2004).

Narrated as possessing communicative and collaborative 'relational' skills that are positioned as highly valuable in today's customer facing business environments, women's opportunity lies in their active participation in the ICT workforce. Held as augmenting and diversifying labour market skill sets, the thesis now turns to a Gender Gestell in which this epistemological and ontological background to women's inclusion sees policy formulation attempting to feminise ICT.

ICT feminisation policy and equity tension

8.1   Introduction: ICT valorisation and care

With increased labour market participation the government's goal, citizenship today for the socially excluded requires greater active responsibility and ICT skills acquisition as the two previous chapters described. As instantiations of the ontological enframing of inclusive relations, the central rationale of the politico-economic ecosystem of partnerships between government and business seeks to further the valorisation process of ICT productivity by ensuring associated employability and entrepreneurship. Contextualised within a background of two British legacies of low productivity and low skill levels, this ecosystem is keen to address one more legacy mentioned in the Literature Review: the low participation of women in ICT fields.

Utilising the same structure as the two previous chapters, this one focuses on the feminisation of ICT and relational expertise as the specific epistemological and ontological cultures for women's inclusion that were also introduced in the Literature Review. Exploring the what-ness of these ways of knowing and being in the ICT business world by narrating the background policy of government, critical attention is paid to how the valorisation process is enframed by the politico-economic forces of productivity. How this influences the experiences or socio-economic relations of women will be investigated by highlighting a core site of tension.

With the new mode of production narrated as requiring not only ICT expertise but also customer care or professionalism, this blend of skills requires greater

diversification of the workforce. Central to this requirement of the new economy are women for they are perceived as 'innately' possessing 'relational' expertise, hence new policies and strategies are necessary for assuring that this present valorisation of their human capital is deployed. Using the term 'gendered capital' to convey this legalization and utilisation of women's specific labour, the chapter explores some key recommendations which take the form of: revamping the industry's negative image to convey the attractiveness of an ICT career; targeting young women to encourage their interest; implementing role model and ambassador programmes to provide greater support; gender mainstreaming to ensure corporate cooperation at policy level; and encouraging work-life balance (WLB) flexibility in the labour process to improve retention. Narrated as taking into account women's difference, this affirmative action is believed to address the failure of earlier equal opportunity programmes to improve women's inclusion to the ICT fields, and to foster greater socio-economic opportunity, earning potential, equity and empowerment.

In presenting this epistemological background of references to the feminisation of ICT, the chapter proceeds to analyse it using the social shaping and social constructivist perspectives. As in the two previous chapters, these perspectives are merged with a phenomenological approach which explores situations of non-obviousness or breakdowns in this background. Two key political economies emerge, where that of a gendered labour market one is an instantiation of the other, flexibility, and both point to the central site of equity tension which is reflected in the part-time employment experiences of low skilled women. Application of these theories suggests that the current feminisation of ICT may be linked to their cheaper forms of labour, where the narrative of equitable flexibility distorts and exploits their inclusion

by acting as a politico-economic structure of capital valorisation that reinforces essentialist classificatory ideology.

By taking a closer look at the narrative of WLB flexibility and contextualising it within the wider setting of the labour market, it is argued that this narrative is part of a broader valorisation process. Speeding up the productive process or the accruing of relative surplus value (RSV), it also lengthens the working day or the accumulation of absolute surplus value (ASV). Used by employers to adjust the size of the labour force and rationalise production, flexibility undermines employees' stability by reducing pay, employment protection and conditions of service. As such, the epistemological narrative of flexibility acts as a key situation of non-obviousness which points to the equity site of tension between the forces and relations of ICT productivity.

This hidden political economy of flexibility in the labour process is exposed by looking at one of its major forms, part-time employment, where the disproportionate percentage of women, particularly those with care responsibilities, reflects a legacy of inequalities in terms of remuneration, promotion and skills enhancement. Constitutive of a historical political economy of gender which cheapens and undermines low skilled women's relation to the labour market, its instantiation questions the newness of flexible forms of work. The chapter suggests that these inequalities may have the effect of undermining productivity in the long-term, but bolstering it in the short-term. For, clustered in a limited range of industrial sectors, low skilled women's occupational choice is severely restricted and the feminisation of ICT presents a reality of low-level employment, where part-time work commensurate with network

engineer expertise is lacking. Reflecting discriminatory practices, the ICT industry's

long working hours culture of productivity accrues another instantiation of ASV,

further prohibiting inclusion for lone women parents.

In presenting these breakdowns in the epistemological and ontological inclusive

narratives of equity and opportunity, the chapter attempts to address the main research

question of how the what-ness of ICT inclusion background policies shapes the who-

ness of socially excluded people. By taking the subsidiary question of what is the

background of gender inclusion policy and how does it shape the who-ness of socially

excluded women, the chapter reflects on the ontological enframing of their citizenship

as relational. With this expertise non-validated and women's technical competence an

ongoing recalcitrant oxymoron, attempts to reconfigure ICT working culture by

utilising an essentialist, classificatory association of femininity serves to amplify the

tensions in the techno-gender relations, not turn them round.

Concluding that this Gender Gestell presents a socio-political and economic

enframing of classification through distorted narratives of equity, the valorisation

process of ICT capital is strengthened but the experiences or who-ness of women are

compromised. By hiding the negative implications of flexible relations and

epistemologically and ontologically prescribing a highly classificatory gendered

validation of difference, women's otherness is reinforced. As such, their citizenship

and inclusion to society and ICT fields are adversely moulded by this gendering of

their capital and neither equity nor inclusion may emerge.

8.2   A feminisation of ICT policy background

8.2.1   A care economy: the importance of diversity and relational skills

With over 56 million inhabitants or subjects of the crown, Britain's domestic setting reflects a broad and diverse population: 7% of which are of Black, Asian or other ethnicity; speak over 300 different languages; and practice at least 14 different faiths (LSC 2003b). This diversity is narrated as a national resource in today's 'global' economic setting, one that should be reflected in the workforce to bring people together, foster greater respect and understanding of difference, help tackle social exclusion, and ensure greater representation of the multifaceted customer profile (CWSET 1994; Fredman 2002; Greenfield et al. 2002; DTI 2003b; LSC 2003b). Today, increased customer satisfaction in ICT solutions is regarded as essential for success in the service economy, and is reflected in another concept used to describe new economic relations, that of customised care (DTI 1998a, 2003b; LSRC 2003).

This background of care entails not only ICT expertise, but also communication, collaboration and negotiation skills (Castells 1996; DTI 1998a, 2001c, 2004a; NTO 2001; Webster 2003a). In part, this customised care has evolved as a response to the phenomenon of ICT systems failure where poorly defined requirements, and ad hoc tinkering with design and implementation often result in inappropriate solutions (Ciborra 1999; Fleck 1999; Ciborra and Hanseth 2000). ICT systems' success is a highly uncertain process, in part due to the asymmetry between customers, users and developers, and its process is predominantly an outcome of 'learning by trying' and dependency on the liaison with groups that come to adopt the technology (Fleck 1999; Bijker and Law 2000). By involving these groups in the processes of construction and

performance, communication must be less technically orientated and more sensitive to human socio-cultural dimensions (Walsham 1993; Wilson and Howcroft 2000; Wilson 2002; Mitev 2003).

As part of ICT professionalism, improved sensitivity to customers and users places a premium on face-to-face interaction, where people orientation, self-awareness, empathy and flexibility in styles of interaction constitute the required human capital (Castells 1996; Payne 1999; Lageson 2003; Webster 2003b). This 'soft' or relational expertise is sometimes referred to as 'hybrid' skills (Woodfield 2002), or 'emotional intelligence' (Fletcher 2001; LSRC 2003), and is narrated as enabling better management of complex requirements that networked e-business environments generate (DTI 1998a, 2003b; Millar and Jagger 2001; Woodfield 2002; LSRC 2003; Webster 2003b). This expertise is said to be in short supply, and in the attempt to turn round the third legacy of the low participation of women in ICT, women are now narrated as vital to ICT professionalism and to the diversification of the workforce (CWSET 1994; Greenfield et al. 2002; DTI 2001b, 2003b; Rübsamen-Waigmann et al. 2002).

Perceived as 'innately' in possession of this relational expertise, this background positioning of women's otherness holds them as better at sharing ideas; paying attention to people problems; charming, cajoling and calming clients; bargaining with delicateness, forgiveness, flexibility; foregoing ego-ness; and offering no-nonsense solutions (DTI 2001b, 2003b). These pragmatic and relational engagements with their worlds are said to place them in high demand in the changing and diversified customer, supplier and partner-facing environments of today's economy. As a

spokesperson for the Department of Trade and Industry commented, their "multitasking abilities and desire to communicate... offer an ideal breeding ground for the new economy", making sound economic sense to proactively recruit and retain women in the ICT industry (CWSET 1994; Kennedy 1997; DTI 2003b[1]). This 21st century emphasis on women's 'innate' relational expertise constitutes the present day epistemology of the feminisation of ICT (DTI 2001b; Rees 1992; Lageson 2003). As such, it represents the ontological challenging-forth of their inclusive citizenship through the reconfiguration of gendered work relations (Hakim 1993; Beck and Beck-Gernsheim 1995; Walby 1997; Bauman 2000).

In defining their what-ness in such a way, this epistemological and ontological enframing of gendered capital locates women as "the single biggest, most undervalued and underused human resource" (CDL 1993; CWSET 1994; Greenfield et al. 2002: 36). To miss out on their perceived relational strengths is tantamount to economic constriction and exclusion from personal empowerment (PAT 1999; DfES 2001b, 2003; Greenfield et al. 2002; DTI 2003a, 2003b). Ignoring this unused gendered capital is akin to robbing society of their diverse abilities, to draw from "only half of the talent pool, and address only half of the marketplace" (CWSET 1994; Greenfield et al. 2002: 34). Such omission is not cost-effective, undermines the critical mass approach and reinforces the shrinking pipeline analysis outlined in the Literature Review. Investment returns on their training and expertise are lost if women leave, either to start a family and decide not to return to the labour market, or choose another career which they regard as more conducive to family commitments (Millar and Jagger 2001; Greenfield et al. 2002; Roberts 2002; DTI 2003b).

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[1] A comment made by Patricia Hewitt, then Secretary for State, Department of Trade and Industry.

Since the 1970s and early 1980s, the government has sought to encourage more women into the IT arena. A range of equity programmes attempted to address inequalities brought about by prejudicial perceptions of their abilities by focusing on positive discrimination to widen their opportunities (Cockburn 1985a; Wajcman 1991; Henwood 2000; Trauth 2002; Woodfield 2002). Proactive recruitment with compensatory strategies, such as additional grants and set quotas for computer science courses, and specific championing in related employment settings were the norm and means by which women could be given a helping hand to reach their potential (Cockburn 1985a, 1985b, 1999a). The underlying logic being that if positive discrimination facilitated the same opportunities, women and men could compete on equal terms and thereby facilitate inclusion to the IT status quo (Wajcman 1991; Henwood 2000; Panteli et al. 2001; Trauth 2002).

However, these strategies did not achieve the results hoped for (Cockburn 1985a, 1985b, 1999b; Wajcman 1991; Gheradi 1995; Adam 1997; Faulkner 2001), with more women continuing to leave the ICT sector[2] in the 21st century than entering it (DTI 2003b). They failed, in part, because the analysis of the time largely focused on biological difference and, as the Literature Review chapter highlighted, this application did little to further understanding of how these variances excluded or discriminated in different ways in different industries and occupations. However, this line of argumentation is currently supported by Cisco Systems in the form of the legacy of inhibitors which was also conveyed in the Literature Review. Stressing the necessity for additional assistance through compensatory strategies, British policy

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[2] Interestingly, in terms of older women, this is also the case across all industrial sectors, for they appear to be cutting their losses in terms of the lack of promotional opportunities and making a fresh start in another direction, such as setting up their own businesses (DTI 2003b).

documentation today, whilst beginning to reflect the need for consideration of cultural influences, also shares this approach (DTI 2001a, 2001b; Greenfield et al. 2002). In acknowledging that the legacy of inhibitors and cultural discriminatory factors run deep and wide, it is hoped that by promoting their perceived strengths their different ways of acting in the world may be better acknowledged and institutionally accommodated to further the drive toward inclusive citizenship.

This strategy for ICT inclusion is narrated as improving women's socio-economic position by increasing their earning potential, their career development and labour market mobility, and hence their independence (Kolding and Milroy 2001; Taggart and Needham 2001; Rochlin and Boguslaw 2001; Milgram 2002). With these advantages emphasised as beneficially impacting on their families, the government is recommending greater awareness of the benefits of a diverse and equal workforce. By encouraging an ecosystem of partnerships with the wider business communities, a multidimensional axis of politico-economic inclusion mechanisms is aimed at challenging the key issues identified.

8.2.2   An array of inclusion strategies

ICT or SET (Science, Engineering and Technology) careers can be regarded as an unattractive option for many women. Finding work is perceived as a matter of luck and not necessarily linked with expertise, pay viewed as poor, and job options held as limiting, boring, repetitive and offering little control or scope for human interaction (Millar and Jagger 2001; DTI 2002; Roberts 2002). In an effort to dispel these perceptions, a number of strategies have unfolded which recommend running ICT training courses in non science or maths departments, or in single-sexed classrooms

which are seen to provide less intimidating environments and afford better support

(Rees 1992; Faulkner 2001; Greenfield et al. 2002). Other strategies that specifically

seek to convey the benefits of an ICT career are: providing role models and mentoring

schemes; and targeting young women at the critical age of puberty by positively

revamping the image of ICT (Osborn et al. 2000; DTI 2001b; e-skills NTO 2001;

Millar and Jagger 2001).

8.2.2.1 A revamping of the ICT image

The importance of ear-marking young women was outlined by a female Cisco

representative as:

> "Evolutionary changes happen at puberty, development of the brain at puberty
> show differences between boys and girls...e-skills[3] are doing these computer clubs
> for girls. They are all over the country, and they've developed these pink and
> fluffy packs...We've got to get them in somehow, so we're going for their
> interests and if their interest is pink and fluffy, fine. Let's get them in...It's very
> attractive, it's very feminine activities, design a poster for advertising your
> favourite pop star's new album, fashion stuff...What we want to do is try and get
> these girls into IT Essentials[4] which they can do at fourteen, and then into the
> Academy program so we get them building PCs at 14, and then they want to do
> the Academy program and we can get them in...Computer Clubs For Girls are
> really taking off, they've had a lot of interest, and a lot of support from some of
> the IT companies. This is boosting the work force" (C1).

As part of the socio-cultural valorisation of ICT productivity, this comment was

reinforced by a government representative[5] who conveyed the impression that ICT

skills would provide "lucrative employment" for young women:

> "Internet networking skills will enable girls to secure lucrative employment in the
> new economy...everything that we do is affected by the Internet" (DTI 2003b).

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[3] E-skills UK is the industry driven Sector Skills Council for IT, Telecommunications and Contact
Centres whose remit is to improve general IT skills in the UK. http://www.e-skills.com (accessed July
2004).
[4] A CNAP programme which provides introductory information on computers and networks.
[5] A comment made by Patricia Hewitt, then Secretary for State, Department of Trade and Industry.

By tapping into young women's perceived cultures of fashion, mobile phones and music, a range of brightly coloured media advertising and schemes like the Computer Clubs for Girls[6] are utilised to convey a 'can do' association (DTI 2001a, 2001b; e-skills NTO 2004). In tailoring digital skills toward personal, social and fun activities, and making the link between ICT and rewarding careers, it is hoped to break the negative 'technophobic' and 'geekish' associations mentioned in the Literature Review (Millar and Jagger 2001; Guffens 2003; van Oost 2003). To support this strategy, the use of role model, mentoring and ambassador programmes have been implemented to ensure senior female managers act as 'gatekeepers' to raise women's profile in the industry and widen dissemination about ICT career opportunities (Osborn et al. 2000; Millar and Jagger 2001; Greenfield et al. 2002; MentorSET 2003; DfES 2004b).

Designed to help women feel less isolated by providing support and guidance in challenging organisational power structures, the 'glass ceiling' or 'glass wall' barriers and discriminatory practices that the Literature Review referred to may be shattered (Osborn et al. 2000; Newell 2001; Robertson et al. 2001; Guffens 2003). Such strategies also provide the gatekeepers with a consolidated network of female expertise to further these goals and ensure 'gender mainstreaming' in corporate policy (Osborn et al. 2000; Greenfield et al. 2002; Rees 2002; DTI 2003b; W&E Unit 2003; NTR 2005). As also outlined in the Literature Review, mainstreaming involves the

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[6] The Computer Clubs for Girls campaign is a joint project between e-skills UK (formally e-skills NTO) and the ICT industry. It was piloted in September 2002 in the south east of England, with national rollout planned for September 2004. The clubs seek to encourage the development of ICT literacy through use of specific software such as web design and games. (http:// www.e-skills.com, accessed July 2004).

systematic integration of gender equality into all national and organisational policies to improve socio-cultural awareness (Rees 2002).

To deliver this background inclusive culture of change, the fragmentation of organisational efforts needs to be reduced for a number of public and private sector organisations and networks have evolved to offer encouragement, advice, support and information for women in, or thinking about, SET or ICT careers. It is estimated that some 70 organisations, projects or initiatives in Britain, such as WES[7], WISE[8], WiTEC UK[9], AWiSE[10] and Portiaweb[11], are dedicated to increasing women's participation in these areas, but they tend to work alone, are poorly resourced and generally lack effectiveness (Greenfield et al. 2002). Therefore, these organisations and related government agencies, such as the Women&Equality Unit and the Women and Work Commission, are to have closer synergies between business, education and gender interests to bring about the critical mass.

Through such ecosystem collaboration, a further inhibitor has been identified, that of balancing domestic care with work responsibilities (Work and Parents Taskforce 2001; DTI 2003b; W&E Unit 2003; W&W Commission 2005). The ICT industry has a reputation for long anti-social working hours, in part to keep pace with technological malfunction and enhancement (Pearl et al. 1990; Ahuja 2002; DTI 2002; Kodz et al. 2002). Recognising that this work culture may be detrimental to many women with

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[7] Women's Engineering Society. http://www.wes.org.uk/ (accessed Sept. 2005).

[8] Women into Science and Engineering Campaign. http://www.wisecampaign.org.uk (accessed Sept. 2003).

[9] Women in Technology, Engineering and Computing is a European-wide network with coordinators in twelve countries. http://www./witec-eu.net/ (accessed Sept. 2005).

[10] Association for Women in Science and Education. http://www.awise.org (accessed Sept. 2003).

[11] Established in 1998, it offers a website portal for women with education and employment in SET information. http://www.portiaweb.org/ (accessed Sept. 2003).

care responsibilities, and in line with the ethos of the care economy, a set of work-life

balance initiatives have been proposed to reconcile commitments. Key to this vision is

improving flexible work arrangements for parents of young children under the age of

six or disabled offspring less than 18 years of age.

8.2.2.2   Work-life balance flexibility

As part of the European social contract of encouraging partnerships with business to

foster 'win win' situations (Duncan 2002; DTI 2003b; Naegele et al. 2003; Stratigaki

2004), work-life balance (WLB) guidelines in Britain were outlined in the

Employment Act of 2002. Positioned in the context of the growth of the service sector

and a decline in manufacturing, which contributed toward a decrease in male

economic activity during the 1990s by around 4%[12], more women between the ages of

30 to 40 and those with young children are entering the labour market (Walby 1990,

2002; Belt et al. 2000; Hibbett and Meager 2003). By 2003, around 57% of women

were working in full-time employment, returning after the birth of each child in the

case of the low skilled, or after the birth of the youngest for more highly qualified

women (Rees 1992; Hibbett and Meager 2003). Narrated as a response to these

women's request for more flexible employment arrangements, the WLB initiatives are

seen to meet their conflicting responsibilities and foster equitable work relations (Rees

1992; Kolding and Milroy 2001; Work and Parents Taskforce 2001; W&E Unit 2003;

W&W Commission 2005).

As a background epistemological mechanism for improving quality of life and

ontological security, the promotion of family-friendly employment policies conveys

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[12] From 95% in full-time employment in 1990 to 91% in 2003 (Hibbett and Meager 2003).

the possibility of combining a personal life with a working one, to be "good parents as

well as good workers" (EOC 2001b; Work and Parents Taskforce 2001; DTI 2003b[13]).

Some recommendations put forward are: better maternity and paternity leave; flexi-

time and staggered hours; time-off in lieu; avoidance of early/late meetings; job

sharing; home or tele-working (Work and Parents Taskforce 2001; DTI 2003b). The

vision is to "promote the best of modern employment relationships in all our

companies, encouraging a culture of fairness and trust in the workplace which is so

important to the competitiveness of our economy[14]" (Hall 1999:1). With a philosophy

of 'a happy worker is a productive one', the benefits are perceived as huge: greater

choice in work arrangements; reduction of stress in juggling commitments; a happier

and healthier work environment; improved loyalty and motivation; enhanced

concentration and decision making; and critical retention of women's expertise (Work

and Parents Taskforce 2001; DTI 1998a, 2003b, 2004b; Rothbard et al. 2005).

Whilst the what-ness of this feminisation ICT policy background looks promising,

little is known about which strategies are successful or indeed why. Puzzlement is

expressed in government and Cisco's gender ecosystem circles as to how it is that

despite the series of inclusion initiatives, fewer women are recruited into the ICT

arena or indeed onto the CCNA programme, with many continuing to leave the

industry and dropping out in the first semester[15] (DTI 2001b, 2003b). A few reasons

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[13] A comment made by Patricia Hewitt, then Secretary for State, Department of Trade and Industry.

[14] A comment made by Stephen Byers, then Secretary for State, Department of Trade and Industry (Hall 1999).

[15] This concern was expressed at a research meeting between two Cisco gender ecosystem representatives, one from the Cisco Learning Institute and the other from Cisco Systems. Statistical evidence was requested by this researcher, but it took two years to be delivered and was shrouded by confidentiality. However, its format comprised of an unreadable set of spreadsheets from which it was impossible to draw any reliable conclusions, since much of the relevant data was absent. Interestingly, a report on Microsoft's vendor-specific training programme - Microsoft Certified Systems Engineer -

as to why this may be occurring were referred to in the previous chapter, with the first

two modules of the CCNA overviewed in Appendix B. In an effort to provide a wider

context to these concerns, women's experiences of the labour market are reviewed in

relation to part-time employment. Constituting a major form of flexible work which

many with care responsibilities seek, it is riddled with gendered inequalities that

restrict the who-ness of low skilled women by limiting their range of employment, pay

and opportunity. Faring no better in the ICT sector, the experiences of lone women

parents on the CCNA programme reveal that employability in the network engineer

profession is slim. With a dearth of part-time work and the gendering of human capital

through relational expertise non-validated in practice, these breakdowns in the

narratives of opportunity and equity present a distortion in the premise of inclusion.

