Back to the Future:
The Networked Household in the Global Economy

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Abstract

New forms of information and communication technology are linking the household to an increasingly complex public realm of formal and informal, spatial and non-spatial relationships. Increasingly households in both 'advanced' and 'developing' regions are simultaneously sites of production and consumption, exhibiting characteristics of both pre- and post-industrial societies. A simplistic public/private split is being superseded by a complex 'layering' through class and gender relations. It is not just the unskilled or elite sectors of the labour market who are obliged to trade their labour across regional and national boundaries (whether through physical migration or through communication networks). Middle-range players are finding themselves competing in a globalised arena of outsourcing, downsizing and home-based self employment contracting. Melvin Webber's view of 'community without propinquity' is used to examine some of the social, political and economic implications of this situation in an Australian context.
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Introduction
Developed nations have promoted a modernist view of the nuclear family functioning in spatially separate public and private spheres of production and consumption. However, in these countries, the coalescence of communications and information technologies has given rise to 'office automation' and 'business process re-engineering' which have destabilised employment. These technologies have also problematised the concept of organisational boundaries by enabling networked alternatives to conventional forms, and have challenged established relationships between size and performance. Currently emergent technologies are allowing small home-based businesses to confront much larger competitors beyond their immediate vicinity, while the same technologies are allowing the state to relocate functions such as hospital care and confinement to the home. Economic globalisation is opening communities in both 'under' and 'over' developed economies to direct competition from across national and cultural boundaries and making access to appropriate information and communication technologies as significant as physical location.

Space, Place and Access
The electronic mobility now available to the suburban and domestic labour force through telecommuting creates a two-way street, with electronic access to and from the home redefining a sphere of both production and consumption. This coalescence of domestic and working space recalls the pre-industrial household which was a locus of production. However, even in the most 'developed' economies the separation of domestic and productive activity promoted by the industrial revolution has been at best partial. Such qualifications are, however, absent from the technological utopianism evident in the current promotion of the 'electronic superhighway' and related technical innovations such as 'optical fiber to kerb' which form the infrastructure of the new networks.

Most descriptions of the 'information society' place a strong emphasis on the uniqueness of the present situation, and suggest seamless, integrated technical
change, leading to a globalisation of social life and economic opportunity. The actual penetration of the technology contrasts with that implied by such claims: the most recent United States census data indicates only a 7 percent network penetration of households, with only 15 percent of high school students' homes on-line (Newsweek 1995a) Counter arguments are emerging, concerned with the oversell of the potential of 'virtual' experiences (Stoll 1995) or with the negative impact of globalisation on community. Gray (1995) argues that when communities are forced to compete directly in a global marketplace, only a small minority with sufficiently scarce skills are able to compete on any basis except price.

The homely notion of the 'telecottage' can be contrasted with the grimmer reality of home based white-collar work, such as telephone sales, but the prominence accorded to the productive dimension of the household facilitated by new information and communications technology is not of itself innovative. This function has survived successive industrial revolutions in a variety of forms but in the recent past it has been discounted in favour of the social and reproductive dimensions of home life. Nor is the hype of emergent technologies new, with similar claims made for the telegraph and for domestic electricity at the turn of the nineteenth century (Marvin 1988). Without an awareness of these continuities, current developments might appear as new intrusions of economic life upon the private, household sphere. Unfortunately the debates around the potential social implications of the increasingly networked household reflect naive definitions of community in both physical and electronic forms. There are more considered and appropriate views of the nature of place and community available, however, which pre date these debates. In particular, Melvin Webber's notion of 'community without propinquity' (Webber 1964) can be used to separate physical and non-locational dimensions of place and community in order to evaluate the implications of electronic access to and from the household.

**Australia: Constructing Place and Region**

Australian conditions present an opportunity to examine the effects of current changes in technology on a society which contains elements of both developed and developing economies. The population comprises a highly concentrated urban component and a highly dispersed, low density rural component. As a relatively small and relatively high wage industrial nation with no obvious trade bloc to join, Australia has endured more than a decade of Federal Government policies seeking alignment with the forces driving economic
globalisation through the exposure of manufacturing and other industries to ‘world best practice’. This has been achieved through financial deregulation and the progressive dismantling of an extensive system of tariff barriers specifically constructed to facilitate the development of these industries (Marceau, Greig & Little 1992). In the latter part of this process the government promoted the development of APEC, the Asia Pacific Economic Cooperation forum. The composition of this grouping of Pacific Rim economies allows Australia little scope for competition based on labour costs. Instead Bob Hawke, then Prime Minister, coined the term ‘clever country’ to describe national ambitions in this context. The rapid development of the supporting technologies continued during this period of adjustment and has enabled networked organisational forms, first proposed by management researchers in the sixties and seventies, to be realised through readily available information and communication technology. Indeed, a super-region the size of the Pacific Rim can only be considered as an economic entity because of the greatly improved communication technologies of the last three decades.

In exploring the relationship between place, space, community and technology, this paper makes use of Webber’s definitions of ‘non-place urban realm’ (Webber 1964). These are examined in some detail in the next section. The implications of global networking for the bounding of nation states and organisations are then discussed. Current understandings of household are examined in an historical context, leading to a section on responses to recent public policy in Australia. Finally an overview of the dynamics of public and private domain within the networked household is followed by some concluding questions.

Non-Place Realms and Non-Place Communities

The theoretical underpinning for the non-spatial relationships of the emerging networked organisations appeared in the sixties, along with equally significant theorisation of the nature of community in such a relatively placeless milieu. In 1964 Melvin Webber challenged the notions of community and centrality used in urban studies by demonstrating that ‘community without propinquity’ was emerging within certain social networks. He argued that individuals were enmeshed in an overlapping range of groups, and that increasingly these social networks were not limited by physical or geographical location. His definition of community acknowledges a differentiated range of ‘non-place’ cultures. It reflects a process-oriented
view of urban form concerned with the flow of people, materials and information to and from sites of activity, triggered in part by the influence of general systems theory. This contrasts with the product-oriented view of urban form, dominant at that time, focusing on physical resources represented by building stock and other infrastructure and controlled through land-use zoning.

The shifting balance between public and private spheres facilitated by communications technologies reflects Webber's formulation of 'non-space realms'. These permit solidarities and collectivities beyond the physical limits of neighbourhood and household, and offer both a challenge and opportunity to establish understandings of the nature of community and city beyond those driving the critiques of current changes such as Gray's (1995).

Webber influenced and was influenced by an orientation towards non-physical aspects of community, and a participatory approach to design which emerged strongly during the seventies. Re-examination of Webber's work in the light of current information technology offers insight into broad issues such as globalisation and consequent redefinitions of centre and periphery and the implications for existing urban infrastructures. In particular it offers a framework against which to assess the many claims made for information technology (IT) as a panacea for marginalised or peripheral groups, whether at the level of a nation the size of Australia, broader economic regions, or local communities and individual households.

Webber's Approach to Place and Community

Webber argues that the traditional formulation of community reflects only one aspect of the concept. Spatially defined communities are relatively heterogeneous in terms of the social position and activities of members, regardless of their degree of social cohesion. Rapoport (1969) compares the physical proximity of different social groups in medieval towns with the spatial segregation of post-industrial cities. He argues that these differences reflect the difference in social mobility. Such social flexibility also allows wider participation in non-place groups, an aspect of community of great interest to Webber. He envisages a hierarchical continuum from highly specialised communities spanning the entire world via less specialised intra-national networks, to metropolitan and neighbourhood networks. Individuals can expect to play roles at a number of these levels at any one time, as a member of an occupation or profession, or as a parent or partner in
neighbourhood, regional and wider interest groups. At each level, the relevant spatial field is shared by a number of interest communities and Webber calls such levels of interdependence and interaction 'urban realms'. These are distinguished from the established notion of an urban region by the lack of specific spatial location. He ends by suggesting that emerging institutional changes and technological developments coupled with ever increasing mobility and specialisation are likely to involve urban dwellers in increasingly wide area communications. Both behavioural models of individual locational decisions made within an urban region, and descriptive models of the overall spatial structures of these regions would benefit from an orientation to these communication patterns which would allow the identification of 'non-place urban realms'.

In order to move from the physical bias of established planning conceptions, Webber proposes the 'city as communications system' (Webber 1964:84). Planners 'share a conviction that the physical and locational variables are key determinants of social and economic behaviour and of social welfare' (Webber 1964:85). According to Webber, the unique commodity offered by the city is accessibility. This approach switches the emphasis of urbanity from physical built form to the quality of interaction in cultural life through the exchange of information. Webber argues that this definition implies that suburban and exurban dwellers enjoy a measure of urbanity not previously acknowledged.

In established practice, plans are formulated in spatial terms, with a view of social and spatial interaction derived from an examination of population distribution and density. However, Webber argues that such an approach is poorly equipped to account for 'dynamic, locational patterns of human communication that occur through space but transcend any given place' (Webber 1964:90). Increasing sophistication in measures and classification of activities still leaves them short of transcending an essentially static picture, even if such 'snapshots' may be strung together to reveal changes over time.