Central to this employment tension between the socio-economic relations and politico-

economic forces of ICT productivity is the narrative of WLB equitable flexibility, for

as a mythologizing carrot used to motivate employees (Tapia 2004), it hides the

valorisation process. As a key situation of non-obviousness, the political economy of

flexibility risks further segmentation of the labour market, amplification of gendered

inequalities in employment, stigmatisation and devaluation of those who seek greater

balance of life. The net effect may be the opposite of inducing women's ontological,

socio-economic or indeed ICT equity and herein lies an underlying paradox of this

Gestell's site of tension. If the current trend of reconfiguring the labour market toward

flexible arrangements and deregulation is increasingly central to the new economy

(Walby 1997; Rubery et al. 1999; Cousins and Tang 2002), then it may serve to have

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outlined the same experience. It concluded that the privacy excuse presented by Microsoft was not an
infringement of data protection laws, rather it masked the lack of diversity statistics and reflected the
need for legislation to ensure private companies provide such information (Ellen and Herman 2005).

an inverse impact on productivity in the long-term whilst bolstering it in the short-term.

8.3   A site of tension: flexibility and equity

Three critical components of healthy productivity are said to be: well functioning markets, the size of the labour force, and higher levels of human capital, of which two key elements are education/training and length of full-time employment (Walby and Olsen 2002). As the two previous chapters outlined, a healthy market is viewed through ICT productivity, and investment in human capital through ICT skills acquisition. This section looks in more detail at the third component − size of the labour force, and argues that the WLB narrative of flexibility in the workplace may well play a critical role in its adjustment. If so, this role situates women with care responsibilities precariously in the labour market and this positioning may serve to further, not reverse, both the legacies of low skills and low productivity with knock-on consequences for their participation in ICT fields. Britain is viewed as already having a competitive edge in the new economy because of the low skills relation to deflated wages, and higher labour market flexibility in comparison to the rest of Europe (Cousins and Tang 2002; Duncan 2002). In seeking to turn around the first (low skills) by encouraging, in the case of this Gender Gestell, validation of relational expertise, a tension emerges through maximising the second (flexibility) to facilitate greater workforce diversity and women's inclusion. This can be shown by exposing the narrative of flexibility.

8.3.1   The narrative of flexibility: who benefits?

Key to the WLB initiatives is the narrative of flexibility, yet this term has many sides

to its interpretation[16]. Traced to the OECD and the European Union's guidelines for

wider distribution and growth of employment, flexible work arrangements were first

put forward in 1974 as a way to facilitate gender equity (Stratigaki 2004). By 1993,

this narrative had shifted to concerns about growing unemployment and the need to

develop labour market participation to reduce the risks of European convergence

(Cousins and Tang 2002; Duncan 2002; Stratigaki 2004). With high levels of social

exclusion resulting from changes in the Union's economic, social and demographic

profile putting further pressure on public spending such as welfare benefits, the 20th

century notion of a linear, stable career was to be replaced by a more varied working

life (Duncan 2002; Naegele et al. 2003; Houston 2005). If this shift in employment

practices is viewed from two angles, employers and employees, a vastly different

picture emerges.

From an employer's perspective, adjusting the size of their workforce can be done

through the use of cost-cutting and streamlining mechanisms which: improve the ease

at which workers can transfer their skills between different types of jobs (functional

flexibility); adjust displacement of employment by using commercial contracts and

changing conditions of service (distancing); offer supplementation of remuneration

and award structures when necessary (pay); and provide work as and when required

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[16] The term 'flexibility' has a wide range of meanings and can be used differently depending on its disciplinary and national context. In terms of employment, it is frequently used to refer to casual, temporary, part-time and self-employed work for example, implying a false homogeneity since each of these styles of employment cover a range of different labour arrangements and experiences. For further information on the debates surrounding the term, see Cousins and Tang (2002) and Wallace (2002).

(numerical)[17] (Rhodes 1989; Walby 1990, 1997). Yet, these rationalisation adjustments are obscured by the narrative of the new economy which justifies their instigation in the quest for greater alignment with fluctuating demand-side economics and global competitiveness. Presented as strengthening productivity, generating jobs and improving workers' employability, they are viewed as facilitating greater employment mobility, motivation and responsibility (Keep and Mayhew 2001; Naegele et al. 2003; Crosbie and Moore 2004).

Reflective of the ontological inclusive cultures of entrepreneurial and individualistic citizenship mentioned in the Literature Review and developed in chapter 6, these flexible relations of production are part of a political economy of the labour process in which relative surplus value (RSV), or the speeding up of the productive process, is augmented in the short-term. With workforce optimisation further enhanced by adopting ICT networked solutions, as commented upon in the Cisco System and the Network Technology Gestell chapters, labour adaptation to its fast changing service orientation requires such deregulation of employment terms and conditions (Beck 1992; Cousins and Tang 2002; Duncan 2002; Wallace 2002). And, as the Network Engineer Training Gestell argued, the new economy's RSV of knowledge work increases labour market competitiveness which is a central characteristic of the flexible rationalisation adjustments.

Seen from an employee's perspective, the care narrative of greater balance between home and work obscures the RSV process of cost-cutting adjustments to the size and deployment of the labour force, the suppression of wages, the amplification of

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[17]These four forms of flexibility are taken from the Atkinson model (NEDO 1986).

divisions between colleagues, and erosion of employment rights. As a political economy linked to the deregulation of trade and capital flow, this subsidiary WLB narrative of flexibility further constrains labour by amounting to little more than precarious employment or part-time conditions of service (Millar and Jagger 2001; Coyle 2003; Webster 2003b; Rothbard et al. 2005). Synonymous with an intensification of work, it conceals the second aspect of the valorisation process: the accruing of absolute surplus value (ASV), or lengthening of the working day. For, the epistemological and ontological narrative of WLB flexibility hides the use of anti-social and unpredictable hours which forfeit overtime payment (Coyle 2003; Webster 2003a; Tapia 2004; UNISON 2005). Putting further pressure on individuals, their careers, their families and their who-ness, this snapshot of flexibility may possibly have a negative effect on productivity in the long-term.

By taking the case of part-time work as a key form of flexible employment which provides many women with the ability to juggle private and public responsibilities, that which emerges is an airbrushed political economy of gendered labour. As a series of inequalities and injustices unfold, their experiences of part-time employment point to the underlying socio-economic and political site of equity tension of this Gestell. By showing that women's employment flexibility cheapens and segregates their labour and suggesting that this is linked to the capitalisation of their epistemological and ontological otherness, the narrative of equity as residing in flexible labour market inclusion appears to further the valorisation process. Setting the scene for the possible manifestations of the WLB narrative of flexibility, this analysis also points to the distortion of their inclusion to the ICT industry.

8.3.2   A political economy of gender: labour market inequalities

Women's increased participation in the labour market is not a new phenomenon, for

the 19th century saw a substantial number economically active in the mills and

factories of the period (Rees 1992; Hakim 1993, 1995). Historically, they have had a

more flexible relation with the labour market, in part because women remain the main

care providers (Rees 1992; Walby and Olsen 2002; Wallace 2002). For many,

particularly those married, access to full-time work was restricted by the view that

they were not primary workers (Walby 1997; Walby and Olsen 2002). This legacy is

perhaps reflected today in women's disproportionate representation in part-time

employment, distorting the narrative of flexibility as new and revolutionary, and in

their clustering in a limited range of industries and occupations. Pointing to

recalcitrant labour market relations where low-level and low-paid work is common,

this political economy of gendered labour exposes the reality of inclusion.

8.3.2.1   Part-time employment: characteristics of flexibility

In 2000, four times as many women (44%) as men (9%) were economically active in

part-time employment in Britain (Walby and Olsen 2002; DfES 2003; EOC 2003a;

Cousins and Tang 2002; Houston 2005); a statistic which held for 2004 (National

Statistics 2004; W&W Commission 2005). Part-time work in general doubled

between 1971 and 2000, from 3.3 to 6.2 million respectively, as 90% of employers

turned to sub-contracting and 80% to part-time arrangements (Cousins and Tang

2002). In part, as a consequence of downsizing and streamlining production, the

percentage for men in flexible, part-time work during the last decade has increased,

rising from 6.9% in 1992 to 9% in 1999, yet the statistic for women has remained

relatively stable (Cousins and Tang 2002; Walby 2004).

The heavy representation of women in part-time work is, to some extent, reflective of a lack of flexibility in full-time employment and the acute shortage of affordable, suitable care arrangements (Walby 1990, 1997; Walby and Olsen 2002; Webster and Valenduc 2003). With Britain having the lowest childcare provision compared to other European nations, a deficit in this necessary and expensive[18] infrastructure presents a major obstacle to their employment inclusion (Kennedy 1997; Cousins and Tang 2002; Walby and Olsen 2002). Furthermore, women's comparative lower levels of education and training[19] mean part-time work may be their only option (Rees 1992; Cousins and Tang 2002; Walby and Olsen 2002; Wallace 2002). As a result, such work is generally low or semi-skilled, associated with less status than full-time employment and poorly represented by trade unionism (Rees 1992; Rubery et al. 1999; DTI 2002; Walby and Olsen 2002). Where unionism, a largely male dominated field, is weak or non-existent, statutory rights hard won are threatened by either evading labour regulation or relaxing its parameters, conditions of service are worse, and the minimum wage poorly protected (Rhodes 1989; Rees 1992; Payne 1999).

Whilst the Equal Pay Act of 1970 and the Sex Discrimination Act of 1975 made inequity of pay and discrimination on the grounds of sex differentiation statutorily illegal, in practice this legislation falls short because women's labour is characterised by horizontal (across an industry) and vertical (within an industry) segregation (Walby 1991; Rees 1992; CWSET 1994; Osborn et al. 2000). This segregation means equitable pay measurement is problematic, such that a gendered differential in part-

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[18] It is estimated that full-time nursery provision for example, costs in the region of £7000 per year for each child under two years of age (Oakley 2006).
[19] This relative lack of education and training is beginning to change as younger women are increasing better educated today (Walby 2002; Walby and Olsen 2002).

time employment was 40% in 2002 and rising to 43% in 2005[20] (Bulman 2002;

Hibbett and Meager 2003; Webster and Valenduc 2003; W&W Commission 2005).

As a breakdown in the narrative of economic inclusion for facilitating better

renumeration, part-time work also tends to miss out on in-house training and has

limited promotion opportunities, with many women's skill levels not increasing in

comparison to those in full-time posts (Panteli et al. 2001; DTI 2002; Walby and

Olsen 2002; W&W Commission 2005).

Yet full-time employment does not mean women are immune to these wage

inequalities, with a differential on average 18% to 19% less than their male

counterparts (Walby 1997; Greenfield et al. 2002; Walby and Olsen 2002; DfES

2003). Fully employed women also experience fewer promotion and training

opportunities, and despite many professional women being better educated than their

men colleagues, these differentials increase with promotion (Grundy 1996; Millar and

Jagger 2001; Hibbett and Meager 2003; Valenduc 2003; W&W Commission 2005).

Wage inequalities are said to be attributable to women's lack of labour market

experience, often due to interruptions in employment such as care responsibilities

(Rees 1992; Hakim 1993; Walby 1997; Walby and Olsen 2002). With a key asset in

today's employment setting that of labour market experience, a further distortion or

breakdown in the narrative of inclusion conceals another reality. Unless women are

protected by maternity leave for example, many experience downward mobility and

under-utilisation of their skills when they re-enter employment, with a direct

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[20] These pay differentials will vary according to industrial sector and occupation.

detrimental correlation between the number of children and their earning potential[21] (Rees 1992; Rubery et al. 1999; Walby and Olsen 2002; W&W Commission 2005). Trading more free time for less pay further jeopardizes career prospects and personal well being or who-ness by reducing work experience, living standards and benefits such as pension and insurance, not to mention holiday entitlement (DTI 2002; Walby and Olsen 2002; Charles and Jones 2005; Tailby et al. 2005).

These experiences of part-time, flexible work for many women, particularly the low skilled and unmentioned in the narrative of equitable opportunity, reflect their greater labour market instability which evolves around exploitation of their otherness (Cousins and Tang 2002; Greenfield et al. 2002; Walby and Olsen 2002; Charles and Jones 2005). Whilst an EU directive seeks to better regulate part-time employment[22], it currently undermines their ontological security in a fundamental manner. Nor does such work come under the remit of the WLB initiatives, and with 40% of the workforce remaining unaware of them, uptake of such flexibility remains relatively low (Wilson 2001a; Ackers 2003; Coyle 2003; EOC 2003b; Rothbard et al. 2005). Furthermore, as part of the valorisation process, part-time employment may have the effect of bolstering productivity in the short-term by guaranteeing cheaper, flexible labour that is more easily adjusted in times of politico-economic change. But this may have a paradoxical influence in the long-term, for in severely restricting women's independence of income by capitalising on these labour market expressions of their otherness, investment in their gendered capital is reduced. Their skills underdeveloped

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[21] One child appears to have little impact on earnings, but two can reduce earnings by 10%, and three by 15% (W&W Commission 2005).

[22] The EU's Part-Time Workers Directive of 1999 seeks to extend full-time employment protection and rights, such as maternity leave, fair dismissal, redundancy payments to the part-time sector (Walby 2002).

and poorly utilised, the knock-on effect is that their labour market mobility is severely restricted (Cousins and Tang 2002; Walby and Olsen 2002), and this will impact on future generations, their inclusive citizenship and their spaces of possibility.

If this capitalisation of women's historically cheaper, more flexible labour is behind the active call for greater participation of women in the workforce in general, and specifically the ICT one, perhaps it is also a response to fewer men entering the labour market (Lister 1990b; Walby 1990, 1997; Sainsbury 1996; Myles and Quadagno 2002). These links require further research to see whether and under what circumstances the feminisation of an industry, for example ICT, is contributing to lowering the costs of productivity; how the gender profile has changed in relation to the labour market as a whole, and how this influences the specific valorisation processes. Necessary for unravelling the complex specificities of gendered injustices, this Gestell's instantiation of equity tension reflects the inequities of flexible labour relations which are obscured and amplified by the narrative of WLB. Furthering the valorisation process by constricting wages and conditions of service, weakening unionism, curtailing training and promotion, and using part-time employment to adjust the size of the labour force, this snapshot of women's relation to the labour market is compounded by another dimension of gendered capital, horizontal and vertical industrial clustering.

Restricting occupational choice for many low skilled women, the feminisation of work reflects pronounced segregation in the wider employment setting, but in sharing the above characteristics of gendered labour, the ICT industry is not particularly renown for regular part-time employment. As the list of breakdowns in this Gestell's

epistemological and ontological cultures of inclusion unfolds, the feminisation of the sector may contribute toward the lowering of productivity by being slow to adapt to the needs of lone parents and remaining recalcitrant in recognition of women's relational expertise. With the ASV of ICT productivity residing in one aspect of its labour process, the long hours working culture, membership for lone women parents is severely constricted and their equity further distorted by highly classificatory gendered assumptions.

8.3.2.2 Occupational segregation and ICT: a reality of feminisation

Seen in the wider context of the labour market, women are disproportionately and increasingly clustered in certain industrial sectors[23] (Walby 1990, 1997; Rees 1992; Dench et al. 2002; Webster and Valenduc 2003; W&W Commission 2005). This clustering is heavily oriented toward the public sector, perhaps because it is more conducive to part-time employment, better conditions of service and pay. But it weakens equality legislation since it is hard to find a comparable male colleague, and acts as a further factor in the pay differentials (Rees 1992; Cousins and Tang 2002; Walby and Olsen 2002; Webster 2003a). As yet another distortion or situation of non-obviousness in the narrative of enhanced opportunity, it restricts women's employment mobility by limiting their range of choice in terms of sector and type of work and, as such, constitutes a gendered rigidity in labour market dynamics (Walby and Olsen 2002).

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[23] Women are more likely to be found in service industries such as public administration, education, health, distribution, hotels and catering which, together, accounted for 64% of their employment in 2003 and 69% in 2005, compared with 33% and 39% for men respectively (Hibbett and Meager 2003; National Statistics 2004; W&W Commission 2005).

Again, reflecting employment dimensions of otherness which mitigate against equity of citizenship and compromise expressions of who-ness, this rigidity is characterised by occupational segregation where women are clustered in low level, dead-end jobs (Walby 1990, 1997; Rees 1992; Walby and Olsen 2002; Wallace 2002; Webster 2003a). Perhaps because the ICT sector also reflects this gendered segregation, as do other technical fields such as engineering, its poor record of attracting women may be linked to this trend (Cockburn 1983, 1985a, 1999a; Hacker 1990; Rubery et al. 1999; Webster and Valenduc 2003). Where women are present, they are frequently ghettoised in subordinate technical work (Cockburn 1983, 1985a; Wajcman 1991; Grundy 1996; Panteli et al. 1999, 2001; Wilson and Howcroft 2000). This experiential pattern of marginalization or exclusion from core areas of ICT production points to a major breakdown in the feminisation of ICT narrative. Despite the stories of acute shortages, the reality that emerges is low-level employment and the lowering of skills status in general; a practice that is reflective of the feminisation of most occupations (Rees 1992).

However, women's low representation in the industry may also be connected to the lack of part-time work. In general, the ICT sector is not particularly viewed as suited to such employment, with only 8% of workers not on full-time conditions of service in 2000, of which 75.7% were women (Millar and Jagger 2001; Cassels 2002). As yet one more distortion in the epistemological narratives of inclusion, the industry has been particularly slow to adopt WLB flexibility, with line managers resistant to change and unable to see the business case (e-skills NTO 2001; DTI 2002; Walby and Olsen 2002; Moreau 2003; Houston 2005). Difficulty in the complex management of an array of projects, resources, customer requirements and remote teams, alongside

the cost of additional recruitment, has the effect of reducing choice in work flexibility (DTI 2002; Vendramin 2003; UNISON 2005). Faced with a practice of call availability in network engineering, often over a 24 hour period 7 days a week, regular part-time work is viewed as insufficiently conducive to WLB practices, as a married female student with two small children narrated:

> "I don't feel that has reached the male dominated computer world yet...it is inflexible in its working patterns...At the end of the day, my family comes first. I don't feel I'm available 24/7" (F-S2).

Where part-time contracts are most prolific are call-centres, which are characterised by poor or not at all trade union representation, shift work, and predominantly staffed by low skilled women under adverse conditions and with poor remuneration (Belt et al. 2000; Kellner 2001; Cousins and Tang 2002; Webster 2003b; Wilson and Greenhill 2004). Reflective of an instantiation of the valorisation of ICT productivity in which women are unfavourably exploited, the accruing of absolute surplus value through unsociable hours and the 24/7 practice of employment means that finding suitable part-time work commensurate with network engineer expertise is like "gold dust", as a female parent CCNA student narrated:

> "I really want to work part-time locally *but* the industry is not here to do part-time work. Part-time work is like gold dust...If I had full-time work, I would have to employ someone to clean and iron" (F_S3).

When networks know no human boundaries and frequently go down at the end of the day, the ability to engage in such an environment is severely restricted for women with care commitments, as many tend to accept their career will take second place to their family. This problematic was articulated by a lone woman parent and CCNA student who simultaneously worked in the field:

> "You cannot do IT, to be fair, if you have got children...you have to be seven o'clock in the morning to turn up and make sure the backups is run and do the

monthly backups. You have to run your child and drop her off at the childminders...you just can't do that...if your network does go down and somebody needs to come out ten o'clock at night...they're going to need you to be there and...if you were a single mother with a child, it would be virtually *no way* you could do that because where, where would you leave your child at 10 o'clock at night..." (LM_S4).

Furthermore, breaks in employment mean that to stay on top of changes, an employee will have to catch up on current ICT knowledge and practices (Millar and Jagger 2001; Greenfield et al. 2002; Walby and Olsen 2002). With many organisations not providing mechanisms to address this, few women with care commitments will have the time or energy to take on board additional study, as a female CCNA student and parent narrated:

> "The problem with IT jobs is that they require continuous retraining. With a family how do you fit this in? The skills become obsolete. You go for a job and you're disadvantaged. I've been doing this for 20 years and technology is changing so fast. There used to be a plateau of skill levels but now there is no plateau any more...It adds pressure to you because of the family, I need to shop and cook and study..." (F_S3).

This pressure is further amplified by a perception that either you have a dedicated, successful career or you have a balanced life (DTI 2002; Kodz et al. 2002). Running the risk of being stigmatised as less committed, an employee will be disadvantaged in the light of company practice to promote people who are seen to be abreast with ICT trends, rather than face the expense of updating skills. For one single woman student, this string of inhibitors, not addressed by the narrative of WLB flexibility, represented a fundamental "contradiction" in the move to recruit lone women parents into network engineering:

> "[this is] the whole contradiction...I feel the majority of their funding is based on maybe women getting back, single mothers getting back into work...it's going to be shifts...there you have the wonderful contradiction...I mean I appreciate what the man said because part of it is true...networking is a 24/7 thing...it's not a 9 to 5 and oh, little Johnny's got a cold today. *Tough!*" (N_S6).

Reflective of Britain's long hours working culture in general (Keep and Mayhew 2001; Cousins and Tang 2002), this narrative outlines a fundamental tension underpinning the politico-economic forces of ICT productivity endeavours to include socially excluded lone women parents. At its heart lies the narrow focus on employability, where the premise of equity rests on active responsibility for employability through ICT skills acquisition and relational expertise. Equity is not the reality of inclusion for socially excluded low skilled women with care responsibilities who are in or seek part-time employment. Rather, that which presents is pronounced discrimination and constitutes yet another labour market rigidity (Walby 1990, 1997; Rees 1992; Rubery et al. 1999; Wallace 2002; Webster 2003a). This prejudicial rigidity of otherness underpins the labour market political economy of women and is brought to the fore by their citizenship association with relational skills, pointing to a politico-cultural enframing of classification that reinforces, not challenges, normative gendered relations and identities.

The use of the term 'gendered' indicates an imbalance where work, such as caring, cleaning or telephone sales for example, reflects a predominant performance by women, but they are not women's work per se since men also perform them (Walby and Olsen 2002). Implying there is no absolute link to an activity and the gender of the worker, the term points to the politico-cultural backgrounds of reference that assume certain genders perform specific tasks. These assumptions are reflected in gendered divisions of labour which contribute to their control and oppression, not only in work but also in domestic spheres (Cockburn 1983, 1985a; Walby 1990, 1997; Wajcman 1991). As intrinsically cemented and valorised in productive relations, these divisions are reflective of gendered backgrounds which some feminists regard as a

legacy of patriarchal relations, where "a system of social structures and practices in which men dominate, oppress and exploit women" underlies the symbolic and material constructions of femininity and masculinity (Eisenstein 1981; Cockburn 1983; Walby 1990: 20, 1997; Lloyd 1993).

8.3.2.3   Discrimination: an essentialist shaping of difference

The ICT industry, renown for its youthful, masculine techno-culture, is a hard and unfriendly environment for many women to enter or succeed in (Grundy 1996; Bowker and Star 2000; Faulkner 2001, 2004; Moreau 2003), despite equity legislation. Whilst some do manage to mould a career, suggesting that this view is insufficient in explaining their low representation (Gill and Grint 1995; Grint and Woolgar 1995; Adam 1997; Henwood 2000; Panteli et al. 2001), the ICT arena generally presents an unattractive and competitive "new frontier culture" which is not only recalcitrant to new initiatives, but also to recognising soft relational skills, as a male community education manager voiced:

> "it's an extremely macho industry...sort of new frontier culture...it's so unattractive, the role models are still...There's not really the focus on people skills that actually are increasingly important within the sector itself, but perhaps aren't being seen and recognised as being particularly important...it is actually getting worse despite all these initiatives from employers" (N_M4).