Webber argues that planning must deal effectively with three components of metropolitan social structure:

1. spatial flows of money, people and goods;
2. location of the physical channels and adapted spaces that physically house activities;
3. locations of activity places (Webber 1964:96)
He suggests that the first component can be derived from the effectiveness with which communications systems may substitute messages for physical movement of persons or goods (Webber 1964:97). He cites the significance of railroad location in North American development as an indication of the importance of the second component in determining urban form. The national and regional influence of long distance rail links was followed by the more local influence of street car and suburban rail lines, then urban freeways. However, Webber's arguments suggest that developments in telecommunication capability and capacity have been equally instrumental in increasing the access and range of locational choice within and between urban areas. Face-to-face communication is still seen as a special need, and traditional central locations are still sought for many forms of business. The permanence of building stock, as well as the character of interaction has a significant influence, but the physical form of this building stock is still regarded as the defining component of urbanism by many architects and urban planners. The third component is approached through the traditional land-use view of development with its emphasis on control through the zoning of land for specific activities.

Webber provides a descriptive schema for spatial structure using the three components, and points out that '(p)atterns of functional interdependence will become increasingly complex at the same time that major developments in transportation and communications systems will be opening up unprecedented possibilities for whole new spatial patterns.' (Webber 1964:107)

Established notions of 'place' in planning are less than helpful: the functional processes which must be acknowledged are not 'place-like' or 'regional-like' at all. Webber therefore formulates a 'non-place community' in terms of Interest-Communities. Accessibility, rather than the propinquity aspect of 'place', is the necessary condition for this form of community (Webber 1964:109). Extensive webs of specialised professionals can be regarded as communities without propinquity. While specialised professionals are acknowledged to be at one end of the spectrum of residents in a metropolitan area, many other similar association patterns may be detected in non-professional communities. For Webber, spatially defined community is in fact relatively heterogeneous, with a unity arising from the pursuit of overlapping interests at a common place. Webber claims that such a 'place community' is simply a special case of a larger genus.
The result of Webber’s arguments is a relationship between urbanity, density and community radically at variance with that being advanced by Jacobs (1961) at the same period and pre-figuring the celebration of Southern Californian urbanism by Banham (1971) and subsequent commentators. Webber argues that if an analysis of the distribution of each individual’s time between realms were possible, it would reveal that rich and diverse human communication was present in conditions of low density and low concentration. He suggests that, in his terms, the urbanity of Los Angeles may not be that different from that of New York. Webber adds that certain approaches to the classification of urban centres are more amenable to the consideration of the range of interactions which he identifies, but that any reconsideration of definitions of centrality in the terms outlined by him would call into question the traditional notions of centre and hinterland. The locational decisions of emerging high technology companies in California at that time are cited. United States West Coast urbanism is of particular relevance to Australia, where Scottish levels of urbanisation are combined with the Anglo-Saxon preference for single family dwellings that, on the eastern seaboard, are derived from Californian prototypes. Recently the Australian Federal Government has encouraged increased physical densities of settlement within conurbations. This policy of ‘urban consolidation’ is intended to assist the provision of both physical and social infrastructure. However, the following sections demonstrate that access to rapidly expanding electronic communications facilities is as central to social development and equity as considerations of physical location.

**Networks, Globalisation and Sovereignty**

Information and communication technologies are not the only spatially significant technologies to impact on the nature of national sovereignty. For example, Headrick (1981) demonstrates the key role of technologies ranging from transportation to medical prophylaxis in this extension of the influence and sovereignty of European powers and the globalisation of their model of the national state. However, continued developments in technology and economic scale in the thirty years since Webber’s paper appeared have led both to the internationalisation of economic activity and to the emergence of environmental consequences beyond the capacity of even industrially advanced individual states to manage.

In a subsequent paper Webber identifies improved electronic communications, including public real-time access to computerised databases
as potentially critical developments (Webber 1968). The technological optimism of this period, exemplified by Toffler (1970) was subsequently given a somewhat dystopian fictional form by science fiction writer John Brunner. The North-Eastern urban corridor of the United States cited by Webber as an example of the new urbanism has likewise become William Gibson's unequivocally dystopian 'Sprawl' (Gibson 1984).

**Globalisation and Sovereignty**

Significantly, the predicted world of ‘Shockwave Rider’ (Brunner 1975), in which it was possible to exist in the interstices of massive computerised domestic credit and surveillance systems, had been exceeded before the close of the eighties by Clifford Stoll's factual account of his global pursuit of miscreants across several international computer networks (Stoll 1989). Brunner's fictional twenty-first century network had been strictly confined within the national boundaries of the United States.

The emergence of transnational corporations (TNCs) and the internationalisation of both financial and labour markets have created a rapidly evolving world system currently characterised by rapid integration at a world scale. The impacts of this globalisation on local communities contrasts with the benign images used to promote the underlying technologies.

Camilleri & Falk (1992) argue that the power and authority of nation states have become diffused, through participation in a variety of multilateral arrangements covering not just trade, production and finance but also increasingly inter-related environmental and security issues. At the same time deregulation policies have reduced national and local governmental controls over TNCs. The result is direct competition between cities and local states and, for example, there are fifty separate industry policies across the United States for inward investors to select from.

**Networked Organisations**

The emerging new forms of internationalised business organisation represent the culmination of processes of downsizing, separation of core and peripheral activities through concentration on critical success factors, and the medium to long term effect of technical changes which have been visible for some time. The recent maturation of a number of capabilities in information and communication technology has allowed these processes to reach fruition. Computer-based information systems are now capable of facilitating or even
substituting for organisational structures and standards. This phenomenon has been evaluated from a variety of social and organisation theory perspectives. Little (1988) shows how very different strategies may be pursued with the same equipment, but that technical capabilities may lag behind organisational ambitions. Sproull and Kiesler (1991) emphasise the difference between immediate technical gains from such technologies and the longer term process of social gains for organisations.

Specific technologies, like computer-aided design, may substitute for organisationally enforced standards and alter the economies of scale in favour of smaller, flatter organisations. Standards for software and electronic data interchange (EDI) are continually presenting organisations with externally derived standards and procedures. The standards are increasingly the result of market-based de-facto processes and not of governmentally supported formally constituted committees.

Webber's definition of non-place realm challenges established notions of community primarily through the analysis of voluntary forms of association. It also offers an explanation of new economic organisations and institutional forms. The emergent concept of the 'networked organisation' has focused attention on the development and maintenance of organisational relationships through computer-mediated communication. The prospect of organisations primarily dependent upon information systems for both structure and social cohesion also implies a new range of locational choices for business. More recently EDI and networking between formally separate organisations has produced a counter-trend to downsizing and outsourcing by permitting coalescence into federated forms of organisation. Diverse human and material resources can be managed without propinquity. The outcome of these processes has been a marked shift in employment patterns with new opportunities and access reflecting new locational opportunities.

Telecommuting by members of an organisation has become another alternative to simply outsourcing activities to separate undertakings. More flexible forms of work contract are leading to the incorporation of households into formal business organisations in a way which recalls the pre-industrial household, as much as any post-industrial scenario. However, while home-based work offers an alternative to the enforced leisure of unemployment, the association between casualisation and home-based work raises concern for the quality of that employment. Gains such as improved employment access for women with dependent children, or workers with
disabilities, must be set against corresponding costs of isolation and fragmentation within this ‘virtual’ workforce, and the potential loss of the social dimension of working life. Technologically optimistic accounts subsume these dimensions into generalised ‘resistance to change’. The reality of current achievements is far from the seamless visions of integrated technologies critiqued by Zimmerman (1986), but is likely to be experienced as incremental, fragmented adjustment and change. The next section sets the recent ‘rediscovery’ of the household as a potential site of paid employment in a broader historical context.

Household as Private and Public Realm

The process of the separation of the domestic and productive spheres which began in western economies with the onset of the factory system during the Industrial Revolution was never completed. The change in the domestic division of labour continued into the twentieth century, with many pre-industrial features surviving in the agrarian sector to within living memory (Kleinegger 1987). The modern household is a recent, and possibly ephemeral stage in a broad process of separation of paid employment and home life. In some senses recent technological and economic developments are reversing this trend and we need to acknowledge the potentially fluid nature of the present division between public and private spheres.

Households, Consumption and Production

The pre-industrial household was a locus of production, and the redefinition of the household as locus of consumption and reproduction, distinct from a public sphere of ‘work’, emerged with the onset of the industrial revolution. However, variations in labour market conditions led to variations in outcomes. Ravetz (1987) points out differences between the pre-industrial situation prevailing in North America as described by Cowan (1983) and that in the United Kingdom. In the latter society, paid domestic employment was a significant feature of economic life, absorbing labour released by the agricultural revolution. Consequently ‘housework’ retained both domestic and public associations. In the United States, where labour was in relatively short supply, technology appeared as a substitute for human labour in the household as well as the factory at a much earlier stage. There is a considerable body of work which covers the development of domestic technology up to World War II (e.g. Cowan 1983, Hayden 1981). Hayden (1976) examines the significance of the reorganisation and redefinition of the
household in utopian enterprises, particularly in the United States. Millenarian, utopian and egalitarian philosophies also contributed to the adoption of technology for household work.

Australian experience is of interest here because colonial development was influenced by labour shortages similar to those which led to so many North American innovations in the domestic arena. However, Australia's membership of the British Empire meant that many of these products were not recognised as responses to specifically Australian conditions, but were subsumed into the Imperial repertoire as 'British' inventions, masking this difference.

Our current understanding of the nature of the household is a product of the relatively recent past. After World War II an intense effort was put into orderly displacement of women from paid industrial labour. This process characterised postwar reconstruction in the Anglophone cultures where the same forces of propaganda and persuasion used a few years earlier to mobilise women were deployed. The 'baby boom' established the fifties perception of the 'normal' household as a nuclear family comprising a married couple with dependent children. Despite this effort, small numbers of women remained in non-traditional employment and larger numbers of women remained in formal employment in those industries that had previously relied on female labour. Outside of direct formal employment, outwork and home-based production remained and still remain a significant factor in several sectors of these postwar economies. However, the nuclear family became established as the focus of an emerging consumer ethos and the role of female household members was associated with domestic consumption rather than public production.