This narrative questions the story of enhanced employability for women given their perceived relational strengths, since these skills tend not to be recognised or indeed rewarded (Rees 1992; Panteli et al. 1999; Fletcher 2001; Webster 2003b).

This additional pattern of women's experiences in the labour market points to the complexities involved. It suggests that inclusion is not as straightforward as equipping them with the required skills to open doors to employability or indeed asserting their

individualisation through inclusive citizenship, for the ICT industry remains recalcitrant in recognising their value, preferring to recruit men (Rees 1992; Panteli et al. 1999; Millar and Jagger 2001; DTI 2002; Webster 2003a). This practice is not challenged by the association of women and relational skills, for their value is seen to reside not in their technical expertise, but in politically and culturally defined personal and behavioural characteristics (Payne 1999). This ideological association teeters dangerously close to essentialist control by reducing women to stereotyped feminine qualities of otherness (Faulkner 2001, 2004; Rommes and Faulkner 2003). Within this homogeneous model of inclusion equity of opportunity can not be women's reality, for equal treatment does not necessarily produce equal outcome (Cockburn 1999a; Osborn et al. 2000; Rees 2001).

By so ordering and regulating gendered identities, the current economic practice to appease customers is seeking to affirm 'what' women are and silence 'who' they may wish to be or become (Bowker and Star 2000; Levison 2001; Webster 2003a). This classificatory enframing of women as relational seeks to give authority to their fixed and immutable 'natural' abilities but denies a range of strengths, the gender crossing of skills and positions women in low skilled, low status work. In manipulating their otherness through essentialist expressions of expertise, historical and socio-political legacies of stereotyped value are perpetuated and reinforced, and whilst society may then appear ordered and known, individuals struggle to find their place or be heard. As an Anglo-Saxon canon of gendered purity, it hides any contextual or individualised strategy of existence and masks a person's who-ness by imposing conformative difference (De Beauvoir 1972: Irigaray 1985a, 1985b, 1990: Lloyd 1993; Gedalof 1999).

If exclusion is about not fitting into practices and beliefs perceived as the norm, but about crossing the borderlands of these recalcitrant narrated canons (Bowker and Star 2000), then how may groups of people classified as socially excluded achieve inclusion if their borderlands of existence are silenced? Whilst the narrative of diversity seeks to validate difference, it does so by reinforcing and homogenising women's otherness and then expecting that the premise of equity is realisable. Yet this measure of equitable difference is normatively defined, not only by male (Osborn et al. 2000; Lageson 2003; Rommes and Faulkner 2003; van Oost 2003; Walby 2004), but also by Caucasian, middle class, heterosexual, familial and other status quo ethics. These dimensions of normality give rise to notions of exclusion, but also to societal cohesion and commonality of interest and aspiration (Henwood 2000; Panteli et al 2001; Trauth 2002). This is seen in the revamping of ICT's image by utilising "pink and fluffy" stereotypes of perceived 'girly' interests, yet belies the concrete reality of sections of technology as masculine enclaves, and pretending otherwise will further disadvantage young and older women.

It is also observable in the WLB narrative which shifts analysis away from women's relation to the labour market and from their different worldly engagements, to a privileging of the family (Cousins and Tang 2002; Walby 2004). The narrative's gendered assumptions about domestic life and roles critically overlooks women's active negotiation of work-life choices, and assumes that work and life are two mutually exclusive, oppositional categories, fragmented into neat, manageable compartment (Rees 1992; Pringle et al. 2003; Webster 2003a; Crosbie and Moore 2004; Charles and Jones 2005). Yet this presents a false dichotomy for the two concepts are more fluid, more intertwined and less easily definable, belying a

complexity of human existence which is more than these two arenas of responsibility (Beck 1992). The WLB narrative ignores the multiplicity of home and work use, the sense of identity people may gain from life in general, and has the effect of blurring distinctions between these two domains and consigning mainly women to unpaid tasks (Walby 1990; Duncan 2002; Pringle et al. 2003; Houston 2005; Rothbard et al. 2005). By so reinforcing essentialist associations of family and relational expertise, many women will continue to be assigned as outsiders or guests in the normative set of public relations and practices, and their labour market experiences will continue to encompass inequities and injustices.

As a key breakdown in this Gestell, the impact on the techno-gender relations is that any "attempt to match a woman's essential identity to the computer science" environment is a particularly painful and costly one (Bowker and Star 2000: 306). Possibly feeling isolated, her skills unacknowledged and at a distinct disadvantage in terms of men's perceived technical prowess, "any mismatch becomes her personal failure since the measurement yardstick remains unchanged although the membership criteria appear to have been stretched" (ibid: 306). The inclusion narratives presented in this Gender Gestell appear to address the membership criteria, but they do so by reinforcing the techno-gender tension through affirmation of normative identities and roles. Such affirmation will continue to negate the experiences and expertise of those on the fringes of society, in particular women's public and private relation to the labour market, with the oxymoron of their technical ability lingering in both these domains (Harding 1991; Wajcman 1991; Henwood 2000; Newell 2001; Woodfield 2002). This was succinctly narrated by a female CCNA instructor reiterating a comment by one of her male university tutors when she was studying engineering:

"If God had wanted women to be programmers he would have given them a brain" (F_T2).

Such an overt discriminatory dismissal of women's technical abilities points to why they are frequently assigned work that does not reflect their skill, aptitude or interest, regardless of their qualifications and expertise (Millar and Jagger 2001; Wilson 2001a; Greenfield et al. 2002; Walby and Olsen 2002; EOC 2003c). The long-term effect of this, and the other labour market rigidities, will ultimately be a reduction in investment of their gendered capital which will negatively impact on productivity levels.

Role model and mentoring schemes will do little to challenge this Gestell of women's relation to the public sphere, for these strategies assume women in prominent positions will promote pro-women policies or procedures. But this is a risky assumption, for their success may mean aping of male behaviour, single-minded determination to ignore harassment, possible sharing of stereotypic norms and status quo aspirations (Kwan et al. 1985; Walby 1990; Grundy 1996). They may competitively seek to protect their position by "bringing the ladder up" as they progress, as was noted by a female CCNA instructor:

> "We find [that] a lot, especially women in computing…are very bad, a lot of them are very bad at "well I'm up here and I'm bringing the ladder up with me"" (F_T2).

Such protectionism of one's position reflects the cut throat nature of the corporate and ICT world, and hides the fragmented, individual and diverse struggles of succeeding (Henwood 2000; Trauth 2002; Woodfield 2002).

Omissions in the WLB narrative may contribute to these struggles by furthering divisions of labour through conflict and resentment (Osborn et al. 2000; Rees 2002;

Houston 2005). With little empirical evidence supporting the link with enhanced productivity, the initiatives do not apply to front-line staff in customer support roles, many of whom are women; nor to those who are single or have other care responsibilities such as elderly relatives, or able or disabled children who are older than the age limits (Charles and Jones 2005; UNISON 2005; Bloom et al. 2006). Nor is the lack of organisational resources taken into account, or the absence of public infrastructure support for care where socio-economic imbalances mean low skilled, low waged women continue to take the brunt of the responsibility (Kodz et al. 2003; Webster 2003a; Hyman et al. 2005; Rothbard et al. 2005). Consequently, the work-life balance initiatives are only effective for certain groups such as the more highly skilled and educated, where the family unit has two wages, and during times of full employment when there is a labour shortage and employers are more open to change (Wilson 2001a; Kay 2003).

As this Gender Gestell has shown, the epistemological and ontological cultures of inclusion for women are based on distorted premises of equitable flexibility, and as such will not only fail to achieve the desired results but further compound their socio-economic relations. Duplicating the failures of earlier of equal opportunity programmes, the short-comings of current policy continue to position women as the main site of the problem, with the array of strategies of inclusion reflecting an onus on them to change their perception of ICT and 'fit in' with the status quo (Henwood 2000; Wajcman 1991). Still emphasising sameness of equity despite the differential of relational, the belief that some homogenous human essence will open up once the obstacles are removed (Shildrick 1997; Henwood 2000; Trauth 2002), belies the prejudices and inequities of inclusion.

Policy continues to fail because the focus on a critical quantitative mass of women does not ipso facto precipitate women friendly environments (Henwood 2000; Woodfield 2002). For the overt organisational segregation and the gendering of skills and pay continues not to be systematically tackled (Grundy 1996; Henwood 2000; Woodfield 2002). Nor are the more insidious and easier to ignore, covert forms of organisational discriminatory practices adequately challenged which manifest through the glass ceilings of the corporate world, the prejudicial behaviours and work hard practices of masculinised competitive networks of power (Robertson et al. 2001; Wilson 2001a; Wilson 2001b). Because analysis remains at group level, current inclusion strategies continue to fail by not dealing with the diverse and fragmented nature of women's experiences, needs and interests (Henwood 2000; Trauth 2002). Ultimately inclusion persists to fall short because gender, technology and society are assumed to be unproblematic black boxes (Henwood 2000; Trauth 2002), and so hid from view the politico-cultural and socio-economic contexts in which each produces and reproduces our ontological and epistemological relations.

8.4   Conclusion

This Gender Gestell presented the epistemological and ontological cultures of inclusion for women which take the form of the feminisation of ICT and relational expertise. Geared toward encouraging more women to enter the labour market in general and the ICT industry in particular, two intertwined political economies emerge, flexibility and a gendered labour market, which place considerable constraints on their socio-economic relations. As part of the wider strategy of equitable flexibility in the labour process, the WLB initiatives may be viewed as cost-cutting labour

realignments in the valorisation process of productivity in which the new economy's ICT rationalisation plays a role, and involves both the accruing of relative and absolute surplus value.

Taking the example of part-time work as a flexible means of employment, that which is revealed is a catalogue of gendered inequalities and injustices. Encountering forms of segregation and discrimination, the range of low skilled women's employment opportunities is severely restricted and their reality is one of low level, dead-end jobs. These characteristics of gendered labour destabilise employment protection, artificially lower wages and may enable the forces of ICT productivity to adapt more easily to demand and change. This political economy of gendered labour, persisting and evolving over time and space (Henwood 2000; Walby and Olsen 2002; Woodfield 2002; Stratigaki 2004), presents a challenging-forth of women's employment that contradicts the narratives of equity, opportunity and empowerment.

Constitutive of a political economy of distorted equity in which flexibility is used to augment its valorisation, it is being extended from part-time to full-time conditions of employment through the WLB initiatives. This central site of tension may jeopardise productivity in the long-term by poorly investing in and utilising women's expertise, and appears to be indicative of flexible notions of equity that are authoritatively adapted to labour market trends. With the care economy appearing to reinforce gendered legacies of otherness, the equitable strategies for inclusion are falling short in turning round the low participation of women in ICT, for, in the first instance, gaining employment commensurate with their network engineer expertise and their specific circumstances is like "gold dust". Struggling against the work hard, antisocial

hours accumulation of ICT ASV and the "new frontier" culture of the industry, diversification of its workforce is not so clear-cut since its practices are in conflict with the limited formulations of the WLB initiatives. In exposing the reality of flexible employment and its dearth in the ICT world, this Gender Gestell reveals, in the second instance, that the ordering and regulating of women's ICT expertise as relational is not validated in practice.

As an instantiation of flexible equity and the inessential essence of this Gestell, the classificatory enframing of gendered qualities or normative what-ness homogenises and standardises femininity, positioning women's technical skills as, at best, of less value, and at worse, an oxymoron. Their inclusive citizenship becomes precariously balanced on this strategy to feminise the ICT sector, but it appears that such a move serves to de-valorise the core skill sets, and this attempt to legitimise their presence in fact perpetuates the techno-gender tensions by affirming their otherness. This politico-cultural or ideological enframing of the epistemology and ontology of women ensures that the procedural practices of technological and gendered expertise, and the representational and conceptual frameworks that reinforce their background associations, remain rigidly black boxed and recalcitrant to change. By moulding or regulating one form of gendered capital for politico-economic gain through narratives of diversity and customer professionalism, the care economy continues to position women within their predefined, discriminatory roles and identities, perpetuating stereotypes and silencing their who-ness.

Amplified by the narrative of flexibility, this gendered citizenship enframing of inclusion signals a shift in labour value and equality for women, and seeks to change

their relation to capital from private to public flexible enterprise. Yet, in de-valorising their care responsibilities by assuming this transition is homogeneously straightforward, this realignment of their domestic positioning normalises their relations of otherness in the public sphere and further jeopardises their capacity to act, thereby compromising their ontological security (Walby 1990, 1997, 2002). Whilst narrated as fostering equality and opportunity, the feminisation of ICT appears to further the short-term valorisation process of ICT productivity, and not low skilled women's personal long-term aspirations or needs. In placing value on their gendered capital, their labour is in fact devalued, placing considerable restrictions on their ability to access a viable wage and move away from domestic violence and abuse.

This answers the subsidiary research question of what is the background of gender inclusion policy and how does it shape the who-ness of socially excluded women. Concluding that the set of epistemological and ontological cultures of inclusion are seriously flawed, that which is exposed by the labour market experiences of low skilled women is a catalogue of inequities which are endemic in the ICT world. In regulating and manipulating women's inclusive citizenship to ICT and society, this Gender Gestell in fact constricts and undermines their equity further (Lister 1990b, 1997; Taylor-Gooby 1991; Walby 1997).

Summarised in the table below, this Gestell as the socio-economic and political enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity, is shaped by the two associated background political economies of flexibility and gender. Mediated by the epistemology of the feminisation of ICT, the production of ICT gendered capital through the ontology of relational

expertise for women's citizenship exposes a site of equity tension that reflects essentialist classification. Detrimentally enframing the socio-economic relations or experiences of women, particularly the low skilled, the practice of validating their otherness appears to control their expressions of who-ness and severely compromise employment opportunity and ICT inclusion.

Table 8.1: A Gender Gestell

	Valorisation of ICT productivity	Political economies	Inclusive cultures	Enframing of capital	Tension
Gender Gestell	Relative and absolute surplus value of WLB flexibility	Flexibility and gendered labour market	Feminisation of ICT through relational expertise	Classification of gendered capital	Distorted equity and politico-cultural control

For, if their grounds of inclusion reside solely in the unequal economic sphere, shaped by objectified, assumed values of gendered expertise and short-term labour process trends, non-economic causes of exclusion and more sustainable long-term developments are ignored, and the inessential essence of this Gestell perpetuated. Governing the way in which women must act by affirming their conformity and commodifying their otherness, this Gender Gestell may have the opposite effect of inclusion. Until socially excluded people and women are acknowledged in the way they personally wish to come forth, and not through distorted impositions of zeitgeist classificatory or politico-economic systems and concepts, their inclusive citizenship may continue to remain elusive. Systematic improvements in: public care infrastructures; pay differentials; valorisation of skills; occupational segmentation; discriminatory practices; the array of omissions and assumptions in the WLB initiatives; and, as the previous chapters outlined, holistic support and welfare protection are a start. Unless such resources are concretely provided, the motivation to give meaning and shape to their diverse interests and needs will continue to be

suppressed. Silenced and misrepresented, giving voice and concrete backup to expressions of authenticity are critical in setting the grounds for inclusive ontology, but it is unlikely to be achieved through the epistemological and ontological cultures of inclusion as they currently stand.

For, in attempting to foster more lasting structural change by raising diversity awareness purely at corporate policy level, functional and quantitative strategies such as gender mainstreaming, role models and the array of private/public sector women's organisations merely tokenise acknowledgement of difference. Failing to factor in the recalcitrance of organisational practices, the dependency on willingness, or the weakness of the legal foundation which rest on the capriciousness of politico-economic climates, women's individual rights and responsibilities tenuously oscillate accordingly. Whilst attempting to reconceptualise the issues of difference and discrimination, no transformative effect is visible (Richards 2001; Noon and Ogbonna 2001; Fredman 2002; Walby 2004), and this is because ultimately the backgrounds of gendered references and women's labour market experiences remain substantially unchallenged and unchanged.

Equity can not lie in the feminisation enframing of inclusion, for underlying it is a flawed, flexible model which assumes unity of aspiration, ability and opportunity if the right politico-economic conditions are in place. With an appearance of justice and liberty in name only (Bourdieu and Passeron 1990), this model of equity is conceived on neo-liberal assumptions that homogenise people's experiences and aspirations. By perpetuating rigid, confused, abstract, poorly understood and implemented terms of reference (Richards 2001; Fredman 2003; Howard and Tibballs 2003), the

consequences of such a model are considerable. As this chapter has shown, the inclusion drive to recruit socially excluded women to the ICT arena by valorising their relational expertise risks perpetuating not only their labour market ignominies, but their domestic ones as well.

In repeating the failures of earlier inclusion programmes by emphasising a quantitative focus, reaffirming their innate otherness and superficially addressing the cultural and organisational dimensions, the individual remains the problem and the historical legacies of low skilled work serve to propagate, not reverse, social exclusion. With the status quo remaining unquestioned, perhaps all may not enjoy equal income, status or opportunity since the model of equity rests on capitalist productive relations that are based on inequity (Marx 1890(1974); Gough 1979).

The enframing of inclusion and exclusion

9.1   Introduction

This chapter pulls the thesis together by recapping the research formulation, the analytical tools and the methodologies used to extract the empirical data. It then proceeds to outline the research findings in the three Gestells, summarised in Table 9.1, page 309, and offers a tentative flow chart of the interrelated processes which the exploratory use of the concept Gestell raised in Diagram 9.1, page 310. The suggestion is that the overall challenging-forth of exclusive objects, as manifest in this thesis, constitutes a particular capital enframing of the epistemological and ontological cultures of inclusion. In discussing this summary, the appearance of degrees of coercion, polarisation, distortion and disrespect enframe the who-ness of the socially excluded through regulatory, standardising and classificatory formulations of inclusive what-ness. As instantiations of warped equity, this politico-economic enframing of the socio-economic relations of people regarded to be outside of mainstream society is argued to constitute a key attribute of capitalist productivity.

Revisiting the techno-gender relations, the chapter concludes that their black boxed instantiations, or inessential essences, of determinism, essentialism and functionalism remain unchallenged by government and Cisco Systems. For, as malleable tools in the array of political economies that the thesis has exposed, these interwoven instantiations appear to be central to the ICT valorisation process. With the cultures of inclusion reinforcing women's otherness by omitting to address the gendered epistemological backgrounds of belief, validation and representation, women's exclusion to ICT and society remains an ongoing problematic. Reflecting on the

research's contributions and limitations, the chapter ends with recommendations for the challenging-forth of subjects, where as citizens of the crown the socially excluded may be involved in empowering representational activities that potentially enable greater exploration and expression of their particular circumstances and requirements.

9.2   Research formulation

9.2.1   Setting of the parameters

With the research parameters initially set by representatives of Cisco Systems who wished to understand why few women were recruited onto, or retained in, the Cisco Certified Network Associate (CCNA) training programme, the reviewing of two sets of literature reshaped this focus into a broader problem domain. First, concern for the low participation of women in ICT fields in general was expressed by the British government in the context of their exclusion from the new economy's infusion of networked technologies. What emerged from this policy documentation was an over-riding focus on three related socio-economic issues - low productivity, low skill levels and a high rate of social exclusion, which the thesis termed legacies of exclusion. These legacies, of which the latter two consisted of a large number of women, particularly lone parents, were regarded as holding the nation back from economic vibrancy and needed to be redressed.

The second set of literature reviewed three perspectives on why and how the problem domain of the low participation of women existed. Referring to this problematic as the gender and technology relation(s), the thesis presented Cisco's cognitive and behavioural analysis which suggested a legacy of gendered inhibitors based on sex differentiation. The overall recommendation, which government shared, was a

quantitative approach to encourage more women into the ICT arena, specifically into Cisco's network engineer programmes. Seeking to shift attention away from the biologically essentialist and gendered stereotyping leaning of this perspective, it was contrasted with the alternative foci of social shaping and social constructivist research. Concentrating more on how societal, cultural and institutional hegemony influenced relations to technology, the social shaping approach largely centred on gendered structural dynamics. Social constructivism, in comparison, questioned these universal constructs as no longer holding consistency of meaning. Power relations for many postmodernists were located in individuals whose on-going performances were fluidly enacted and diversely expressed. Taking the strengths of each of these latter perspectives and blending them, the thesis' aim was to supplement the techno-gender debate by contextualising individual experiences within the wider social, political and economic backgrounds.

With an overview of IS gender research flagging some deficits of analysis, it was suggested that a feminist theoretical contribution could add to the discipline's debates. Turning to the government's policy initiatives for redressing the three legacies of exclusion, these were contextualised within European directives for improving politico-economic momentum. Three strategies emerged that were part of the drive to embrace the new global economy and involve more women - enhanced entrepreneurial ICT productivity, ICT employability and the feminisation of ICT. Referring to these strategies as cultures of inclusion, each involved a citizenship reconfiguration for those perceived to be at high risk of social exclusion - active responsibility, ICT skills acquisition and, for women, relational expertise. Contoured by the visionary transformative power of ICT infusion, strategic partnerships between

business, pedagogy and government would take in hand the legacies of exclusion, improve the human and social capital of the nation, and establish a setting of opportunity, employability, equity and empowerment for all citizens.

With the 'river like quality' of ICT to flow anywhere and everywhere (Grove 2003) permeating policy formulation and business enterprise, the thesis' goal was to match this strategic planning with the reality of practice. It sought to explore how this vision of change affected the lives of ordinary people, particularly those classified as socially excluded. Targeted by this reform, the main research question was formulated as how ICT inclusion policies shape the circumstances of one subset of this group, lone women parents. Dividing the question into three parts, each took a specific set of policies and related strategies as constitutive of a culture of inclusion and looked at how the citizenship of these women was influenced.

9.2.2   Selecting the investigative tools

To explore in greater detail these cultures of inclusion and the lives of individual people, the thesis adopted the phenomenological emphasis on description to provide graphic instantiations of their specific manifestations. Utilising this theory's framework of epistemological backgrounds of reference and individual ontological experiences, the exposure of hidden or less covert breakdowns, mismatches or situations of non-obviousness between the two would be used to point to underlying key sites of tension. Drawing on Heidegger's use of Gestell to encapsulate these three foci of attention, its conceptualisation of our ontological and epistemological relations to technology provided the core structure, with the variable of gender added to reflect this research's particular interest in the problem domain. Gestell became initially

reformulated as the epistemological and ontological enframing of our background, experiential and conflictual relations to technology and gender.

Equating an epistemological background of reference as an expression of what something should be, its what-ness, and relating it to a given culture of inclusion, the aim was to describe the specific instantiations of each epistemological culture as presented by the institutional partnerships. Interpreting the ontological experiences of individual people as being shaped by the citizenship reconfigurations, the thesis wished to document how they mediated the spaces of possibility or who-ness of lone women parents. Adapting this Heideggerian and Arendtian expression for ontological security, the who-ness of a person was implied as the ability to give authentic meaning and self-expression to her existence with a clear-sighted, mindful, representational and critical stance in public and private life. Positioned as a key responsibility of education to nurture by Arendt, this concept was used as a means by which to investigate the epistemological (backgrounds) and ontological (experiential) cultures of inclusion and whether they were taking socially excluded people toward a sense of community, belonging and inclusive citizenship.