Gender, Technology and Households

The postwar 'homes for heroes' agenda of the United Kingdom and other countries led to the conscious incorporation of a heavily gendered division of domestic labour into the design of domestic architecture. In the United Kingdom, for example, this took the highly articulated form of design manuals portraying, hour by hour, the 'typical' day in a household (Roberts 1991). The home was presented as a support structure for paid male employment conducted elsewhere.

The gendering of activity within the household, enshrined in the United Kingdom housing design guides, has been reinforced by a gendering of the
technical artefacts themselves. White-goods may be seen as gendered around ‘housework’ and the female sphere, ‘brown goods’ may be seen as associated with male recreational pursuits within the home. Livingstone (1992) demonstrates that the same domestic technical artefact can hold different meaning, reflected in its pattern of use, according to the gender of the user. There were markedly different perceptions of the telephone from male and female respondents, with women valuing its role as a medium of social exchange more highly than men. Men in turn attached greater recreational value to television than women. Livingstone attributes the high value attached to white goods by women to their perception of the home as a site of work rather than of leisure. However, women’s work within the domestic sphere has too often been discounted in discussions of technology and the labour process.

Where domestic and productive activities coexisted in farming, the commercialisation of women’s household production was ‘masculinised’ and removed from their control through the introduction of increased levels of technology. In this context Kleinegger defines masculinisation as ‘consisting of increased mechanisation, specialisation, capital outlay and scientific expertise’ (Kleinegger 1987, p.163). In the context of contemporary domestic consumption, these characteristics may be identified with the ‘featurism’ which leads to increasing and unnecessary sophistication and complexity in consumer products. This proliferation of features is attributed by manufacturers to the need to match facilities offered by competing products rather than any demand from customers. However, rather than being associated entirely with masculine activities, the process can be seen equally in technology such as computerised sewing machines which are primarily directed at female users.

The ‘re-conversion’ of war-time productive capacity to serve the emerging domestic consumerism of the fifties entailed the redirection of the significant technical advances achieved under wartime conditions to peacetime production. There were short-lived attempts in the United Kingdom, North America and Australia, to apply techniques and resources developed for aircraft production directly to the construction of housing, but more generally this meant a resumption of the development trajectory of pre-war domestic technologies. These technologies resumed their role in the replacement of the shrinking domestic labour force in middle and upper class homes, but with higher volume production and falling prices in high
employment economies, they began to filter down to lower-middle and working class homes.

Luxton (1980) compares the impacts of these technologies across three generations up to 1977 providing support for the arguments of Cowan (1983) in respect of earlier generations of technology. New technologies made little impact on the time spent on housework, producing instead increasing expectations and higher standards of performance. Buchanan and Boddy (1983) report similar observations of workplace innovations such as word-processing where efficiency gains were used to increase the number of drafts of documents and the sophistication of their presentation rather than to release resources for other purposes.

**Communication and Employment**

The impact of baby-boom demographics was reflected in the increase in the rate of household formation and the reduction in average household size. This has followed the reduction of residential densities in postwar reconstruction and development. The physical changes of lowered residential densities coupled with increased affluence has led to a massive growth in private transportation. The increasing physical separation of household and workplace has been a trend throughout the process of industrialisation. However, the gendered nature of access to transport was often overlooked in the assumptions of postwar urban planners and only examined explicitly in the nineteen eighties (Focas 1989). Car ownership rates did not reflect the relative availability of the single vehicle for male journeys to work versus female journeys for shopping and other domestic activities. Where female access is available, the substitution of private for public transport has created an extension of housework responsibilities, as witnessed by the popular ‘Mum’s Taxi’ bumper sticker. In Australia this situation is reflected in both the design of and advertising for motor vehicles based around the delivery of dependent children to a variety of venues.

Grieco, Pickup and Whipp (1989) further link these activities to the broader issues of the management of access to employment and other resources within the family, and emphasise the economic significance of such ‘domestic’ activity. They point out that historically workplace proximity was essential to female participation in the paid workforce. They cite current World Bank advice on the requirement of geographical adjacency of employment for disadvantaged groups (World Bank 1986). Increased transport facilities
serve to widen the labour market for female participants, but as with private transport, women's responsibilities often broaden to include the complex coordination of household activities in this domain.

The next section examines the impact on the household of recent Australian public policy on industry and employment in the context of the increasingly networked household.

**Australia: ‘Networked Nation’**

The incorporation, or re-incorporation of the household into the formal economic sphere must reflect a two-way connection between production and consumption. This might be achieved in the manner of early industrial practices, by connection though successive levels of devolution from the urban centres of production. This is manifested currently in Australia in the outworking and home-working associated with attempts to compete with lower wage economies (Greig 1991) or by the direct use of the core technologies of the new techno-economic paradigm (Perez 1984) within the domestic space.