The central aim of the thesis was to highlight areas of tension between the what-ness of inclusion and the who-ness of excluded women as a way to further unravel the gender and technology relations. With the epistemological and ontological cultures of inclusion specifying the givens of how socially excluded people may achieve equity through ICT activity, the research sought to unpeel the black boxes of ICT and gender by exposing instantiations of their inessential Heideggerian essences, or their functional and objectified qualities. By showing how policy and practice reflected

these qualities of what-ness and how they influenced the who-ness of women, it was hoped to shed fresh light on the problem domain.

Revisiting the concept of citizenship, its unifying notion was historically located in ideas of equity, justice and fairness for all, and its current conceptualisation outlined in which the rights and responsibilities of the socially excluded were undergoing transformation. Encouraged to engage in free-market principles of entrepreneurship, competitiveness, accountability and individualism, the perception that "technology makes it difficult to protect citizens, so citizens must be able to protect themselves" (DTI 1998b: 31), meant that these values were presented by government as the means by which to induce inclusive, equitable citizenship. By reducing passive reliance on welfare benefits, increasing employability and labour market participation, these culturally specific attributes were positioned as necessary for turning round the legacies of exclusion, redressing the gendered digital divide, and fostering a sense of belonging and ownership of responsibility.

This civic redefining of socially excluded people's relation to society, the economy and ICT infusion was reflected in the ontological cultures of citizenship and argued to position them in a socio-political enframing of societal membership that promised greater ontological security through labour market inclusion. With ICT employability seen to provide greater socio-economic opportunity, the thesis wished to match this promise of security with the public and private circumstances of lone women parents; whether their self-determination and authentic who-ness was fostered or not. Seeking to analyse the logic of revitalising productivity through improvement of the nation's ICT human and social capital, part of Marxist theory was utilised. In an attempt to

move beyond Gestell's philosophical use and apply it more concretely to present day settings, the additional restructuring of the concept included Marx's analysis of the forces and relations of production. The forces were interpreted as the background epistemologies of the politico-economic partnerships between government and business. Extending Marx's analysis of capital to ICT production, attention was on how specific instantiations of the accruing of absolute and relative surplus value, or the valorisation process, were overtly or covertly shaped by these two forces of production, and how they mitigated the socio-economic relations of the socially excluded.

Interpreting these relations of production as shaped by the rights and responsibilities of ontological citizenship inclusion, their reformulation was presented as part of the changing dimensions of the ICT labour process. Attempting to provide an alternative to the homogeneous Marxist notions of class and alienation which were, in the first instance, shaped by the relations of production, the term who-ness referred to the individual and wider societal implications of these relations. With the final application of Gestell taking the form of the socio-political and economic enframing of technology and gender by epistemological and ontological cultures which valorise ICT productivity, this new interpretation of Gestell sought to bring to light the complexities of exclusion and inclusion.

This remodelling of Gestell reflected an effort to go beyond Marxist dialectical and Heideggerian dualistic analytical formulation, for social life is more complex than these triad or dichotomous hierarchical constructs imply (Haraway 1991). At risk of placing change in some distance, hypothetical future that naturally or ideally occurs,

Gestell as a dynamic theoretical framework was redesigned to encapsulate and locate synthesis in that which was practically happening in the here and now. To convey this, the thesis utilised narrative methodology to enable rich expressions of the epistemological and ontological cultures of inclusion and how they were experienced by socially excluded people. Utilising feminist critical theory which privileged the voices of women and questioned the status quo, this phenomenological investigation took the form of highlighting women's narratives to show how their ways of knowing and being in the world were shaped by concrete manifestations of their otherness. Arguing that the masculinised Cartesian demarcation between validation and non-validation set the scene for women's societal exclusion, the de-valorisation and marginalization of their ontology and epistemology provided a philosophical conceptualisation that could be used to explore how instantiations of otherness influenced their exclusion and inclusion to ICT domains and the labour market. In general, the research was interested in whether the cultures of inclusion were constitutive of transformative empowerment or restrictive social control.

9.2.3 Empirical data

To provide empirical data for the central research question, the research used the case study of the CCNA programme and involved fieldwork in four different pedagogic settings which were summarised by describing their environment, student profile, ethos and structure of the network engineer programme. A synopsis of the parent company, Cisco Systems, provided its background in ICT networked infrastructures which centred on three core products: routers, switches and the Internetwork Operating System. Expressing concern for the digital divide and a deficit in network engineers, the company's social responsibility manifested in the instigation of, and

support for, the Cisco Networking Academy Programme. Formulated against a background of US pedagogic reform, network engineer skills were presented as the means by which digital opportunity could be gained and equity realised. Briefly overviewing the Academy's structure, provision and pedagogic philosophy, Cisco's concept of ecosystem was introduced to reflect the array of multidimensional partnerships necessary for business and civic inclusion to the new economy. Adopting the corporation's successful e-learning programme and advocating a social constructivist methodology, the Academy's mission was to equalise the way people teach and learn.

By establishing pedagogic and gender ecosystems, research into best practices to realise this goal was shaped by the high drop-out rate of women students in the first semester of the CCNA. Formulating an array of strategies based on the legacy of inhibitors mentioned above to improve the gender profile, the Academy's literature and Cisco representatives positioned it as having in place the right strategies to offer those at risk of exclusion empowering employment. The thesis then proceeded to explore in-depth the backgrounds of this ICT inclusive endeavour and contrast it with the actual experiences of the students and staff on the CCNA programme.

9.3   The challenging-forth of inclusive objects: research findings

That which emerged from the three analysis chapters suggested that the epistemological and ontological cultures of inclusion were reflective of social and gendered control. In exploring the valorisation process of ICT productivity, each Gestell displayed a specific form of technological rationality that instrumentalised, objectified and manipulated the socio-economic relations of those on the fringes of

society. Revealing a number of breakdowns in the politico-economic forces of ICT productivity's narratives, or epistemological cultures of inclusion, the reality of their practices pointed to three central sites of tension in which the high cost of socio-economic integration for the unemployed, the low-skilled and women compromised their ontological security. Pointing to commodification of their rights and labour, the different manifestations of inclusion were indicative of functional requisitioning for productive use. Whilst this may accrue greater appearance of security for government, it appeared not to do so for the socially excluded since their who-ness was considerably constrained. Caught in the structural turmoil of change, their daily lives were adversely mediated by the ontological cultures of inclusion that shaped their citizenship in ways that airbrushed their choices and alternative means of existence. In masking their who-ness through politico-moral constructions of inclusion, this ontological enframing of their relations was linked to the valorisation process of ICT productivity by exposing some hidden or less advertised political economies in each Gestell. Differentiating between the specific accruing, or valorisation of human, social and material resources, three new types of capital were explored - entrepreneurial, pedagogic and gendered to show how the cultures of inclusion were, in the first instance, governed by techno-economic determinism.

9.3.1   Network Technology Gestell summary

The Network Technology Gestell (NTG) revealed a central political economy of regulation that was argued to be mediated by two other political economies involving ICT standards and Foreign Direct Investment (FDI) flow. In describing the growth of networked communications, the narrative of the new global economy positioned the relative surplus value of ICT commodities as critical for enhancing socio-economic

change. Contextualised against a background legacy of low productivity, this ICT valorisation process was seen to require adjustments to national micro and macroeconomic policy to free restrictions on innovation, labour, trade and entrepreneurial capital flow. Taking the form of an "arms-length" regulatory approach, the specific adjudication of ICT products and services was narrated as being managed by independent bodies. However, in exploring the global setting it was suggested that the construction of these bodies was mediated by the Triad ecosystem of multidimensional politico-economic partnerships. By charting a flow of FDI, that which came to light was a tightly controlled, closed international market setting, rather than a global one. Tentatively putting forward the hypothesis that ICT forces of production played a prominent role in the direction and movement of this FDI capital, Britain appeared eager to attract it. Requiring conducive a labour market environment with greater citizenship participation, the ontological construction of inclusion took the shape of active responsibility for access to income. In presenting these government ICT policies and the valorisation of the ICT industry's commodities, this Gestell surmised that the epistemological and ontological focus of this background constituted a specific instantiation of a multifaceted politico-economic regulatory enframing of ICT entrepreneurial capital that was shaped by FDI.

For, in analysing this snapshot of national and citizen inclusion to the new economy, a list of breakdowns emerged which centred on current market instability and the contributory volatility of ICT commodities. That which came to light was a simultaneous restructuring of social welfare policy and a compromising of the socio-economic relations of the unemployed. Controversially linking this reshuffle to the deregulatory enframing of ICT productivity by the international Triad ecosystem, it

was argued to constitute a political economy of welfare which acted as the fundamental site of tension. With welfare provision a social structure of valorisation that shelters both entrepreneurial capital and labour, this tension was mediated by the market-led welfare enframing of the politico-moral and economic construction of inclusive citizenship. Positioning the universal rights of the unemployed to benefit entitlement in conditional responsibilities, this presented a controlling challenging-forth for sections of the socially excluded population, and pointed to the inessential essence of this Gestell as an ongoing authority regulating 'inactive' people toward employability. Placing the blame for lack of labour market participation in the individual, and hiding the reality that in times of structural change unemployment is a consequence, the state appeared to be compromising its responsibility for protection of the socially excluded.

This Gestell saw a commodification of benefits which positioned lone women parents in an equity model of responsibility that assumed an epistemology and ontology of sameness, where the neutrality the equalising conditions reinforced their otherness or difference. Lacking validation of their alternative family structures and airbrushing their care commitments, earning potential and different models of income generation, their entrepreneurial and personal activity was restricted by normative expectations and politico-economic values (Rees 1992; MacKenzie and Wajcman 1999b). Shaped by the politico-economic forces of ICT production, this Gestell's snapshot of "arms-length" regulation of ICT entrepreneurial capital and tight regulation of social welfare policy appeared to compromise the socio-economic relations of the unemployed by jeopardising their ontological security through augmenting their poverty and infringing their civic rights.

9.3.2   Network Engineer Training Gestell summary

Compromising the who-ness of socially excluded people and lone women parents in the quest for greater labour market participation, the Network Engineer Training Gestell (NETG) revealed a political economy of skills that highlighted a fundamental site of pedagogic tension. Also evolving around the accruing of relative surplus value, the valorisation of knowledge work saw the particular instantiation of the epistemological enframing of inclusion taking the shape of ICT employability. Positioned against a background legacy of low skills and a perceived quantitative and qualitative shortage in knowledge workers, the ontological formulation of citizenship inclusion took the form of ICT skills acquisition in the first instance. With the ecosystem of partnerships between business, government and educational institutions reflected in the restructuring of vocational education and training (VET), this reform of pedagogic capital sought to consolidate, standardise and homogenize the plethora of ICT skills and courses, and widen educational participation for the low-skilled. Envisaged through e-learning provision and vendor-specific qualifications such as the CCNA, their marketing took the shape of epistemological narratives of lifelong learning and enhancement of the educational process by utilising a social constructivist methodology. In reviewing these government ICT skills policies and the valorisation of the ICT industry's demand for knowledge expertise, this Gestell drew the conclusion that the epistemological and ontological backgrounds constituted a specific instantiation of a politico-economic standardisation enframing of ICT pedagogic capital.

With the politico-economic forces of productivity's narratives of inclusion not matching with the experiences of students and staff on the CCNA programme, a

catalogue of breakdowns exposed the mythologizing reality of employability and pedagogic empowerment. That which emerged was a second instance of ontological enframing which had the appearance of a cultural and moral component of skills deployment. Vocational ICT training as a social structure of pedagogic capital valorisation involved an element of emotive labour construction. Hiding this construing of their employment identity and personal expression with the narrative of "meta-skills", this market-led pedagogic enframing of the socio-economic relations of inclusive citizenship inculcated uniformity, conformity and obedience in the low-skilled. Revealing the inessential essence of their inclusion as an instantiation of the individualised enframing of docile citizens according to the dominant politico-economic order of our time, this Gestell presented a controlling and functional challenging-forth of students as passive objects of manipulation. Encapsulated in the case study of the CCNA programme, this ontology of inclusion was realised through an epistemology of a universal e-banking system that commodified their intellectual and personal development.

Omitting the revenue generated by validating e-learning, conservatively estimated to reach some US$ 6 billion by 2007 for corporate use alone[1], this ICT VET model of inclusion left unquestioned the notion of skill (Lloyd and Payne 2000), and the reality of an extremely competitive, small knowledge-based labour market. With students struggling to have their qualifications recognised by employers, gain employment or work experience, this Gestell's snapshot of standardisation in ICT and cultural skills definition appeared to compromise the socio-economic relations of the low-skilled, especially so for lone parents and ethnic minorities. By jeopardising their ontological

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[1] http//www.ecommercetimes.com/perl/story/32325.html (accessed December 2003).

security through steering them toward mythical ICT employability, nullifying cultural and individual preferences or variations of identity, and once again assuming an epistemology and ontology of sameness, a sense of otherness or difference was argued to be reinforced. Particularly acute for lone women parents, their common experiences of otherness took the form of discrimination, violence and sexual abuse, yet in forsaking key pedagogic principles of exploratory and empowering holistic development these circumstances were de-valorised. Impacting on their pedagogic processes and employability, feelings of demotivation and lack of consideration of their particular personal circumstances suppressed authentic expression of their academic and demonstrative who-ness.

9.3.3   Gender Gestell summary

The Gender Gestell (GG) exposed two political economies which evolved around the gendered profile of the labour market and the labour process of flexibility. As part of the imperative to turn round the legacy of the low participation of women in the ICT industry, the epistemological narratives of diversification, feminisation of the workforce and work-life balance (WLB) flexibility suggested recognition of their different needs, responsibilities and abilities. As instantiations of the business and government ecosystem of partnerships, the revamping of ICT's negative image, the targeting of young women and the implementation of role models and ambassador schemes were presented as quantitatively improving women's recruitment and retention. Part of the wider strategy to encourage their labour market participation, the epistemological argument was that the new economy's focus on care and customer professionalism required relational expertise in addition to ICT skills. With women positioned as innately in possession of such know-how, the ontological construction of

their citizenship inclusion resided in this valued proficiency. In describing these epistemological and ontological backgrounds of the government's feminisation of ICT policies and the valorisation of the ICT industry's gendered expertise, this Gestell surmised that they constituted a specific instantiation of politico-economic classificatory enframing of gendered capital, in which a distorted narrative of equitable flexibility played a central role.

For, as a series of breakdowns in the official narratives unfolded, that which come to light was a political economy of flexibility which was shown to be instrumental in streamlining productivity by increasing both absolute and relative surplus value. Linking this analysis to WLB flexibility, it was argued that this presentation of gendered equitable care to improve labour relations in fact obscured the valorisation process. By taking a closer look at the narrative of a greater balance between work and life, what emerged in reality was a synonymy with part-time conditions of employment. For many women with care commitments such work was their only option and in outlining their labour market experiences, a considerable distortion in the narrative of equality was revealed. Low-skilled women's part-time employment was beset with rigidities that restricted their careers opportunities, deflated their wages and limited their conditions of service. By segregating them into low-level jobs and clustering them in certain industrial sectors, it was suggested that their cheaper, more flexible forms of labour helped to boost productivity in the short-term but possibly jeopardised it in the long term.

Presenting a fundamental site of equity tension that appeared to act as a politico-economic structure of capital valorisation, it was mediated in the first instance by

flexibility enframing of the labour process and its instantiations in the gendered labour market rigidities. With the ICT industry reflecting the latter in the form of gendered occupational marginalisation in low level, low paid work, discrimination was encountered by both women and ethnic minorities in recruitment procedures. Combined with the absence of part-time and WLB conditions of service and the working culture of long hours, argued to contribute toward the accruing of absolute surplus value, many women and lone parents struggled to find employment. Furthermore, the industry's recalcitrance in validating 'relational' expertise exposed the second instance of the site of equity tension which was mediated by the politico-moral and economic construction of gendered otherness. As a cultural or ideological classificatory enframing of inclusive citizenship for women, it objectified, stereotyped and homogenised their otherness through essentialist notions of femininity. This what-ness of ontological inclusion revealed the inessential essence of this Gestell, and presented a controlling challenging-forth of women as commodified gendered capital. Mitigating against social and ICT inclusion, the Gender Gestell's snapshot of flexibility, distorted equity and classification in the feminisation of ICT policies appeared to compromise the socio-economic relations of women. Jeopardising their ontological security or who-ness by not redressing the array of deeply embedded· prejudicial employment practices and beliefs, it was suggested that a political economy of flexible notions of equity was used to adjust the parameters of their labour market participation to suit economic trends.

9.3.4   Unifying the Gestells

Drawing the key conclusions of each Gestell together, they are summarised in the table below. However, this initial table doesn't fully cover the complexities that each

Gestell attempted to explore, and more time is required to think through how this may be improved as section 9.6 below reflects upon. Yet, in describing the three background instantiations of the socio-political and economic enframing of technology and gender by epistemological and ontological cultures of inclusion that valorise ICT productivity, the key sites of tension that emerged were social welfare, pedagogy and equity. Having the appearance of being mediated by ICT politico-economic ecosystems that capitalise on the regulation, standardisation and classification of human and material productive resources, the experiences of the socially excluded students reflected different forms of control that contradicted the narratives of opportunity, equity and empowerment.
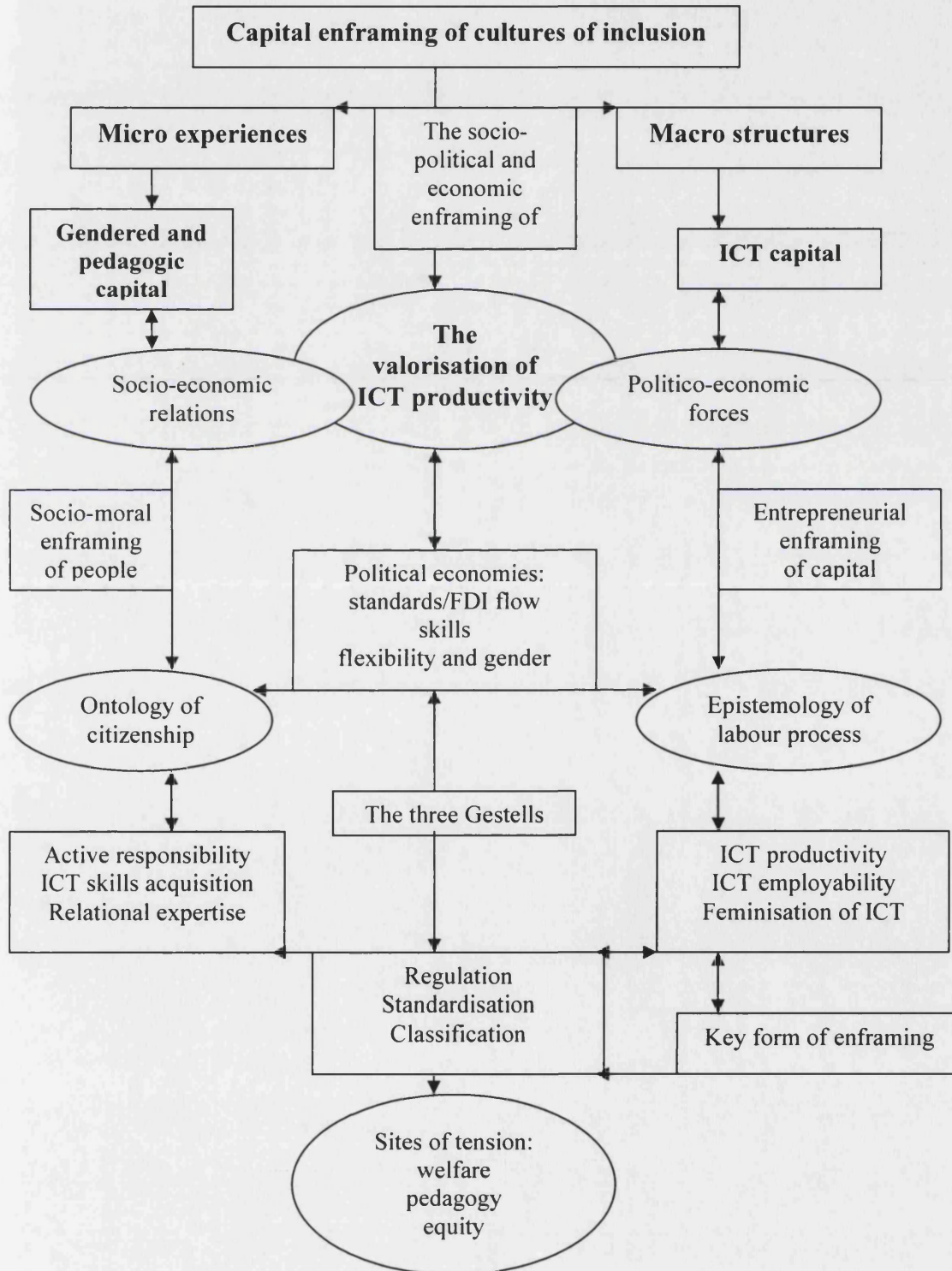
Table 9.1: Gestells of inclusion

	Valorisation of ICT productivity	Political economies	Inclusive cultures	Enframing of capital	Tensions
NTG	Relative surplus value of commodities	Standards Regulation FDI flow Social welfare	ICT productivity through entrepreneurial, active responsibility	Deregulation of ICT entrepreneurial capital	Social welfare and benefit control
NETG	Relative surplus value of knowledge work	Skills	Employability through ICT skills acquisition and meta-skills	Standardisation of pedagogic capital	Vocational pedagogy and socio-cultural control
GG	Relative and absolute surplus value of WLB flexibility	Flexibility and gendered labour market	Feminisation of ICT through relational expertise	Classification of gendered capital	Distorted equity and politico-cultural control

Surmising that this constitutes a particular capital enframing of the cultures of inclusion, the diagram below offers a tentative flow chart of interrelated processes which the exploratory use of the concept Gestell flagged. It suggests that the centralisation of the valorisation process of ICT productivity gives rise to specific instantiations of epistemological and ontological enframing by the macro politico-

economic forces to control the micro dispersions or distributions of the socio-economic relations. Motivated by ICT entrepreneurial, pedagogic and gendered

Diagram 9.1: Capital enframing of cultures of inclusion

Capital enframing of cultures of inclusion

Micro experiences	The socio-political and economic enframing of	Macro structures

Gendered and pedagogic capital		ICT capital

Socio-economic relations

The valorisation of ICT productivity

Politico-economic forces

Socio-moral enframing of people		Entrepreneurial enframing of capital

	Political economies: standards/FDI flow skills flexibility and gender	

Ontology of citizenship

Epistemology of labour process

	The three Gestells	

Active responsibility ICT skills acquisition Relational expertise		ICT productivity ICT employability Feminisation of ICT

	Regulation Standardisation Classification	Key form of enframing

Sites of tension:
welfare
pedagogy
equity

capital accumulation, the strict epistemological and ontological borderlands contour the boundaries of the labour process and citizenship for those classified as excluded. With key political economies enframing the parameters of their inclusion, they are objectively, functionally and homogeneously challenged-forth by socio-moral constructions of control. Appearing to considerably constrict their range of choice, well-being, educational development, labour market experiences and expressions of who-ness, the sites of tension point to areas where their exclusion is at risk of amplification should obedience and compliance not be forthcoming.