The Australian Federal Government has promoted a policy of ‘urban consolidation’ which focuses on the physical aspects of overall urban density, rather than identifying the access issues raised by Webber. In parallel with its encouragement of increased physical density the Government has adopted an increasingly proactive stance towards the development of this connectivity in commercial, scientific and domestic spheres (see for example Australian Science & Technology Council 1994).

A focus on physical measures of access and centrality threatens to prolong many of the problems of the current situation while ignoring many of the opportunities specific to Australian conditions presented by a shift to non-spatial measures of access. For example, the front-office/back-office dichotomy identified in North America by Nelson (1988) is visible in the principal Australian conurbations of Melbourne and Sydney. The relocation of lower paid part-time employment to cheaper suburban locations does at least offer the prospect of flexible paid employment for women unable to travel to central areas for a full working day but there is a clear hierarchy associated with this spatial division of labour. As electronic communication becomes an increasingly effective substitute for physical movement, the relationship of the household to an increasingly integrated public realm of production and consumption is changing. The key role of information and
communications technology in these developments invites speculation that a further chaining of productive capacity onward to the telecottage or home office may be the next broadly discernible development.

Current commuting patterns were established in times of lower congestion and travel costs. Congestion, diminishing benefit to users, and a growing reaction against the negative impacts of independent individualised transport provision have enhanced the attractiveness of some forms of white-collar home-working which have been repackaged as ‘telecommuting’. However, this will add the burden of office management to existing household ‘chores’, along with the provision of any necessary equipment and other infrastructure costs. In many ways this recalls working conditions prior to the onset of the factory system but the ‘post-industrial’ household differs from its pre-industrial precursor in its direct incorporation into an increasingly globalised information system.

Bringing it All Back Home: Conflict in the Domestic Arena

The convergence of communications and information technologies in the public sphere has led to the globalisation and networking of economic activities described above. It is echoed in the household sphere by the prospect of interactive television and broad band telecommunications.

The increasing electronic mobility of the suburban and domestic labour force available through telecommuting also implies a two-way street, with electronic access to the home forcing its reconstruction as a sphere of both production and consumption. Teleshopping channels, initially broadcast via satellite or cable, are being progressively reworked into a fully interactive technology. The prospect of direct sales into the individual household raises the prospect of further reinforcement of the household as a locus of consumption and reproduction at the same time as its productive function is being re-emphasised.

Kleinegger (1987) recounts the conflicts of interests between consumption and production which arose within farming households. As producers, the family sought to maximise prices; as consumers they sought to minimise prices. Paradoxically their success as producers sometimes resulted in a lowering of prices and households were then exhorted to consume more of their own produce in order to decrease supply so that prices could recover. Comparable conflicts might reappear as the domestic sphere is reconstructed around a dual function. A striking example of this is given by Aungles (1994)
in an analysis of the impact of electronically monitored home detention on the relationship between the Australian state and the families of prisoners. The majority of offenders are male and the result of an apparently humane technically-enabled innovation is to displace the task of monitoring confinement from the state to the household. It becomes an additional demanding household task for the female partner who becomes both homemaker and domestic representative of state power and authority.

**Social Choices. Technical Options**

These new forms of incorporation of the household into the public realm reflect the diffusion of information technologies and their impact on the organisation of production at global and local levels. The starting point of the IT revolution of the late seventies onwards was the decreasing size and increasing power of electronic computation. For small to medium businesses the availability and low cost of entry and support for the technology required the catalyst of IBM's legitimisation of the PC market by its entry in the early eighties, and the establishment of a de facto standard for end-user computing in business. Subsequent innovations within computing and innovation technology have cascaded from the large, multi-site and multinational early adopters to medium and small enterprises at an accelerating rate. Mulder (1991) predicts a rapid downward diffusion of Integrated Services Digital Networks (ISDN) to home-based workers and consumers. Stokes (1995) expresses concern over another manifestation of 'featurism': the promotion within Australia of the more expensive fibre optic approach to an 'electronic superhighway'. The existing infrastructure already reaches most homes and could support a simpler but effective service at much lower cost through the use of ISDN protocols.