9.4   The challenging forth of exclusive objects

9.4.1   Coercion

Controlling nonconformity, tokenising difference and validating or airbrushing women's otherness, depending on the politico-economic agenda, this 21st century snapshot of the epistemological and ontological capital enframing of inclusion assumes an essential sameness and unity of aspiration in humanity. The absence of reappraisal on how diverse dimensions of existence may actually enrich society results in the reality that those who assert alternative cultures of knowing and being in the world will continue to remain on the fringes of society. With these backgrounds of exclusion intrinsically part of social existence, their apparent opposition to democratic inclusion plays a central role in the valorisation of capital. Through subordination and domination of these variances, the injustices and inequalities of social existence help underpin capitalist productivity by enabling the division of labour into gendered, racial, technical and other forms of socio-productive classes. This under-narrated dimension of capitalist productivity in general by the politico-economic forces is

visible in a selection of the political economies, such as welfare, skills and the gendered labour market.

With functional, technological and gendered determinism underpinning the appropriation of the socially excluded in terms of sections of the unemployed, the low-skilled and lone women parents, their labour process reflects a Heideggerian standing-reserve that is drawn upon for the necessary but menial, low-cost, invalidated requirements of capital accumulation. Justifying this reality by aligning their interests with those of the affluent and powerful, the myths of equitable inclusion are embedded in conformative and politico-moral flexible values and serve to give the appearance of holding society together by gathering those on the edges into mainstream cultures. Clearly demarcating between productive and non-productive, contributory and non-contributory, these myths act as ideological validation of capitalist materialism, self-interest and discriminatory manipulation. If a myth conveys a belief in, or evaluation of, a way in which people may think about themselves and the world, then this representational or cultural mechanism sets the ground for anything to be possible (Levi-Strauss 1963; Beattie 1964). But, in mythologizing socio-economic cohesion to compensate for sections of humanity's helplessness in the face of change, the functional status quo management of contradictions in social existence is masked and distorted (Hirst and Thompson 1999).

Hidden by the narratives of care, equity, opportunity and empowerment and contravening the narrative of individual responsibility, this mythologizing authoritarian mechanism distorts reality and validates the socio-political and moral constructions of our concrete relations to the world and each other. Enmeshed in an

unchallenged techno-economic rationale, the valorisation of ICT objects and productive processes shapes the politico-economic and social epistemology and ontology of inclusion at the cost of fully understanding and therefore concretely redressing issues of exclusion. Inculcating a range of hypothetical ideological values in sections of the socially excluded does not turn round the inequalities and injustices of their particular circumstances, as this research has shown. For the unemployed, the low skilled and those managing care responsibilities in single parent families are exposed to welfare, pedagogic and labour market rigidities which further segregate, discriminate and inadequately remunerate their labour or allow for personal expressions of who-ness. In blurring traditional demarcations between government, business and pedagogy, in relocating state responsibilities in conditional personal rights, and in conflating private and public existence, the politico-economic enframing of regulation, standardisation and classification moulds the valorisation of ICT productivity and not the empowerment of the oppressed.

9.4.2   Polarisation

This particular capitalist enframing of productivity indeed teaches docility to the refractory hand of low-skilled labour by eliciting science and technology into its service, as the Marxist quote at the beginning of the thesis stated. Through manipulatory challenging-forth the unproductive relations of those classified as excluded and contouring their who-ness through politico-moral and economic formulations of what-ness, their labour is divided by strict demarcations of benefit entitlement, skills definition and gendered ability. Society and its citizens are further polarised by these constructions which appear geared toward producing, reproducing and regulating different forms of capital. Hiding this division through cultures of

inclusion gives rise to false consciousness, for the term 'culture' represents a "constellation of unexamined assumptions, attitudes, values and institutions that has the power to suppress one's awareness of one's true condition" (Euben 2001: 178). As a diverse enactment of existence that encompasses conflictory meanings and experiences, the government's adoption of the term fails to examine the matrix of difference and compromises in conformity. Rather, it imposes regulation, standardisation and classification that distorts and suppresses the lived enactments of the expressive who-ness of agency.

With the logic of capitalism being that demand and supply are intrinsically interwoven, it has given rise to the belief that investment in both will generate entrepreneurial, pedagogic and gendered capital and thereby address Britain's legacies of exclusion. Yet, as one of the world's largest offshore financial centres that is geared to income generation from international trade and financial transactions rather than production (Hirst and Thompson 1999), the British government's reliance on this market system is precariously balanced on the fluctuating financial returns of ICT and investment companies. With the reality of tenuous market stability and only small patches of economic success contrasted against on-going backgrounds of poor performance, high social exclusion, societal tension and increasing poverty, the short-sightedness of capital interests foregoes the long-term well-being of its labour force. In a knee-jerk response to rescue society from moral and economic decay, the revaluation of Anglo-Saxon precepts of democracy and individual freedom presents a distorted and compliant challenging-forth of notions of equity.

9.4.3   Distortion

Based on universal, neutral and liberal principles the concept of equity implies autonomy, liberty, fairness and justice, and that all aspire to these values and are able to attain them. Yet this Grecian ideal is false, for formulated as it is on a masculine elite's narrowly extended and fiercely guarded sense of citizenship, it hides the reality that some are more equal than others (Lister 1990a, 1997; Walby 1997; Yuval-Davis 1997; Beard 2006). Past down the ages as the system of belief for Anglo-Saxon democracy, this vacuous classical notion of equity is conditional as adherence to the normative values and responsibilities set out in law must be part of social existence. As such, it perpetuates a public mantle of conformity, discrimination and invisibility which is flexibly adjusted according to the prevailing societal requirements. Present government's assumption of the relation between individuals, the state and civil society is conveyed in the belief that it is not prescribing but rather responding to the changing nature of society[2]. Yet its policy narratives contradict this by outlining imaginary myths of how certain groups of people should engage with social existence (Yuval-Davis 1997; Adam 1998; Lewis 2002). By regulating, standardising and classifying the socially excluded through equitable notions of citizenship, the inclusive connotation of the term is distorted to suit the conventions for societal order, polarisation and control (Stratigaki 2004; Walby 2004). Utilised as a convenient alibi for intervention in people's lives, what is formulated as an attempt to provide certain groups with the space to express themselves actually manifests as an enforcement of an identity selected by the authorities (Beard 2006; Sen 2006). Through a mask of equity, individual freedom is limited to that which is acceptable and productive.

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[2] Comment made by Patricia Hewitt, the Secretary for State, Department of Trade and Industry, on BBC News 24, 18th September 2004.

As a highly abstract, politically structured concept supporting the dominant ideology, the premise of equity neglects private dimensions of dependency, oppression and violence, and public dimensions of discrimination, segregation and exploitation. Voiced to reaffirm an array of values and disaffirm others, it can not tackle the deep-seated dimensions of inequity for it is overtly biased, narrowly conceived and superficially implemented. Omitting the validity of difference, the complexity and slipperiness of the concept can not be divorced from relations of power (Lister 1990a, 1997; Taylor-Gooby 1991; Faulks 1998; Walby 2004), and as the thesis has shown, the epistemological and ontological enframing of inclusion is hard to challenge, particularly for those who are often dependent on state support. Changing the parameters of exclusion by focusing on citizenship reconfiguration will do little to alter this distortion of equity, for the structural systems and beliefs that contribute toward forms of prejudice, oppression and exclusion are not challenged.

With policy embedded in soft advisory and not hard legal intervention (Walby 2004), equity recommendations to improve the inclusion of socially excluded groups through diversification of the workforce, and WLB and gender mainstreaming for women in particular, are merely short-term, piecemeal, precariously funded strategies which are outside the bulk of mainstream practice. The avocation of diversity risks extending twisted notions of gendered equity to other groups, removing gender specific projects (Rees 2001; Duncan 2002), and widening the imposition of conformity to perceived standards of normality. Inadequately accommodating difference in aspiration and socio-economic circumstances, the poorly understood and also abstract concept of diversity risks commanding pressure to say and do the 'right' thing and consigning exclusive and discriminatory practices further underground (Howard and Tibbals

2003). Inclusion under these terms will be a hard and painful experience since any agency or expression of who-ness is adversely mediated by exposure to, and entrapment in, the injustices and incivilities of the politico-economic order.

The conditional criteria for equitable citizenship will not change this, for the people targeted are devoid of recognisable power and status, bereft of an array of resources and entrenched in relations of subordination. The regulatory, standardising and classifying what-ness of inclusion reinforces rather than redresses socio-economic exclusion, disenfranchisement and isolation since the underlying principle of treating everyone homogeneously fails to respond to, or indeed challenge the hegemonic cultures in which the distorted conceptualisations of equity and difference are formed (Grundy 1996; Osborn et al. 2000). Mythologised by the cultures of inclusion and functionally capitalised upon by institutional structures and practices, inequitable variations of difference constitute the very foundations of capitalist society. Without them and the domination of those who fall under their remit, the valorisation process would perhaps be less easily achievable.

9.4.4 Disrespect

With traditional civic precepts and certainties fading from the daily lives of the socially excluded, their citizenship rights have been submerged in politico-economic imperatives that individualise preconditions for inclusion (Beck and Beck-Gernsheim 1995; Lister 1997; Faulks 1998). As categories of moral and socio-economic value that have political agency by shaping the focus of policy, active responsibility, ICT skills acquisition and relational expertise are geared toward market aspirations of self-determination and self-reliance, but they have been shown to mitigate against full

access to citizenship for the socially excluded (Lister 1990b; Taylor-Gooby 1991; Walby 1997). Stigmatised as worthlessly on the periphery of society and undeserving of state support, their range of choice is further constricted by these normative inclusion values which bring the state and its agencies toward their management, treating them as objects without power and in need of care (Lane 2001). Contradicting the essence of their inculcation, these citizenship ethics belie the narratives of respect and concern and are indicative of the Heideggerian inessential essence of societal membership.

For, in transferring the economic risk from the state to the individual and from the employer to the employee, the new economy displaces appreciation and attention of difference, and that which manifests in reality is greater insecurity for those who can not weather the changes (Cousins and Tang 2002; Coyle 2003; Webster 2003a; Tapia 2004). Blurring the rich borderlands of their diverse existences, such competitive individualism conceals the suppression of wages and the augmentation of stress and strain, with the health and well-being of certain citizens appearing to be sacrificed for greater productivity (Greenbaum 1995). This individualised morality of inclusive citizenship welds a coercive commanding of what sections of the population must be and aspire to, and lies at the heart of the cultural enframing of inclusion. Exposing a consequence of this inessential essence, this trend in actuality acts as a "corrosion and slow disintegration of citizenship", where the individual becomes a citizen's worst enemy (Lister 1990a; Bauman 2000: 36). Sitting in contrast to a unifying sense of community and belonging, individualisation implies that the risk of any shock and fluctuation in the economy or life in general is placed firmly in the lap of the isolated, rootless Heideggerian and Arendtian individual who, less protected by the state, may

increasingly lack control of her circumstances (Hirst and Thompson 1999; Bauman 2000; Britton 2002).

The narrative of the digital divide masks the contradictions of this inessential essence by displacing legacies of inequalities and injustices in the new location of access to ICT infusion, but whilst the valorisation process is affirmed the benefits do not filter through to society as a whole (Hacker 1990). Requiring more than ICT skills to qualitatively and authentically assess the value, veracity and reliability of technical information, the equalising, unifying and universalistic aspirations embedded in this new economy's narrative belie the simple fact that many don't have, or indeed wish to have, access (Mansell 2002; Selinger 2002b). With the inevitability of a global communications infrastructure questionable and a long way off, the underlying ideology of technological solutions to an array of socio-economic problems is not about humanistic empowerment, but rather objectifying, regulating, standardising, classifying and manipulating a compliant conformity in the low-skilled workforce.

This political economy of coercive, polarising, distorting and disrespectful inclusion will not turn around the three key legacies of exclusion, rather it is shaped by a fear of a growing underclass that has led to the production of the 'enemy' and ideological constructions of the socially excluded as scapegoats for Britain's problems (Faulks 1998). Through acts of compulsion on the isolated minority of the 'other', their citizenship remodelling is based on fragmenting their solidarity to foster the aspirations of the majority and serves to undermine the very people who need the state's support the most (Deleuze 1995). That which is ignored in privileging ICT infusion is improvement of decrepit public housing, under-resourced education and

health services, and comprehensive social protection. These essential infrastructures and hallmarks of a modern, ethical civil society considerably enhance the lives of the socially excluded, yet they take secondary place to the ongoing structural and local waves of selective investment that the diffusion of new networked technologies requires. Necessitating prolonged social processes of reform, re-education and docility of labour, this synopsis of exclusion will also fail to address the techno-gender relations.

9.5   The techno-gender relations revisited

By unpeeling the epistemology and ontology of gender and technology, this research has pointed to how their black boxes instantiations of determinism, essentialism, reductionism and functionalism are presented by government and Cisco. These surface appearances of their what-ness are uncontested constructs that are systematically shaped by the valorisation of ICT productivity through specific instantiations of enframing by regulation, standardisation and classification. Their production and reproduction is that of a torque (Bowker and Star 2000), twisted and squeezed between temporal and spatial definitions of what each must be to meet the requirements of the capitalist hegemonic order. Mediating their Heideggerian essence, neither is given the space nor freedom for alternative expressions. Decontextualised and disembodied, this instrumental and authoritarian containment warps our understanding of technology and gender by positioning each in webs of unquestioned meaning and association. Constructing both as malleable tools for knowing, being in, and ordering the world, this is hidden by the political economies of the valorisation process. By building society through the valorisation of ICT objects and processes, as

Heidegger surmised and this thesis has confirmed, this creation materially influences our lives and our relations. And by inextricably interweaving or positionally enframing gender within this technologically productive matrix of knowing and being in the world, civil society then has the appearance of ordered cohesion.

But the risk in so manipulating technology and gender, or indeed exclusion and inclusion, is that society is not cohesive as the three Gestells have indicated. With lone women parents coerced to fit in to the normative, homogeneous parameters of citizenship equity, their otherness is either concealed or affirmed by the Cartesian practice of airbrushing their expressions of who-ness. In the quest for order, control and regulation, these women's structures and practices for epistemological and ontological security are consigned to invalidity or capitalised upon. By so hiding their challenging borderlands of nonconformity, their existence is masked by prescriptions of ICT membership which throw them toward short-term strategies for infusion at the cost of exploring their own forms of ontological security. Under this instantiation of culturally specific masking, it is questionable as to whether women or indeed the socially excluded will achieve either parity or inclusion.

For in seeking to regulate and standardise the complexities of gendered social existence, the classificatory enframing of women's citizenship as relational attempts to redress their ICT absence through a quantitative, critical mass approach. But little has been done to qualitatively change the normative "new frontier" culture of technical practices, with the onus remaining on women to adapt and to integrate an acceptable identity (Wajcman 1991; Adam 1997, 1998; Faulkner 2000b, 2004; Henwood 2000). Embedded in this approach is the assumption that the institutional

imposition of a mass will resolve their low participation, but the absence of analyses

on the complexities their ICT exclusion and inclusion results in the ongoing failure to

resolve this problem domain (Adam 1998). Perhaps the term 'gender imbalance'

better reflects this critical omission by signposting the multifaceted micro and macro

variables involved that need to be comprehensively considered for gaining a deeper

understanding of how this phenomenon continues to prove recalcitrant.

This thesis has attempted to consider these variables by taking such an approach, and

that which emerges as a considerable contributory factor is the gendered labour

market rigidities of occupational segregation, discrimination, poor pay and conditions

of service. Particularly acute in the ICT industry, they remain unchallenged by

androcentric policies such as the work-life balance that reinforce these injustices, and

validate the imparity of gendered roles and responsibilities endemic in stereotyped

notions of family life. Black boxing such taken for granted structures and practices

means individual variances seamlessly disappear into the public production and

reproduction of gendered ideological hegemony (Zukin and DiMaggio 1990; Rees

1992; Adam 2002; Rommes and Faulkner 2003). Shaped by the power interests of

politico-economic groups and consigned to otherness by this cultural affirmation of

normative life, few lone parent women will have the strength, support or the

inclination to be tempted to risk their career or personal sense of identity in

inequitable ICT employment settings.

One-dimensional in perception and formulation, the strategies of role models, mentors

and the revamping of the ICT image further reinforce women's otherness and

exclusion by perpetuating cognitive and behavioural gendered essentialisms that

underpin both public and private discrimination and segregation. Hidden from history, no mention is made in policy documentation of the hundreds of wrens who were involved in deciphering German enigma signals during the Second World War. Nor is there reference to Hypatia, Ada Lovelace or Grace Hooper who were prominent in establishing the foreground of mathematics and digital technology. These forgotten dimensions, and others, of women's contribution is obscured by a blinkered perception that focuses on motivation and membership, but more central are the endemic injustices they are exposed to and this requires more than a quantitative strategy to affirm their presence and validate their abilities (Henwood 2000; Woodfield 2002).

With gendered structures, practices and processes deeply embedded in the habitual social, political, economic and cultural backgrounds and integral to a normative sense of self, the instantiations of epistemological and ontological what-ness in each Gestell neither support membership nor inclusion but rather tailor prejudicial degrees of motivation and ability (Cockburn 1983; Wajcman 1991; Levinson 2001). As highly rigid constructions of existence that are qualitatively open to interpretation, they require greater awareness of the everyday realities of women that Cisco's legacy of inhibitors analysis barely touches upon.

This research has offered these micro narratives in an attempt to point toward the complexities of turning round the problem domain, and it is clear that given the socio-politico and economic enframing of gender and technology by epistemological and ontological cultures of inclusion that valorise ICT productivity, this is no easy task. Interwoven as the problem domain is with civic responsibilities, cultural and

classificatory representations, deterministic and instrumental technical rationality, and pervasive market forces, this present day snapshot of Britain is shaped by a higher level Gestell. Reflecting a particular capitalist enframing of exclusion and inclusion, it powerfully valorises specific ontological and epistemological standpoints which are contoured by a background of multidimensional national and international agents of ICT productivity. Distancing us from our immediate contexts and presenting degrees of mastery and manipulation (Kallinikos 1995), this capitalist Gestell demands the reduction of society and people to objects of normative, productive functionality. As a relatively recent Anglo-Saxon legacy, its affirmation in present day policy formulation serves to subordinate concrete human requirements by coercing, polarising, distorting, disrespecting and commodifying our relations to technology, to gender, to society and to existence. Productive 'man' is yet again falling into the Cartesian trap of shaping the world in his form, rendering it calculable, controllable, manipulable, securable, knowable, marketable and falsely equitable.

9.6   Reflections on contributions and limitations

Such formidable construing of existence requires not only formulation of new theories but also revitalisation of old ones to conceptualise and convey the complexity of multidimensional, matrix-like spiralling and shifting instantiations of social, political moral and economic control. In exploring in greater detail the implications of the quantitative approach, this research has sought to give greater substance and explanation to an on-going strategy to address the gender imbalance in ICT arenas. Whilst a focus on this approach may be regarded as limiting a comprehensive understanding of how the imbalance has come to be and continues to be perpetuated,

the thesis has attempted to show that this is not necessarily the case. Since it constitutes the focus of attention for government, business and education, the contextual analysis presented in this research has sought to expose part of the background rationale of its institutional conceptualisation and how women are subject to the ignominies and falsehoods embedded in it.

Women, once again, are subjected to the capriciousness of policy which is tuned, in part, because women are seen to 'get things done' (DTI 2003b); an adage expressed by Margaret Thatcher that if you want anything said, ask a man, but if you want anything done, ask a woman. During the 1940s, they were required to break with tradition and patriotically work in the industries to cover the shortage of labour incurred by war, and then expected to give up their jobs when the men came home. With the 1950s seeing domesticity and family life idealised, this historical and gendered whim of policy provides a background context to the tenuous validity of women's labour that current formulations duplicate.

9.6.1   Contributions

Having presented the analytical and empirical evidence for this argument in the Gender Gestell, the unravelling of specific instantiations of the reconfiguration and commodification of women's present valorisation, and that of the socially excluded in the remaining Gestells, contributes to research in several forms. By affirming and expanding on the under-theorised investigative tool of phenomenology and the lack of practical application of the concept of Gestell, the thesis has shown how the valorisation process is epistemologically and ontologically enframed by technological background horizons of meaning that are drawn upon by government, business and

educational actors. Reinterpreting Gestell to incorporate how this referential enframing of technology extends to gender and affects the daily lives of the socially excluded, the thesis focused on the shaping of their citizenship to pay attention to situations of non-obviousness or breakdowns in policy which flagged key sites of tension in reality. This innovative theoretical framework was supplemented by adding three new interpretations of capital - ICT, pedagogic and gendered to differentiate between and politicise the specific accruing of human, social and material resources. Utilising a neo-Marxist analysis to show how these forms of capital were shaped by the valorisation process, the thesis' analyses of the shaping of the socio-economic relations of the unemployed, the low skilled and lone women parents by the politico-economic forces of ICT productivity constitutes a substantial contribution to the IS discipline.

Adopting the under-utilised methodological approach of narrative to ground this theoretical framework, this research provided descriptive accounts of both the institutional actors and the under-represented socially excluded. Matching policy with practice, these diverse macro and micro expressions provided different perspectives of exclusion and inclusion, and analyses of them answered the core research question of whether ontological security or insecurity emerged. Surmising that the latter was the case, this research flagged forms of social, behavioural and gendered control which were part of the status quo's attempt to foster a sense of belonging and membership to society and the ICT world which IS literature is currently short on. Drawing upon the under-utilised feminist critical theory to sensitively and ethically reflect on the research process, judicious and prejudicial lens were established to review this policy objective by privileging the under-represented voices of lone women parents. Taking

the feminist epistemological positioning of the black box of gender in Cartesian classifications of otherness, this provided a referential background for understanding the reality of many women's lives in relation to social welfare, vocation training and the labour market. Connecting the catalogue of inequities, injustices, discriminations, segregations and curtailments of women's empowerment to capitalisations or distortions of women's otherness, the thesis showed the strengths of feminist research which many IS scholars often ignore.

By taking a case study of network engineer training and phenomenologically beginning to unravel the black box of technology, the deficit of analysis on the technical, engineering and ICT side of IS has been redressed and the digital divide debate widened to take a closer look at the socio-economic and political implications of acquiring access skills. Through providing analytical and empirical data on social exclusion, the thesis presented different manifestations of the ICT labour process with regard to inclusion. With these contributions largely absent from IS literature, this research has provided an alternative to the over-riding emphasis on organisational and managerial concerns which remains essentially unchallenging of conventional society (Tapia 2004). Whilst none of these contributions would perhaps be radical in other disciplines, their introduction to the IS research community opens up its parameters of investigation to reflect a multidisciplinary, critical endeavour that moves on from a preoccupation with the quantitative/qualitative justification.

9.6.2   Limitations

However, use of the concept of Gestell to structure this thesis caused considerable problems. Encapsulating as it does the complex structures and daily actualities of

exclusion and inclusion, the attempt to interweave the multifaceted manifestations of the socio-political and economic enframing of gender and technology by epistemological and ontological cultures of inclusion that valorise ICT productivity proved unwieldy. Initially formulated to encompass the institutional enframing of our relations to technology and gender, Gestell grew in sophistication as the vast array of concepts emerged from the research process. Instinctively sensing a matrix of connectivity between these concepts, the challenge was how to convey the relations and what they signified. With Gestell appearing to offer this, retrospective reflection points to its current formulation as over ambitious, too complex and requiring simplification. For significant difficulty arose in the use of terminology; demanding exactness, each expression of Gestell or any one of its sub components could be articulated in a number of ways, with each conveying slightly different connotations. For example, the epistemological enframing of inclusion could be referred to as the politico-economic forces of productivity's enframing of epistemology, yet this latter expression did not signpost influences external to productivity. On reflection, a consequence of this precision may have inadvertently centralised economic factors by not adequately paying attention to the combination and order of terms used.

Furthermore, in exposing the number of political economies, it proved problematic in deciding which one was the key influence and whether it constituted the site of tension or merely flagged one. Generally, this was not difficult in the individual Gestells, but when attempting to integrate them the ramifications of one analysis impacted on the others and throw off course the interwoven picture. Tricky and time consuming to manage, this exploratory exercise into whether the concept had anything to offer research concludes that it does. Yet, further effort is required to

reduce the mind numbing complications, the ambiguity of the language and the convoluted intricacy of analysis that its present formulation gave rise to.

In attempting to provide a bigger picture of the techno-gender relations, the thesis verged away from the actual problem domain, and several shortcomings can be identified. First, the research did not make a distinction between science and technology, in part because it sought to reflect Cisco and government's conflation of the two. Whilst interwoven, the two are quite distinct (Adam 1998), and perhaps would have required another chapter to clarify this, but having realised this too late in the research process to address, it does represent a weakness which further investigation could unravel. Second, in using the term 'gender' the research is also destabilized by lapsing into a focus on women and not exploring in greater detail the experiences of men, or indeed demarking ethnicity, age and sexuality for example. Conditioned initially by the quantitative agenda, the focus was on how this affected socially excluded women in particular and whilst attempts were made to widen analysis, on reflection better integration could have been done. As Adam (1998) notes, a thesis for example can be written in any number of ways, and with hindsight this is more apparent. It may be that this lack of integration points to a limitation in the use of 'gender', but the term does still hold value in that it exposes the institutional structures and localised practices that produce and reproduce discriminatory values. With many women's expression of who-ness in Anglo-Saxon societies potentially in opposition to their what-ness, it continues to fall on feminist research to privilege their experiences, contextualise them within the backgrounds of the status quo and explore emerging sites of tension to provide supportive analysis of routes toward empowerment.

Third, in deciding to use the broad terms of epistemology and ontology, the cost was an exploration of the diverse expressions of these ways of knowing and being. The decision to refer to the citizenship configuration as an ontological enframing of inclusion negated the epistemological implications, but to have incorporated both terms may have given rise to confusion in what the research was referring to. For clarity, the ways in which we come to know and understand the world and ourselves were positioned in our backgrounds of reference, and whilst in the first instance, phenomenology holds that our ontology is the decisive factor, who we are or wish to become is shaped to a large extent by our socio-economic circumstances. Consequently, the research was motivated by what lay behind the drive to change the circumstances of women in relation to ICT infusion, and evolved by unravelling the institutional rationale and paying less attention to women's different experiences of existence.

Taking the stance, as outlined in the Methodological Approach chapter, section 4.3.1, that a focus solely on the everyday lives of women alone would not unravel the wider dimensions of their oppression and empowerment, the central goal of the thesis was to structurally contextualise how women's personal circumstances were commonly shaped by governmental and economic forces seemingly beyond their control. Given that our society is weak in accepting otherness and its non-conformative expressions, this in itself required challenging. One way to do so was to provide an analysis that pointed to how this was institutionally perpetuated and what forms it took, but at the expense of localising its manifestations. Whilst the use of narratives attempted to address this, it did not adequately do so. One reason for this is that such a methodology generates a substantial amount of data which can be unusable depending

on the research focus. With the thesis ultimately driven by the theory and less from the data, this leaning is reflected in the limited selection of quotes that were drawn upon, as a quick glance in Appendix A will reveal.

Finally, the fourth shortcoming is that the techno-gender relations are inadequately theorised. More could have been done by drawing perhaps from the differentiation between women 'in', 'and' or 'of' technology which some feminist researchers have made to distinguish between the symbolic gendering of artefacts, the embedded gendered labour relations and women's diverse ways of engaging with each (Cockburn 1985a; Cockburn and Ormrod 1993; Faulkner 2001, 2000b, 2004). Conscious that this complex minefield of analysis would have considerably altered the boundaries of investigation, the thesis' lack of exploring these subtle variances contributed perhaps to the absence of separation between gender and women's relation to technology, and to conflating gender with women as referred to above (Adam 1998). However, focus on one may contribute to the other as Adam suggests, and this research's weaknesses may perhaps have enabled an investigation that supplements these considerations by providing greater context to how gendered relations to ICT are moulded by socio-political and economic forces of productivity, and how women's experiences of these forces inform their individual epistemology and ontology.

9.7   The challenging-forth of subjects

Whilst this research has been predominantly about exposing the rhetoric surrounding ICT infusion and less on answers, for they are complex and locally situated, one major area of concern is policy formulation. Requiring a fundamental shift, if government

and business are increasingly intent on shaping the lives of the socially excluded then these people should have representational voices that provide the opportunity to assert their requirements and move away from the ethos of 'help' or distorted care (Arendt 1954(1961), 1958(1998); Hacker 1990; Lister 1997; Lane 2001). This is only possible, in the first instance, at local levels where they constitute the majority and policy makers the minority. Then perhaps they may express that which for them is their reality, and in articulating their diverse pressing needs and aspirations some formulations of truly transformative action can be aired. Viewing themselves as validated political beings, their capacity for activity is then present in even the most unlikely of situations (Arendt 1958(1998)). By listening to and reflecting upon their different perspectives, a collective understanding of their circumstances may emerge that should enable stronger representation of their interests and constructively influence the institutional players.

This more flexible, bottom-up approach, whilst time consuming and costly, may enable the socially excluded to truly be subjects of the British crown. For, if agency holds a sense of being able to engage with the world in an informed and aware manner, then this public representation is an essential component of democratic inclusion. Such interaction requires assertion of self and confidence, acceptance and tolerance of others, and awareness of a range of choice that is not conditioned by expectations of what-ness. Idealised as this is, for the thesis has shown that institutional players are recalcitrant in thinking and doing, nonetheless the nurturing of empowerment lies in a deeper understanding of the multidimensional variables of exclusion and inclusion. More fully explored by giving voice to those who experience the reality of these variables, this task resides in the ethical responsibility of academia

to provide realistic, comprehensive and systematic appraisal of them and so assist government and business agencies to re-evaluate their strategies.

Perhaps, as Marx surmised, we need to go beyond universalising notions of fairness and justice in relation to democratic citizenship inclusion, for they assume a homogeneity of circumstances, opportunities and aspirations that is not reflected in reality. Opening these and other related concepts up to reflect modern society's international, multicultural, multi-sexual and multi-family configurations for instance, would present a positive challenge for government that could be articulated in a politics of difference (Lister 1997; Beard 2006). With greater respect for, and recognition of, the nation's diversity of citizens that encompasses reflective consideration of others, of differing expressions and ways of knowing and being in the world, an ethos of communal care may be fostered (Lister 1990b, 1997; Adam 2001; Lewis 2002). Through reducing ambiguity, inconsistency and normative policy formulation, the assessment of core principles and meanings embedded in their construction could perhaps be revised toward this feminist morality of human existence which crosses boundaries of informal and formal, private and public, unpaid and paid work.

Rarely the centre of attention in government circles (Lewis 2002), the redefining of welfare protection, skills acquisition, labour market and ICT inclusion in this light positions the well-being or who-ness of those dependent on state institutions in an alternative model of responsibility, one in which all humans are sensitive to the circumstances of others. Re-formulating this fundamental ground for parity, and respectfully dignifying claimants for example by providing sufficient unconditional

income, may enable unemployed lone parents to explore a greater variety of options. Such an epistemological shift in policy narratives would relocate attention from specifying what people should do for their societies and themselves to improving ontological validation of the nation's subjects, and requires greater not less state protection. This more caring governmental role may then set the ground for enhanced personal security which is not solely located in the current trend of inculcating fear and conformity by over-emphasising terrorism, crime and exclusion.

Perhaps this recognition of care and the situated specificities of social existence may help to sever people's exclusive relations to the state (Adam 1995; Yuval-Davis 1997; Zuga 1999), but it alone is not sufficient. The right to be unemployed, to train in whatever takes fancy, to work in occupations of choice requires better shielding from the stigmas, injustices and inequities of the wider social and economic worlds. Radical reappraisal of the instantiations of otherness, such as the hidden domestic subjugation of violence and abuse and overt public enactments of discrimination and segregation, are necessary (Lister 1990a; Walby 1997). Whilst it may be assumed that women are the strongest if in employment by accruing financial independence, trade union protection and freedom from household isolation (Greenhill and Wilson 2005), this setting is beset with gendered rigidities. Unless equitable transparency of pay, opportunities for promotion, access to care facilities and training, and consideration of the wider complexities of the work-life balance initiatives are systematically revised, women's participation in the labour market will continue to adversely affect their ontology and productivity (Walby and Olsen 2002).

As the thesis has also highlighted, quality training provision that encompasses holistic support is vital for low-skilled lone women parents in particular, subjected as they are to domestic and public maltreatment and exploitation. Opening up their learning process to different ways of understanding how technology and its gendered constructions are implicated in their changing lives is a start (Pannabecker 1991; O'Riley 1996; Kvasny and Keil 2006). Being sensitive to and exploratory of cultural and individual variances in the pedagogic practice may enable better nurturing of their strengths and who-ness, and by focusing on the less formal outcomes such as personal levels of confidence and competence, technical skills may be utilised in a more meaningful manner (Henwood et al. 2000b; Lloyd and Payne 2004). Changing the content and delivery of technical education is critical in redressing not only the gender imbalance but also our design, implementation and use of technological systems. By incorporating the historical, socio-cultural, political, economic, poetical and philosophical considerations of technology, the Heideggerian essence of that which shows itself in reality may be explored (Heidegger 1954(1968). This essence is hidden by rational, functional thinking and may be reflected upon by students to assess for themselves where they abilities and interests lie (Dahlbom 1996; Chafy 1997).

In extending this approach to gender, pedagogy has an important role to play in opening up how it is socio-politically and ideologically constructed. Whilst the avocation of segregation of lessons may encourage more openness of exploration and expression (Zuga 1999; Faulkner 2002, 2004; Rommes and Faulkner 2003), this strategy is risky if not mindfully managed for women may feel patronised, stereotyped and further isolated (Adam et al. 2004). Such positive discrimination that requires additional, precarious support and resources lacks the vital component of

engaging in mixed environments to develop strategies for inclusion and acknowledgement. But if we replace the institutional rationale of human or social capital with pastoral care that builds on self-esteem, fosters self-awareness and provides a sense of solidarity, then these vital dimensions of pedagogy for the oppressed may comprehensively enable empowerment. Confidently equipped to challenge the recalcitrant shaping of gender and technology, societal citizenship becomes established in personal horizons of meaning and the heterogeneity of exclusion and inclusion shared.

If we make a distinction between education and learning, then we may not forget the pedagogic caring of who-ness: the capacity for developing informed choice in pursuing personal interests (Arendt 1954(1961); Kennedy 1997; Gordon 2001). Learning in the form of training jeopardises the empowerment of the socially excluded by standardising their skills acquisition and socio-moral construction, but in the broader sense of education lies their liberation through providing the time and space to critically reflect. Such reflection can not be rushed for it requires solitude, silence and patient waiting; seemingly unproductive periods that nonetheless help to personalise the learning and developmental process. Moving away from ticking boxes which over-simplifies or airbrushes this activity, and from assessment procedures that measure the what-ness of technical data, we may qualitatively augment the critical powers of contemplation. Encouraged to contextualise the factual data with awareness of personal circumstances and the prejudices that surround them, the commonalities and divergences of socially excluded students experiences may be built upon to foster deeper understandings of how their relations to the world shape their lives. This critical reflection and the public space that educational institutions potentially offer

are ideal for not only challenging the fixed, determined and seemingly unchangeable dimensions of their individual settings, but also representational public interaction (Arendt 1954(1961); Gordon 2001; Levinson 2001; Smith 2001).

Yet, by moving toward partnerships with business and utilising the language of the market and philanthropic care in the community, this potential for flexibly and holistically enhancing the learning process is rapidly being eroded by cutting back on unprofitable practices and focusing on single-issue activities (Kennedy 1997). With the future of education apparently residing in e-learning and public/private consortiums, the increasing dependency on corporate sponsorship risks a privileging of economic valorisation that shapes the curriculum, skills, participation and pedagogic ethos. Unproven in terms of cost-effectiveness and replacing local education authority guidance (Smithers 2006; Taylor 2006), corporate social responsibility that seeks to revise the image of capitalism as a constructive, considerate, honest and respectful force in society, blurs the interests of capital with humanistic ones. In presenting the corporate image as socially responsible, companies such as Cisco appear to be merely branding their products through an ideological agenda that in reality is constitutive of market hegemony and control (Pandya 2004; Edwards and Wajcman 2005).

Hiding their exercises in power and legitimating their presence through such branding of care, they risk shaping social relations toward material, profit-oriented goals that provide superficial, short-term solutions for those they appear to be concerned about. With their interest ultimately lying in appeasing shareholders, this philanthropic twist raises questions as to when corporations should take a role in social issues, how this

should be played and when it should not. With the ordinary person having no say in this trend, rather than giving the pedagogic and social reins to business, perhaps government needs to increase public accountability and control of such endeavours (Sikka 2004), rather than abdicate responsibilities for its protective functions. Making or breaking communities when strategic decisions require relocation or downsizing, such tenuous corporate social responsibility balances the lives of the local population on whim, fashionable modes and opportunist exploitation. These characteristics of capitalism do little to foster long-term projects which are required to turn round the legacies of exclusion and the on-going failures of inclusion.

With productivity the over-riding imperative towards which everything is reduced to standing-reserve remaining unquestioned in official paradigms of change, the valorisation of ICT products and services belies the intervention of people. In separating the social, political and economic from the technical, we abdicate accountability for the human consequences of ICT infusion (Haraway 1991, 1997), and whilst the three Gestells have shown the compromises made by the socially excluded, they have also pointed to that which requires change. With this reflection, empowering transformation, in the first instance, needs to encompass freedom from the constraints of disembodied technical, calculative thinking (Heidegger, 1954(1968), 1959(1966), 1962(1977a); Rorty 1992), from the rational instrumentality embedded in the politico-economic backgrounds that hide or suppress intuitive, alternative wisdom. In the second instance, it requires freedom from normative, stereotyped assumptions of gendered identities and roles which increasingly are being challenged by modern multicultural expressions of self and who-ness. In the third instance, those classified

as socially excluded must be freed from the stigma and judgement that surrounds their lives and controls their circumstances.

Encouragement to explore these marginal and unorthodox horizons of existence that shift according to our lifestages (Griffiths et al. 2006) requires radical, meditative epistemological and ontological shifts in the cultures of inclusion, relocating synthesis of difference and unity in multitudinous, not solely economic, spheres. More mindful of our interwoven dimensions of existences, with caring representational participation and reflexive inclusive processes, perhaps then our understanding of empowerment will move from exposing the oppressive situations from which we wish to escape to concretely tackling the individual manifestations of subjugation (Freire 1972a; Lorde 1992). Knowing only the logic and tactics of the controlling agents, our trust in Heideggerian intuitive leaps out of this darkness may then not be so conditioned by individualised passivity, fear and trepidation but with informed, conscious unity of action, hope and confidence.

November 2002 to August 2004

Organisation	Position of Interviewee	Interviewee No.	Interviewee Code	No. of hours interviewed (I) / observed (O)	Gender	Status*
Cisco: EMEA Europe, Middle East and Asia	Education Consultant	1	C_1	I: 12.5 O: 2	F	BW/P
Cisco: Worldwide Education	Manager of International Strategies and Partnerships	2	C_2	I: 1.5	F	BW/S
Cisco Networking Academy Programme	Manager: UK and Ireland	3	C_3	I: 2 O: 4	F	BW/S
Newham Training and Education Centre	Head of Business Development Unit	4	N_M1	I: 1.5	F	BW/P
Newham Training and Education Centre	Assistant CEO: Education	5	N_M2	I: 1	F	BAs/P/SA
Newham Training and Education Centre	Assistant CEO Operations: Finance Manager	6	N_M3	I: 1.5	M	BW/S
Newham Training and Education Centre	Tutor	7	N_T1	I: 0.5 O: 1	M	BW/S
Newham Training and Education Centre	CNAA Course Manager + Tutor	8	N_T2	I: 2 O: 2	F	BAC/P
Newham Training and Education Centre	Student	9	N_S1	I: 1 O: 0.5	F	BAC/S/SA
Newham Training and Education Centre	Student	10	N_S2	I: 1.5 O: 0.5	F	BA/P/SA
Newham Training and Education Centre	Student	11	N_S3	I: 1 O: 0.5	F	BAC/S/SA
Newham Training and Education Centre	Student and later Trainee Tutor	12	N_S4 [N_TT1]	I: 1.5 O: 15	F	BAC/LP/SA + EdF
Newham Training and Education Centre	Student	13	N_S5	I: 3 O: 1.5	F	Bas/LP/SA

*Code expansion below

Organisation	Position of Interviewee	Interviewee No.	Interviewee Code	No. of hours interviewed (I) / observed (O)	Gender	Status
Newham Training and Education Centre	Student	14	N_S6	I: 3 O: 1.5	F	BW/S/S F
Newham Training and Education Centre	Student	15	N_S7	I: 0.5 O: 0.5	F	BAC/S/S A
Fife Women's Technology Centre	Head of Centre	16	F_M1	I: 3.5	F	BW/LP
Fife Women's Technology Centre	Tutor	17	F_T1	I: 1.5 O: 0.5	F	BW/P
Fife Women's Technology Centre	Tutor and CCNA Course Manager	18	F_T2	I: 2.5 O: 0.5	F	BW/P
Fife Women's Technology Centre	Student	19	F_S1	I: 1 O: 0	F	BW/P/S A
Fife Women's Technology Centre	Student	20	F_S2	I: 1 O: 0	F	BW/LP/ SA
Fife Women's Technology Centre	Student	21	F_S3	I: 1 O: 0.5	F	BW/P/S A
Hackney Community College	Head of Computing, Accounts, Business Studies and Secretarial Section	22	H_M1	I: 0.5	F	BW/S
Hackney Community College	Tutor and CCNA Course Manager	23	H_T1	I: 1.5 O: 2	M	BW/S
Hackney Community College	Tutor	24	H_T2	I: 1 O: 0	F	BAC/LP
Hackney Community College	Student	25	H_S1	I: 0.5 O: 0.5	M	BC/S/SA
Hackney Community College	Student	26	H_S2	I: 0.5 O: 0.5	F	BA/S/PF
Hackney Community College	Student	27	H_S3	I: 0.5 O: 0.5	F	BA/S/PF
Hackney Community College	Student	28	H_S4	I: 0.5 O: 0.5	M	BA/S/SA / R-NE

Organisation	Position of Interviewee	Interviewee No.	Interviewee Code	No. of hours interviewed (I) / observed (O)	Gender	Status
Hackney Community College	Student	29	H_S5	I: 0.5 O: 0.5	M	BA/S/ SA/ R-NE
London Metropolitan University	Principal Lecturer and CCNA Course Manager Head of Computer, Communication Technology and Mathematics Department	30	LM_M1	I: 2 O: 5	M	BW/P
London Metropolitan University	Tutor	31	LM_T1	I: 1 O: 7	M	BE/S
London Metropolitan University	Trainee Tutor from Newham Training and Education Centre	32	N_TT2	I: 0.5 O: 2	F	BM/P/ EdF
London Metropolitan University	Trainee Tutor	33	LM_TT3	I: 0.5 O: 0.5	F	BAC/ LP/Ed F
London Metropolitan University	Trainee Tutor	34	LM_TT4	I: 1 O: 0.5	M	BW/S/ EdF
London Metropolitan University	Trainee Tutor	35	LM_TT5	I: 0.5 O: 0	M	C/S/E dF/R-ES
London Metropolitan University	Lab Technician	36	LM_LT3	I: 0.5 O: 2	M	BW/S
London Metropolitan University	Student	37	LM_S1	I: 0.5 O: 0.5	F	BAs/S /PF+ PTJ
London Metropolitan University	Student	38	LM_S2	I: 1 O: 1	F	BI/S/P F
London Metropolitan University	Student	39	LM_S3	I: 0.5 O: 0.5	F	BI/S/P F/R-ES
London Metropolitan University	Student	40	LM_S4	I: 1 O: 0	F	WSA/ LP/SF

Organisation	Position of Interviewee	Interviewee No.	Interviewee Code	No. of hours interviewed (I) / Observed (O)	Gender	Status
London Metropolitan University	Student	41	LM_S5	I: 0.5 O: 0	M	B/S/SL+ PTJ /R-ES
London Metropolitan University	Student	42	LM_S6	I: 0.5 O: 0.5	M	BW/S/CF
London Metropolitan University	Student	43	LM_S7	I: 0.5 O: 0.5	M	E/S/SF
London Metropolitan University	Student	44	LM_S8	I: 0.5 O: 0.5	F	I/R-NE
London Metropolitan University	Student	45	LM_S9	I: 0.5 O: 0.5	M	BW/S/CF
London Metropolitan University	Student	46	LM_S10	I: 0.5 O: 0	M	BW/S/CF
London Metropolitan University	Student	47	LM_S11	I: 0.5 O: 0	F	T/SF
London Metropolitan University	Student	48	LM_S12	I: 0.5 O: 0	M	BW/S

Observation Only Schedule

Organisation	Position of Interviewee	Interviewee No.	Interviewee Code	No. of hours interviewed (I) / Observed (O)	Gender	Status
London Metropolitan University	Tutor	49	LM_T2	O: 20	M	BI/S
London Metropolitan University	Tutor	50	LM_T3	O: 15	M	BE
London Metropolitan University	Tutor	51	LM_T4	O: 10	M	BI
London Metropolitan University	Trainee Tutor	53	LM_TT6	O: 0.3	M	BAC/S
London Metropolitan University	Trainee Tutor	53	LM_TT7	O: 0.3	M	BAC/S
London Metropolitan University	Lab Technician	54	LM_LT1	O: 0.5	M	BA/S
London Metropolitan University	Lab Technician	55	LM_LT2	O: 1	M	BA/S

Status Code Expansion

Ethnicity		Parenting		Finance		Refugee	
BA	British African	LP	Lone Parent	CF	Company Financed	R-NE	Non-English Speaker
BAC	British African Caribbean	P	Parent with partner	EdF	Educational Institution Financed	R-ES	English Speaker
BAs	British Asian	S	Single	PF	Parental Financed		
B	Bangladeshi			PTJ	Part-time Job		
BC	British Caribbean			SA	State Assisted		
BI	British Iraqi			SF	Self-financed		
BE	British European			SL	Student Loan		
BM	British Malaysian						
BW	British White						
C	Columbian						
E	European						
I	Iranian						
T	Turkish						
WSA	White South African						

An overview of the first two modules of semester one

B. 1   Introduction

This introduction to the Cisco Certified Network Associate programme is based on the third version released in June 2003, and is substantially different from ten years ago when all one had to do to become a Cisco engineer was take an exam which comprised of some 60 questions. Reflecting the growing complexity of networked technology, today the qualification requires re-examination every three years and comprises of some 560 hours of curriculum exposure. Either accessed online or downloaded to a personal computer, the programme consists of four semesters that are each divided into 12 (CCNA 1), 11 (CCNA 2), 9 (CCNA 3), or 6 (CCNA 4) modules and cover the theory of networking basics, routers, switches and wide area network technologies respectively. Each semester is supplemented by extensive practical application in laboratory (lab) sessions and a case study, with each module usually delivered in one week, either spread over a number of days or two sessions of approximately three hours each, depending on the course's structure.