Miles has argued that the micro-chip is the coordinating device for increasingly sophisticated domestic technology (Miles 1993). Elsewhere Miles, Cawson and Haddon (1992) discuss the complex technical and social processes which give form to innovative products. Microcomputer-based control for household technology utilising domestic power-supply frequency modulation has been available off the shelf for a decade. The domestic manifestation of the intelligent systems already deployed in many commercial buildings offers a number of functional gains in support of new household activity patterns, and the potential development of new ranges of domestic products. In fact the next paradigm for domestic technology may already be present in Japanese robotics research, much of which is driven by the
demographic imperative of an ageing household base (Schodt 1988). The postwar development pattern in Japan has created problems for that country's emergent social service system. Ageing cohorts are concentrated in newer settlements which lack the traditional community infrastructures which formed the voluntary basis of existing social service delivery (Ben-Ari 1991). The substitution of technical goods for human services serves a desire to establish a potentially global industry and market. It also substitutes capital for labour in one of the few remaining areas of labour intensive work in advanced economies. In the future state-of-the-art technology may monitor and minister to one family member while another co-present member utilises similarly advanced technology to project their intellectual labour to a remote location. Periodic media coverage during the late eighties and early nineties of proposals for Japanese retirement communities in various Australian locations represent an alternative strategy driven by the logic of globalisation and regional comparative advantage. Here advanced technology would need to substitute for family propinquity rather than human care.

Households, Networks and Citizenship

This section analyses the impact on the household of the increasing porosity of national boundaries. For example, the coalescence of communication and computing technologies has transformed government attitudes to communication infrastructure. The relatively narrow national missions of common carriers have been challenged by the rapidly expanding range of commercial possibilities, and an equally rapidly expanding demand for capitalisation to deliver new forms of service. The response has been to embark upon privatisation and deregulation. The informal replacement of national broadcasters by extraterritorial organisations using direct satellite broadcasting has taken place in parallel with telecommunications deregulation. This further demonstrates the eclipse of the ability of national governments to form and control key areas of policy for technologies which impact on urban infrastructure (Camilleri and Falk 1992). The diffusion of state power through agreement to and participation in multilateral regulation in areas such as trade, security and environment has been matched by the emergence of transnational corporations operating in internationalised financial and labour markets.

The policies which result in specific technological strategies are increasingly determined at supra-national levels. They impact not only at national and sub-
national levels, but increasingly flow through to the individual household: the household becomes the end point of trans-border data flows.

**Infrastructure as Marketplace**

The privatisation and/or corporatisation of national telecommunications carriers and broadcasters and the introduction of market competition also means a loss or reduction of the redistributive, social role implied by such public monopolies. In a highly urbanised society with large areas of low population density, emerging competition is focusing on the established densely populated and serviced centres. Already in Australia one national electronic bulletin board has had to relocate to a capital city because of a concentration on serving lucrative urban markets at the expense of its redistributive role by the national carrier. In the United Kingdom, cable television companies are attracting a significant proportion of first-time local telephone subscribers for whom the economic barriers to entry to the former state system have been set too high. The situation is even more problematic in countries such as Russia where unfettered privatisation has been unleashed in a situation of much greater existing inequity between centre and periphery (Giglavyi 1993). Local governments must now compete for the early availability of new communication resources, just as they once competed for access to railway routes. In many senses, a railroad analogy is more appropriate to this private provision of closely monitored services than Al Gore’s federally funded public superhighways.

**The Household Unbound**

As argued above, the relatively benign scenarios of increased personal choice which have been built around the prospect of ‘telecommuting’ and ‘electronic cottages’ are already compromised by the realities of telemarketing and other forms of white-collar outwork. The broad background of casualisation across all sectors of the workforce should be grounds enough for caution. With a renewed emphasis on the productive role of households, competition between cities and sub-city regions might be reflected at the micro-level of competition between neighbourhoods or even households.

Silverstone, Hirsch and Morley (1992), in describing the moral economy of the household, identify ‘boundary maintenance’ as one of the problems set for the household by information and communication technologies. Concerns in this area have generally been aimed at the content of mass media and other leisure activities such as video games and, most recently, the INTERNET.
The boundary problems of the ‘globalised’ household are as likely to revolve around the technologies of production as around those of consumption. Aungles (1994) describes one extreme form of penetration of the household by the technology of commerce in the form of electronically monitored home detention. At the same time the mediating technology recreates the electronic panopticon observed by Sewell and Wilkinson (1992) in the formal workplace within domestic space. In an electronics factory transferred from British to Japanese ownership, both unobtrusive electronic monitoring of work and error rates and visible physical labelling of under-performing workstations were used to engender an atmosphere of close self-monitoring by the workforce. This raises a particular irony: as humanistic paradigms, such as human-centred systems, gain ground in the formal workplace, the prospect emerges of unrestrained electronic Taylorism transferring to the household.

**Entry Points to the Technology**

Electronic networking alters the size/performance equation and removes many of the traditional buffers between smaller and larger social and economic players. Since Webber wrote, key issues have emerged over access to the big technologies driving the processes of globalisation and to those related technologies underpinning the small scale implementations which facilitate local and regional responses.