It is not within the scope of this appendix to systematically cover the entire programme, so only a selection of screens from the first two modules of semester one (CCNA 1) will be provided. The purpose is to show how the programme progresses from general information to specific concepts and algorithms, and how this is conveyed to students during the first two weeks of their exposure. Easier to follow than the other semesters which assume this background has been covered, because the content is difficult to read in the captured image, in most instances the graphics and text will be split with the latter displayed in boxed format after the former, and

supplemented with additional information drawn from the accompanying course book (CNAP 2003d). In addition, the experiences of this researcher during her participation on the instructor training programme, the Cisco Certified Academy Instructor (CCAI), is provided and gives an insight as to why so many people drop out of the programme.

B.2.   Networking fundamentals

The first semester starts with a brief introduction to the Cisco Networking Academy Program (CNAP) outlined in a separate Academy Orientation module, and explains its structure and organisation. Introducing Cisco's initiatives toward bridging the digital divide, it mentions the social constructivist learning methodology, best practices for teaching and learning, and the layout of the online curriculum with its set of accompanying tools and exercises. It also outlines the assessment procedures; the importance of laboratory work; gender awareness; and the various online resources and community that students have access to. Each semester and module begins with an overview of the contents, with the latter shown in Screen B.1.

Screen B.1: Module Introduction
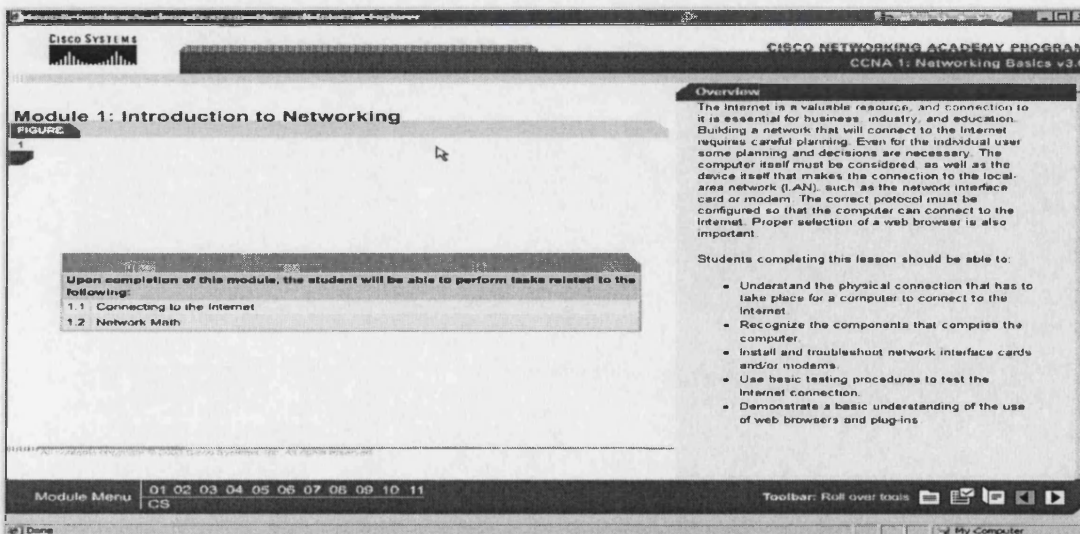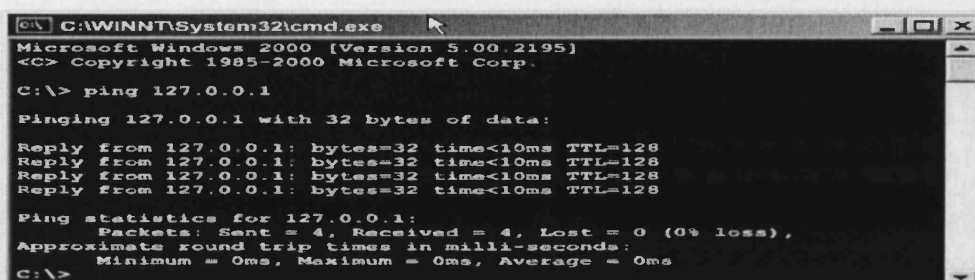
Summarising the learning objectives on the right side and upon completion the expected abilities on the left, to the bottom left of the screen are the links to the eleven modules and the case study, and to the right are index, quiz and glossary tools, and the navigation buttons. The main focus of the first module of the CCNA 1 is to provide students with a background to networks and what is involved in the communication process between them, and this is shown in the first instance by images of a central processing unit, a network interface card (NIC), and a modem extension card. Emphasising the notion of troubleshooting these components in terms of connectivity, the basic physics of digital technology is conveyed by introducing the core workings of a computer, such as transistors, capacitors, resistors, integrated circuit boards, RAM and ROM. Showing the different serial and parallel ports, a history of modem speeds is followed by an introduction to the Internet Protocol (IP) addressing system through use of the 'ping' command, used to test connectivity by identifying the unique Media Access Control (MAC) address which is hard-wired in hexadecimal notation in its chip by the manufacturer. The command is shown in Screen B.2.

Screen B.2: Ping Command

Testing connectivity with ping

Ping is a utility used to verify Internet connectivity. It is named after the sonar operation used to locate and determine the distance to an underwater object.

The **ping** command works by sending multiple IP packets to a specified destination. Each packet sent is a request for a reply. The output response for a ping contains the success ratio and round-trip time to the destination. From this information, it is possible to determine if there is connectivity to a destination. The **ping** command is used to test the NIC transmit/receive function, the TCP/IP configuration, and network connectivity. The following examples describe the types of ping tests that are commonly used in a network:

ping *127.0.0.1* - This ping is unique and is called an internal loopback test. It verifies the operation of the TCP/IP stack and NIC transmit/receive function.

ping *IP address of host computer* - A ping to a host PC verifies the TCP/IP address configuration for the local host and connectivity to the host.

ping *default-gateway IP address* - A ping to the default gateway verifies whether the router that connects the local network to other networks can be reached.

ping *remote destination IP address* - A ping to a remote destination verifies connectivity to a remote host.
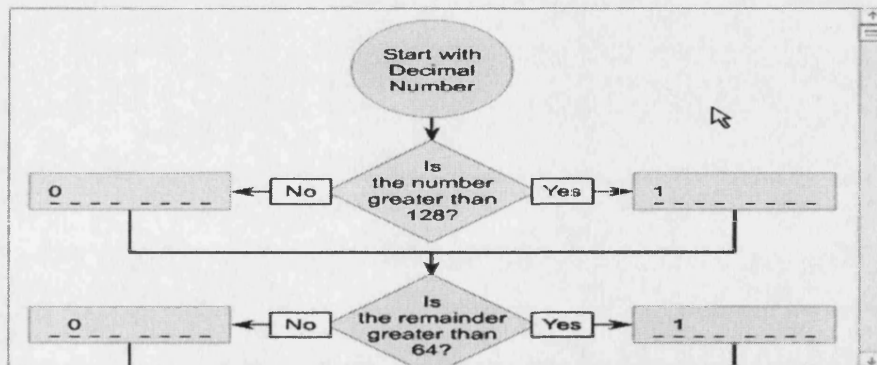

Web browsers and common applications are briefly covered, and then students are introduced to the binary, decimal and hexadecimal numbering systems which they are required to convert from one to the other. Screen B.3 shows the decimal to binary conversion algorithm recommended.

Screen B.3: Decimal to Binary Conversion

Converting decimal number to 8-bit binary numbers

There are several ways to convert decimal numbers to binary numbers. The flowchart in Figure Ɪdescribes one method. The process is trying to figure out which values of the power of 2 that add together to get the decimal number being converted to a binary number. This method is one of several methods that can be used. It is best to select one method and practice with it until it always produces the correct answer.

Conversion exercise
Use the example below to convert the decimal number 168 to a binary number:

128 fits into 168. So the left most bit in the binary number is a 1. 168 - 128 leaves 40.

64 does not fit into 40. So the second bit in from the left is a 0.

32 fits into 40. So the third bit in from the left is a 1. 40 - 32 leaves 8.

16 does not fit into 8 so the fourth bit in from the left is a 0.

8 fits into 8. So the fifth bit in from the left is a 1. 8 - 8 leaves 0. So, the remaining bits to the right are all 0.

Result: Decimal 168 = 10101000

For more practice, try converting decimal 255 to binary. The answer should be 11111111.

With the importance of the different numbering systems emphasised, the module progresses to Boolean algebra and its digital circuitry that accepts one or two incoming voltages. With the input voltages either on or off, these states are represented in the binary format as 1 or 0, generating a different output voltage depending on the values passed through the circuits. Students need to be cognisant at this early stage of the centrality of Boolean logic and the AND operation, for it is used in the calculation of subdividing the Internet Protocol (IP) address. Considered by many as the hardest and most confusing aspect of the entire CCNA programme, if it is not grasped at this stage many will fall very quickly behind. As with most mathematical calculations, practice is the essence and students are given regular exercises in this process for it is frequently referred to and used, and involves the

identification of the peripheral host devices such as computers, printers or scanner on the network.

An IP address is structured according to class or the logical division of the address space, and reflects the organisational use of networks and their size. At the time of the CCNAv3, the 32-bit addressing mechanism was based on IPv4 which is currently at v6 and enables greater 128-bit addressing space. The higher the alphabetical letter, which ranges from A to E in IPv4, the larger the size of the network but the shorter the host portion of the subnet, as shown in Screen B.4. By subdividing the network address into two parts, the first identifies the particular the network and the second the subnet of host devices.

Screen B.4: IP Addressing Components
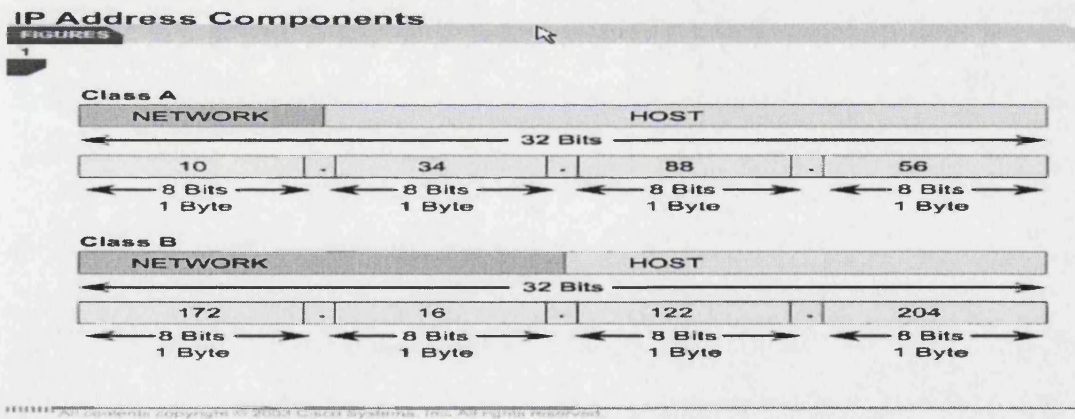
IP Addresses and network masks

The 32-bit binary addresses used on the Internet are referred to as Internet Protocol (IP) addresses. The relationship between IP addresses and network masks will be addressed in this section.

When IP addresses are assigned to computers, some of the bits on the left side of the 32-bit IP number represent a network. The number of bits designated depends on the address class.

The bits left over in the 32-bit IP address identify a particular computer on the network. A computer is referred to as the host. The IP address of a computer consists of a network and a host part that represents a particular computer on a particular network.

To inform a computer how the 32-bit IP address has been split, a second 32-bit number called a subnetwork mask is used. This mask is a guide that indicates how the IP address should be interpreted by identifying how many of the bits are used to identify the network of the computer. The subnetwork mask sequentially fills in the 1s from the left side of the mask. A subnet mask will always be all 1s until the network address is identified and then be all 0s from there to the right most bit of the mask. The bits in the subnet mask that are 0 identify the computer or host on that network. Some examples of subnet masks are:

11111111000000000000000000000000 written in dotted decimal as 255.0.0.0

or

11111111111111110000000000000000 written in dotted decimal as 255.255.0.0

In the first example, the first eight bits from the left represent the network portion of the address, and the last 24 bits represent the host portion of the address. In the second example the first 16 bits represent the network portion of the address, and the last 16 bits represent the host portion of the address.

Converting the IP address 10.34.23.134 to binary would result in:

00001010.00100010.00010111.10000110

Performing a Boolean AND of the IP address 10.34.23.134 and the subnet mask 255.0.0.0 produces the network address of this host:

00001010.00100010.00010111.10000110
<u>11111111.00000000.00000000.00000000</u>
00001010.00000000.00000000.00000000

Converting the result to dotted decimal, 10.0.0.0 is the network portion of the IP address, when using the 255.0.0.0 mask.

Performing a Boolean AND of the IP address 10.34.23.134 and the subnet mask 255.255.0.0 produces the network address of this host:

00001010.00100010.00010111.10000110
<u>11111111.11111111.00000000.00000000</u>
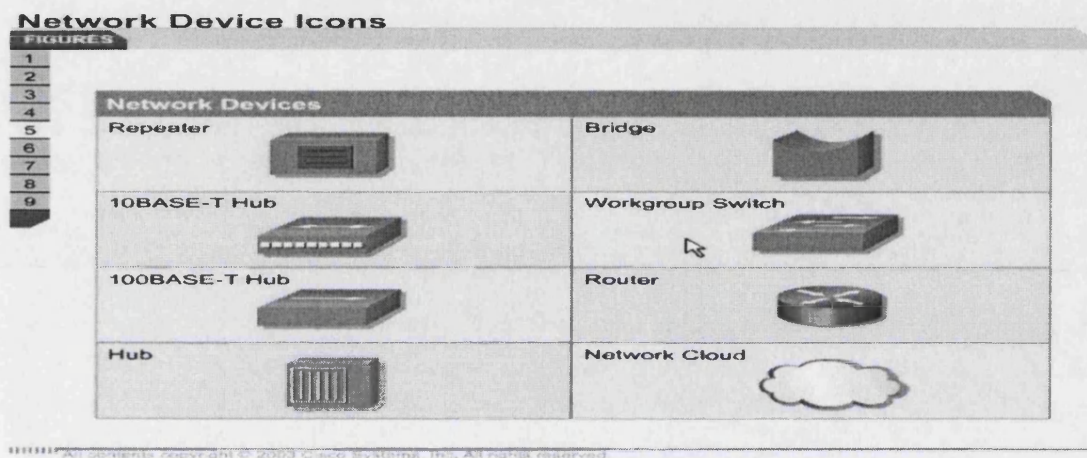00001010.00100010.00000000.00000000

Converting the result to dotted decimal, 10.34.0.0 is the network portion of the IP address, when using the 255.255.0.0 mask.

This is a brief illustration of the effect that a network mask has on an IP address. The importance of masking will become much clearer as more work with IP addresses is done. For right now it is only important that the concept of the mask is understood.

The second module covers network information and terminology in more detail, first outlining business use and requirements, then a brief history of networks in general and a recap of the key host devices. It then introduces the key network devices used to

monitor and regulate connectivity, such as hubs, bridges, routers and switches by providing images of workstations and their networked links via these devices. Screen B.5 displays the icons used to represent these core devices, and the numbers provided in the text refer to the different windows available in this screen, 9 in total.

Screen B.5: Network Devices

Network Device Icons

Network Devices		
Repeater	Bridge	
10BASE-T Hub	Workgroup Switch	
100BASE-T Hub	Router	
Hub	Network Cloud	

Networking devices

Equipment that connects directly to a network segment is referred to as a device. These devices are broken up into two classifications. The first classification is end-user devices. End-user devices include computers, printers, scanners, and other devices that provide services directly to the user. The second classification is network devices. Network devices include all the devices that connect the end-user devices together to allow them to communicate.

End-user devices that provide users with a connection to the network are also referred to as hosts. [1]These devices allow users to share, create, and obtain information. The host devices can exist without a network, but without the network the host capabilities are greatly reduced. Host devices are physically connected to the network media using a network interface card (NIC). They use this connection to perform the tasks of sending e-mails, printing reports, scanning pictures, or accessing databases. [2]A NIC is a printed circuit board that fits into the expansion slot of a bus on a computer motherboard, or it can be a peripheral device. It is also called a network adapter. Laptop or notebook computer NICs are usually the size of a PCMCIA card. [3]Each individual NIC carries a unique code, called a Media Access Control (MAC) address. This address is used to control data communication for the host on the network. More about the MAC address will be covered later. As the name implies, the NIC controls host access to the medium.

There are no standardized symbols for end-user devices in the networking industry. [4]They appear similar to the real devices to allow for quick recognition.

Network devices provide transport for the data that needs to be transferred between end-user devices. 5 Network devices provide extension of cable connections, concentration of connections, conversion of data formats, and management of data transfers. Examples of devices that perform these functions are repeaters, hubs, bridges, switches, and routers. All of

the network devices mentioned here are covered in depth later in the course. For now, a brief overview of networking devices will be provided.

A repeater is a network device used to regenerate a signal. Repeaters regenerate analog or digital signals distorted by transmission loss due to attenuation. A repeater does not perform intelligent routing like a bridge or router. 6

Hubs concentrate connections. In other words, they take a group of hosts and allow the network to see them as a single unit. This is done passively, without any other effect on the data transmission. Active hubs not only concentrate hosts, but they also regenerate signals.

Bridges convert network transmission data formats as well as perform basic data transmission management. 7 Bridges, as the name implies, provide connections between LANs. Not only do bridges connect LANs, but they also perform a check on the data to determine whether it should cross the bridge or not. This makes each part of the network more efficient.

Workgroup switches add more intelligence to data transfer management. 8 Not only can they determine whether data should remain on a LAN or not, but they can transfer the data only to the connection that needs that data. Another difference between a bridge and switch is that a switch does not convert data transmission formats.

Routers have all the capabilities listed above. 9 Routers can regenerate signals, concentrate multiple connections, convert data transmission formats, and manage data transfers. They can also connect to a WAN, which allows them to connect LANs that are separated by great distances. None of the other devices can provide this type of connection.

To ensure students are familiar with these icons, an interactive media activity enables each device to be dragged and dropped into the correct box, checking the results and resetting if mistakes are made, as shown in Screen B.6.

Screen B.6: Interactive Media Activity
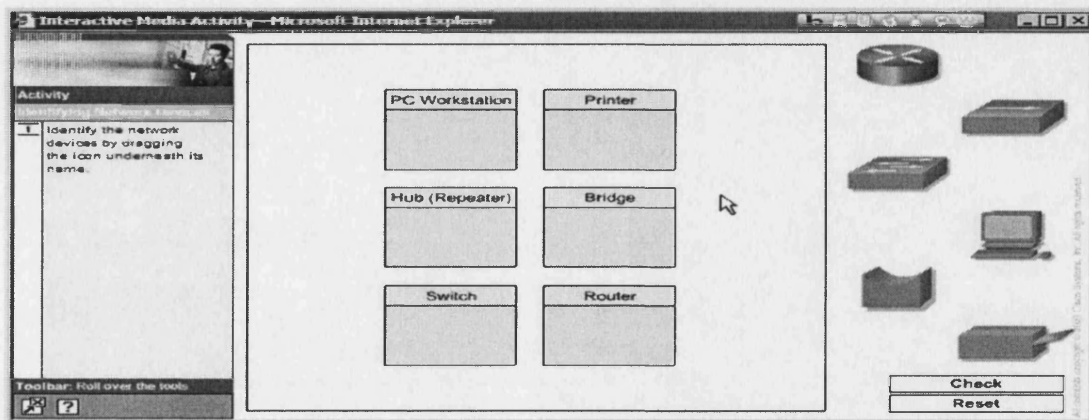
Moving on to the main network topology such as bus, star, extended star, ring, hierarchical and mesh, and why each might be used, the module introduces the notion of physical, or the actual layout of the cabling media such as copper, optical or wireless. Contrasted with logical topology, this defines how the media is accessed by the networked hosts for broadcasting or token passing data, enabled by protocols such as the Transmission Control Protocol/Internet Protocol (TCP/IP) suite. Protocols control how the physical network is built and connection is made, how data is formatted for transmission and actually sent, and how errors are handled. A list of bodies which establish these standards are given, such as the Institute of Electrical and Electronic Engineers (IEEE), and the American National Standards Institute (ANSI), with web links to more detailed information on protocols. Many screens offer these links which provide more detailed information to the CCNA's content.

Going into more detail on the different types of networks, local area networks (LAN) which use Ethernet or Token Ring technologies, and wide area networks (WAN) which use Digital Subscriber Line or Integrated Services Digital Network technologies are covered. Students get a sense of how these networks compare with a metropolitan area (MAN), storage-area (SAN) or virtual private (VPN), and the concepts of intranets and extranets are explained. The critical consideration of bandwidth follows, with analogue/digital difference, the complexities of its limitations, measurements and throughput, and a simple formula for calculating data transfer offered. Students are then introduced to the Open System Interconnection (OSI) network model and its seven layers which each manage in different ways the flow of data from source to destination hosts.

Using the analogy of a conversation between people, where an idea is formulated, then a decision made on how to communicate that idea, the final delivery may be actuated. In digital terms, this process takes the form of encapsulating the core data in segments, packets and frames of networked information, or logical groupings, that are managed by various layers of the OSI model. Each adds its own content to the data stream, passing it onto the next layer until it is converted to digital bits for transmission across the network cloud. Handled by an array of protocols at both ends of an open communication system, the correct formatting and transmission of a sequence of packets is encoded at source and decoded at destination, and returned to its original format by the top application layer. The OSI model is a peer-to-peer communication system, meaning that each layer on the source network communicates with its peer on the destination network via layer-specific protocol data units (PDUs), as shown in the following screen:

Screen B.7: Peer-to-Peer Communication
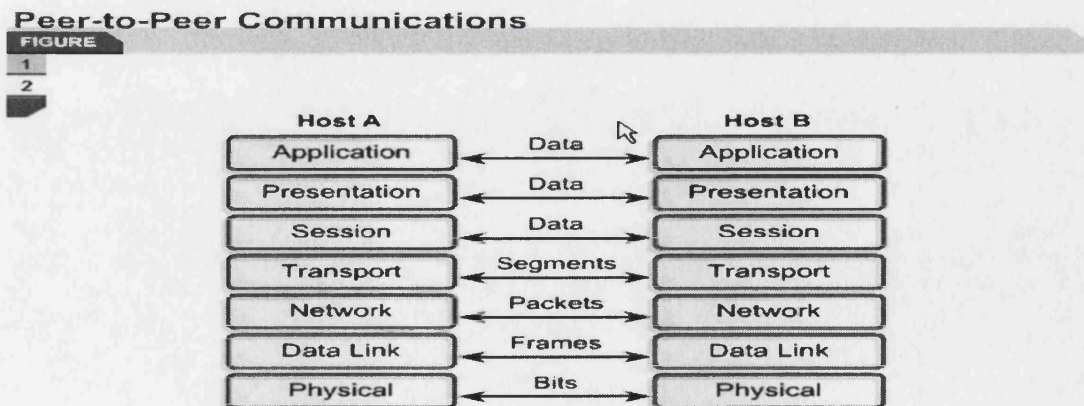
Peer-to-Peer Communications

Peer-to-peer communication

In order for data to travel from the source to the destination, each layer of the OSI model at the source must communicate with its peer layer at the destination. This form of communication is referred to as peer-to-peer. During this process, the protocols of each layer exchange information, called protocol data units (PDUs). Each layer of communication on the source computer communicates with a layer-specific PDU, and with its peer layer on the destination computer.

Data packets on a network originate at a source and then travel to a destination. Each layer depends on the service function of the OSI layer below it. To provide this service, the lower layer uses encapsulation to put the PDU from the upper layer into its data field; then it adds whatever headers and trailers the layer needs to perform its function. Next, as the data moves down through the layers of the OSI model, additional headers and trailers are added. After Layers 7, 6, and 5 have added their information, Layer 4 adds more information. This grouping of data, the Layer 4 PDU, is called a segment.

The network layer provides a service to the transport layer, and the transport layer presents data to the internetwork subsystem. The network layer has the task of moving the data through the internetwork. It accomplishes this task by encapsulating the data and attaching a header creating a packet (the Layer 3 PDU). The header contains information required to complete the transfer, such as source and destination logical addresses.

The data link layer provides a service to the network layer. It encapsulates the network layer information in a frame (the Layer 2 PDU). The frame header contains information (for example, physical addresses) required to complete the data link functions. The data link layer provides a service to the network layer by encapsulating the network layer information in a frame.

The physical layer also provides a service to the data link layer. The physical layer encodes the data link frame into a pattern of 1s and 0s (bits) for transmission on the medium (usually a wire) at Layer 1.

Students need to be very familiar with the two key TCP/IP protocols used in this process, and with the specific functions of each layer. To understanding the layering of transmission and how each manages the encapsulation process, the example of an email is used. Its formulation at application layer is purely for user services, where the availability of communication between the partners, and the synchronisation and confirmation of error and data integrity control is established using the protocols of Hypertext Markup Language or File Transfer. The email is passed to the presentation layer, and the alphanumeric characters of the email are converted into digital data and checked for readable by another system's equivalent layer. If necessary, this layer

translates multiple text, graphic or sound formats into common ones such as JPEG, MIDI or MPEG, and also handles the encryption and decryption processes.

The data, augmenting in networked detail, is then passed to the session layer which establishes, manages, synchronises and terminates sessions between the two communicating hosts through use of other protocols such as the Network File System or Apple-Talk Session. The next layer is the transport one which segments the data into streams ready for transmission, and is concerned with reliability in the establishment, maintenance and termination of the virtual circuits, where one of its protocols is the transmission control protocol (TCP). Passed on to the network layer which ascertains the connectivity and path selection, these data streams are encapsulated into an array of packets containing the base data, with use of the Internet Protocol (IP) and others coming in at this layer.

Next comes the data link layer which converts the segments into frames containing a number of fields, such as the start or header, the MAC addresses, length of frame and type, data and the frame check sum (FCS) in the trailer. The FCS is a number based on the data in the frame and used by the receiver to check consistency, failing to deliver if there is an error. Each device in the chosen network path requires this framing process for connection to the next device, and this layer is responsible for reliable transmission and control of data flow across a physical link through verification of the IP address, the network topology and network access, and handles error notification and the delivery order of the frames.

The final physical layer converts the frames into digital bits ready for actual transmission, and defines the electrical, mechanical, procedural and functional

specifications for activating, maintaining and deactivating the physical link between

the two networks. Concerned with such physical specifications as voltage levels and

the timing of their changes, data rates, maximum transmission distances and

connectors, it uses a clocking function to enable devices to distinguish the digital bits

as they travel across the network cloud. Originating on a LAN and crossing a campus

backbone for example, the physical layer is then ready to transmit the e-mail by

sending it out to a WAN link to the destination on another remote LAN. The order of

encapsulation is then reversed, the data stream reassembled from bits to frames,

segments and packets, decrypted if necessary, and reconverted to alphanumeric

presentation for display in readable email format. An example of a frame is given in

Screen B.8.

Screen B.8: Data Encapsulation

Data Encapsulation Example
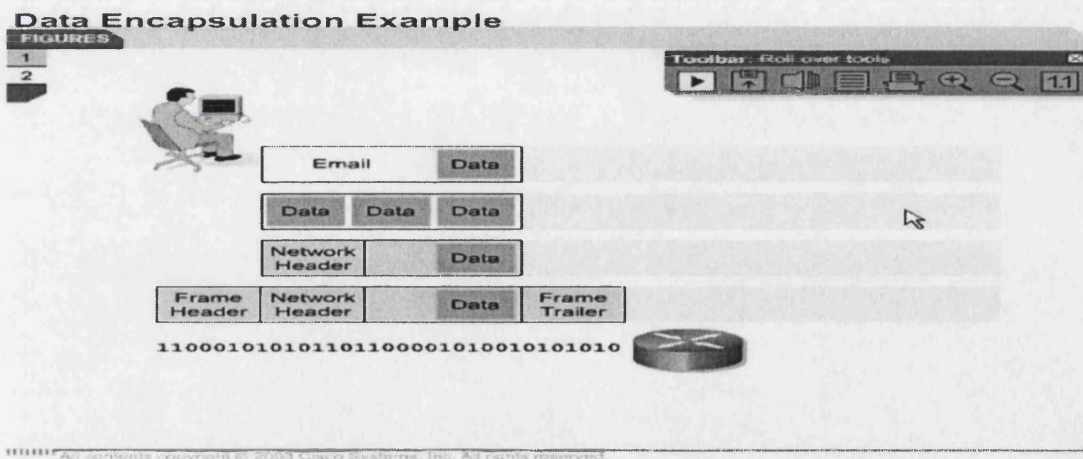
Detailed encapsulation process

All communications on a network originate at a source, and are sent to a destination. The information sent on a network is referred to as data or data packets. If one computer (host A) wants to send data to another computer (host B), the data must first be packaged through a process called encapsulation.

Encapsulation wraps data with the necessary protocol information before network transit. Therefore, as the data packet moves down through the layers of the OSI model, it receives headers, trailers, and other information.

To see how encapsulation occurs, examine the manner in which data travels through the layers as illustrated in Figure 1. Once the data is sent from the source, it travels through the

application layer down through the other layers. The packaging and flow of the data that is exchanged goes through changes as the layers perform their services for end users. As illustrated in Figure 2, networks must perform the following five conversion steps in order to encapsulate data:

Build the data.
As a user sends an e-mail message, its alphanumeric characters are converted to data that can travel across the internetwork.

Package the data for end-to-end transport.
The data is packaged for internetwork transport. By using segments, the transport function ensures that the message hosts at both ends of the e-mail system can reliably communicate.

Add the network IP address to the header.
The data is put into a packet or datagram that contains a packet header with source and destination logical addresses. These addresses help network devices send the packets across the network along a chosen path.

Add the data link layer header and trailer.
Each network device must put the packet into a frame. The frame allows connection to the next directly-connected network device on the link. Each device in the chosen network path requires framing in order for it to connect to the next device.

Convert to bits for transmission.
The frame must be converted into a pattern of 1s and 0s (bits) for transmission on the medium. A clocking function enables the devices to distinguish these bits as they travel across the medium. The medium on the physical internetwork can vary along the path used. For example, the e-mail message can originate on a LAN, cross a campus backbone, and go out a WAN link until it reaches its destination on another remote LAN.

The second module ends with contrasting the OSI model with the TCP/IP model, which is the main one used by the CiscoFusion network architecture and works on the same principle, only it has four layers of functionality. Network access which combines the physical and data link layers; Internet which is equivalent to the network layer; Transport which is the same; and Application which includes both the Session and Presentation layers. From these screen dumps and accompanying explanation, it is obvious that the first two week of the CCNA 1 is intense, involving an array of new concepts, mathematical calculations and a lot of information. This pattern continues throughout the semester, and unless it is internalised in what ever manner works for

each student, progression through the following semesters is not possible. Taking time

and patience to do this is essential as are study skills, but these learning mechanisms

have to be personally developed since they are not part of the programme.

B.3   A personal experience of the CCNA instructor course

This section summarises participation on the instructor training programme of the

CCNA which leads to the CCAI qualification. Ideally, this researcher had wanted to

participate on the CCNA course as a student, but was unable to commit for three days

a week over a period of one year, and Cisco back-tracked on waiving the fee. Offered

in the Regional Academy of London Metropolitan University, the CCAI consisted of

four weeks spread over nine months, in which the first two semesters had an interval

of 3 months and the remaining two were combined into consecutive weeks. Each

semester was presented in four days, with the fifth given to sitting the semester exam

and practical tests.

Beginning at 9am, most students drifted in and read the online content until the formal

lecture was given at about 10.30 or, if the lab was open, worked on the 50 odd

practical assignments per semester. Much of the lab work was repetitive, and as

trainees gained confidence they tended to be more selective in the ones they did.

Many felt there was insufficient time to cover the labs, each of which generally took

about half an hour though some required longer time allocation, plus it was necessary

to allow at least another half hour at the beginning of each lab session to sort out the

cabling. Each lecture usually lasted two to three hours and covered the key concepts in

three or four semester modules, with the time of presentation rarely given and students

often had five minutes or so to stop whatever they were doing. Because of the lack of

structure, some students would took a break without realising a lecture was about to commence, and consequently missed part of it. Three tutors covered these lectures and their style of delivery varied immensely; some would encourage questions whilst others clearly did not appreciate any interruption to their flow. The day progressed with more online reading, another lecture or lab work in the afternoon and finished around 6 or 7pm. It was not unusual to forego breaks, with many students expressing frustration and tiredness amongst themselves at having to juggle so many different tasks, but this never articulated to the staff.

Because the trainee tutors had already sat the CCNA exam as students, it was assumed they were generally familiar with the material so this researcher was already at a distinct disadvantage. Two weeks before the training, she prepared by attempting to read the online curriculum but did not progress beyond the first module. Bored and frustrated by the superficial, factual and dry delivery, she did not like the linear approach and was unable to grasp subnet masking from the online content. Furthermore, to recap on something it was necessary to recall which module it was in and, if not flagged in the index, this was a time-consuming process. Having flicked through the rest of the modules to gain an idea of what they covered, she decided to use the book instead and found it more interesting for it provided greater detail, enabled non-linear dipping to expand on concepts introduced but not fully explained online, and clarified concepts not understood. But this process took a considerable amount of time and determination which, if honest, was reluctantly engaged with since other commitments were pressing.

For the first two semesters, this researcher was able to keep up with the work, reading the book alongside the online programme, doing the labs and the quizzes. Each module has a set of quiz questions that tests comprehension of the concepts introduced. Screen B.9 shows a typical quiz window where the user works through 4 to 10 screens, each having 3-10 questions per screen, and selects the appropriate answer. This example tests subnet masking.

Screen B.9: Subnet Masking Quiz
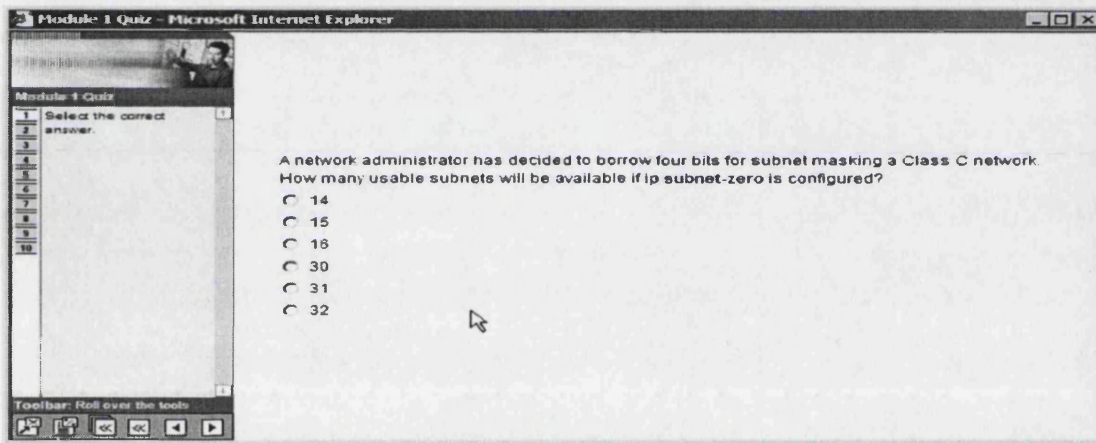
People have the choice of seeing the answers as they progress or waiting till the end for a complete graded report card. These quizzes are designed to prepare students for the end of chapter informal and end of semester formal exams, where the latter was allocated one hour, but often only took 20 minutes. The pass marks for CCNA students was set at 70% the first time, 75% the second attempt and 80% for the final go, with a reduction in the price of the final exam for those who had marks above 80%. For instructors, the pass mark is slightly higher - 80%, 85%, and 95% respectively. Consensus was that the syntactical structure of multiple-choice questioning was often confusing and misleading, requiring careful reading to understand the actual meaning since answers were either right or wrong.

Access to these online exams was not granted to this researcher, nor was observation

of students or trainee instructors sitting them, with the argument that this information

could be passed to potential students. Consequently, she worked in a bit of a vacuum,

and as the course progressed began to fall behind, in part as a result of paying

minimum attention to the labs, allocating less time to revision and learning the volume

of new material. Lab exposure was critical, the backbone of the curriculum, as one

female trainee tutor narrated:

> "You can't read it! You can't take the information in. I'm a practical person, I
> have to do things, I can't read; I don't have the time. I think of ways of doing
> things...like [thinking of] oranges and apples for remembering the OSI
> layers...oranges you peel and have a white layer inside, that's the first layer...or
> using All People Seem To Need Data Processing....or DSPFB to remember the
> order of encapsulation...data, segments, packets, frames, bits..." (N_TT2)

There was a strong correlation between the labs and the chapter contents, with the

former designed to provide a step by step instruction to tasks which reiterated the

theory. So when students needed to understand a particular protocol, they would be

asked to configure the switch or router using the specific commands of that

communication medium. The programme was not academic and anyone who tackled

it so would get into trouble, as this researcher did by falling into the trap of reading to

gain the information. Unable to keep up with the number of labs required, she was

gradually reduced to merely observing the lab ethos of 'doing' as the course

progressed. In part, because the constant need to check the cabling, the repetitiveness

and the regular pestering of other students to go over the logic bored and inhibited her.

By the time the third semester came, three months had passed and having grappled

with subnet masking and finally understood it, it was completely forgotten and this

semester assumed you could do the maths automatically. By day one, she realised her

mistake of not paying more attention to the labs, so tried to read the online version

backed up by practical exercises and the books, but to no avail for her mind just went

blank. This feeling was not new; as each semester progressed, by the second or third

day the volume of new concepts and the tendency to use their abbreviations, such as

WDM (Wavelength-division multiplexing), was overwhelming and confusing. Initial

interest in the subject soon turned to feelings of frustration, inadequacy and lack of

motivation, partially due to isolation and absence of curriculum exposure that other

trainee tutors had by assisting on the CCNA delivery at their home base.

Confiding her frustration with one of the students, she was told that very few people

understood it first time around and that only now on the instructor course was she

herself beginning to realise what it was all about. Adding that if she hadn't done the

CCNA as a student and had come on the instructor training programme as a novice,

she wouldn't have survived; indeed, of the initial 7 students, only 3 saw the course

through. Understanding why so many leave the first semester of the CCNA, the

consensus was that one only did what was absolutely necessary to pass the exam, the

rest you glossed over. Trying to take everything in was impossible in such a short

space, but necessary for a deeper comprehension of the whole if approached in an

academic manner. Lacking context, the CCAI and the CNNA focused purely on the

technical side of networking and as such this researcher experiences were of high

levels of boredom, superficiality of understanding, stress with the amount of work and

annoyance at not being able to engage.

The style of instruction predominantly consisted of introducing key concepts and how

to troubleshoot, with most lecturers simply repeating what was either online or in the

books (CNAPd, CNAPe), emphasising what had to be known or was deemed problematic. Only one lecturer gave an interactive delivery in which he offered real world examples, plenty of analogies and encouraged questioning. All lecturers did give very good, clear PowerPoint presentations that were Cisco copyright material and had PhDs in networking, but most whizzed through them, talking and delivering so fast that slides were rarely visible for longer than one minute. Note taking was impossible, and one lecturer had a habit of punctuating each sentence with a 'yes', which gave the impression that what he was delivering was straightforward, frequently saying "this is easy". Somewhat disconcerting when it wasn't, he was the one who taught the most difficult aspects of the course, subnet and wildcard masking (used to identify IP addresses for performance or test denial), and access control lists (means of controlling network traffic and security). As an archetypal computer science lecturer - remote, inaccessible and arrogant, he clearly understood his material and believed it to be straightforward, assuming everyone else did not encounter problems since nobody asked him questions. Whilst this researcher attempted to, she was soon silenced by his clear frustration at interrupts in his flow.

Restless in having to sit through lengthy lectures on chairs that were exceedingly uncomfortable, in rooms that were hot, airless and with little natural light as blinds were drawn to counter any reflections on the screens, this researcher experienced unusual headaches resulting from long periods of concentration. Developing the blank look that many students are renown for, writing in her notebook was tricky as lectures were often presented in the labs where there was no space to rest the book, and audibility poor as students from other courses would often be holding conversations. Full of questions, as an observer this researcher felt she couldn't 'dominate' the

session by asking too many, and when checking with the trainees afterwards as to whether they had understood the lecture, found that they hadn't yet had refrained from seeking clarification because of lack of confidence and not wanting to appear stupid. Gradually, in such a setting, the risk is that one looses both focus and the plot. Swapping from one form of logic to another in which something wasn't fully grasped caused the brain to struggle, and in attempting to switch off for a minute to make sense of something that is not complex but must be grasped, one may fall behind the speed of delivery. In the end, this researcher stopped trying to comprehend and just routinely followed, but what came next was dependent on understanding the former, so ultimately she gave up. Having switched off from the course, a risk was switching off from yourself with a sense that you're the only one, but you're not. You may revise harder when you get home and slowly grasp the procedures and concepts, but the pace of delivery the next day meant you were behind yet again. Sometimes the next day was better, sometimes it wasn't, and so you find excuses to stay away: the shopping had to be done, the house needed cleaning. In the end, you stop trying and the cycle of frustration repeats itself; before you know it, you've disengaged. Demotivated, robbed of curiosity and determination, these critical components for completing the programme were tenuously balanced on the style of delivery, the environment, level of confidence and willingness to persist on a very challenging learning process.

Cross-referencing of data with analysis

The data extraction outlined below came from a female manager, N_M1, who was the head of the Business Development Unit at Newham Training and Education Centre in East London. Selected to indicate why this research analyzed sites of tension, I had just returned from a site visit to Fife's Women's Technology Centre in Scotland. Impressed by Fife's comprehensive holistic approach which had been developed in response to the high rate of domestic violence and abuse experienced by many students, I was keen to inquire if Newham was also incorporated such strategies. The question of holistic support was specifically directed to N_MI and another manager, N_M2. With the latter becoming impatient and asserting that was not what the centre was about, the first manager reiterated this sentiment but her narrative also recounts recognition of the "needs" of women students. Clearly seeing the centre's key role as ensuring the provision was "employer-led", its mission was to ensure programmes were aligned with labour market requirements and students were skilled in "job readiness" and "motivational training". Recognising the "separate needs" of women students and that their "problems" did require confidence building and "positive feedback", staff however weren't "always able to actually support them". Instead, specialist agencies were signposted, but the particular agency mentioned was the Citizens Advice Bureau which is not an organization that specializes in domestic violence, although its staff may have information on ones that were. The centre's support mechanisms were for getting people into work and ensuring they took "responsibility for their own actions and their own development". It was obvious from this narrative that the role of education was not to engage with private turmoil, and in the light of the research parameters on exclusion and inclusion, this motivated one analytical investigation.

Table C.1: Cross-referencing data with analysis

Interviewee	N_M1	
Chapter	Network Engineer Technology Gestell	
Pedagogic Practice	Business-led [section 7.2.2]	Holistic support [in contrast to the narrative of F_M1 in section 7.3.4 –]
Data	What we are trying to do is to make our provision more employer-led and to get employers to identify what the skills are that they are looking for, and customise the training programmes to accommodate that... The way we are starting to change...we're starting off with what's the actual labour market need. That needs to drive the programmes, and then the funding needs to be found around that...The support that goes on around the transition to work starts well in advance of being in a position that they could go for an interview. At the moment we're running for that group [CCNA] 20 week programme, leading up to the end of their course, which tackles all aspects of job readiness support, in terms of the transition into employments starts through the provision of that particular employ-ability module if you like. And that covers attitudinal issues , motivation issues but also practical ones like filling in an application form, preparing a CV...How you manage your own time, how you problem solved, how you work with others. The actual delivery of that is handled by the team that I'm responsible for which is the Business Development Team. We have a trainer who sits within the team, a business skills trainer, who [covers]....Motivational Training.	In the 21st century, women have at times separate needs, such as domestic violence and child abuse. A profile our women learners do come to us with a wide range of problems. They need lots of counseling and many have had to leave the programme to go into refuge or hiding. Also, Muslim women won't go into mixed environments...There is a big placement on positive feedback, team work, images of self...and on what [they] can do...Clearly [it's] something we feel very concerned about but aren't always able to actually support them here, and it would be a mistake to say that we could. We would recognise that there would be specialist agencies that perhaps would be better or could advise in a better way. We would try where possible to sign post; say someone had a particular specific issue around violence or housing, we would be looking to sign post them at very least, to local advice bureau that would point them in the right direction. So there's a raft of support mechanisms for people moving into work, and whilst we are keen for people to take responsibility for their own actions and their own developments, we recognise that sweepingly we can say that this is quite a needy group and that takes longer [to address] than it perhaps would under other circumstances.

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