The rapid development of information and communication technology in the thirty years following Webber’s formulation of ‘community without propinquity’ has confirmed many of his assertions. Globalisation and deregulation of economies has produced a number of nomadic communities. Attali (1991) predicts the emergence of a nomadic international elite, in line with the examples provided by Webber (1964) but in addition to the elite employees of transnational corporations, a range of skilled, semi-skilled and unskilled workers, legal and illegal are evident, moving into and between the more developed economies. The recent establishment of a Los Angeles office by the British Labour Party is an indication of the United Kingdom’s place in this process. Postwar migration patterns and improved physical and electronic communications have produced transcontinental extended families at all levels of societies, something of which Australians are particularly aware, if only from Telecom/Telstra advertising campaigns directed at specific migrant communities.
Information networks are emerging as the social milieu of non-place communities. Webber hardly considered the emerging problem of 'information asymmetries' that Lamberton (1995) raises. The concept of 'information justice' has value. However, the ubiquity of the base technology means that access to non-place community does not depend on large investment, nor on esoteric technical skills, a point sometimes missed in otherwise justifiable criticism of technological optimism. The growing maturity of the contributing technologies means that relatively stable standards are emerging, allowing both commodification (and consequent cost reduction) of components and the diffusion of appropriate technical literacy and skills among the general population. The major hurdle at present is the selection of an appropriate strategy from the confusing range of opportunities currently being promoted with a great deal of hype.

Small scale implementations can be achieved through points at which entry cost is low enough for individuals and small groups, in some cases because they piggy-back from existing infrastructures. The yuppie icons of fax and mobile phone are sufficiently close to existing technical experience for users such as self-employed tradespeople to successfully appropriate them. While these relatively simple technologies can alter the size versus performance equation for businesses, even the smallest companies may employ state-of-the-art technologies. Such diffusion may be sponsored by the larger players as with the deeply layered subcontracting systems in Japanese manufacturing. These link top-level suppliers, themselves TNCs, down to small family companies which may be assisted with the acquisition of key technology (Miyashita & Russell 1994). However, big technologies still underpin the complex wide area networks which support global business exchanges and global broadcasting, for example geo-synchronous satellites, fibre optic networks, massively distributed computing facilities, such as INTERNET. Here an institutional perspective is needed to understand the driving concerns which are shaping the emerging 'new world order'.

In Australia, government has pushed both the diffusion of the smaller facilitating technologies and facilitated national access to the bigger technologies. However, industry policy has assumed that relatively concentrated and centralised industries like automotive manufacture must be more technically advanced, and therefore more worthy of support than a distributed industry like textile clothing and footwear (TCF). In fact in the latter type of industry, large companies are utilising technology equal to that of the motor industry, with equally complex subcontracting arrangements.
which may involve off-shore relocation of the labour intensive making-up process (Greig 1991). The alternative for TCF companies is on-shore home-based work, and the relatively invisible, predominantly female work force may be another reason for the differential treatment of the two industries by government.

Cyberspace and Citizenship

The emergence of ‘cyberspace’, a non-place realm of computer-supported relationships, has taken Webber’s original conception considerably further. Benedikt (1991) traces the term to William Gibson’s dystopian novels (for example Gibson 1984). The ‘cyberpunk’ culture which has grown around the themes first articulated by Gibson has both utopian and dystopian strands. Cyberpunk literature emphasises the intellectual and cultural possibilities of the emerging global ‘non-space realm’. The non-space aspects of ‘netland’ have been exploited by the enthusiasts but have also attracted more respectable attention from a number of researchers. Harasim (1993) assembles a broad overview of the ‘official’ dimensions of its use and development. In line with Webber’s observations, specialised scientific communities provide the most impressive evidence of global social networks.

Critics of urban planning in the decade following Webber’s formulation attacked redevelopments that privatised previously public spaces, yet the virtual space of computer and communication networks is primarily private, with the deregulation and privatisation of common carriers widening this trend. In their naivety some technophiles have become neo-Luddites subverting rather than physically attacking the technological base of a ‘new world order’, using slogans such as ‘information wants to be free’. The phenomenon of ‘hacking’ is indicative in part of resistance to emerging patterns of ownership and control. It can be seen to parallel earlier resistance to privatisation and regulation of public space within the physical environment, from mass trespass in the United Kingdom in the thirties to ‘green bans’ against urban redevelopment in Australia in the sixties and seventies.

The ‘cyberpunk’ sub-culture represents the first example of an increasingly global non-space community inhabiting the ‘virtual space’ of communication networks. It became global as the technological base diffused from the nations that developed it. A great deal of traffic across the networks in the summer of 1991 originated in Russia and described the events of the abortive
coup to the outside world. In China, following the suppression of the democracy movement in 1989 there was a massive increase in the incidence of computer viruses. In the United Kingdom at the height of the anti-Poll Tax campaign an elaborate hoax was staged to persuade local authorities that a computer virus had been introduced in order to corrupt the databases essential to the collection of this unpopular charge. The employment of faxes and laptop computers by the Mexican Zapatista rebels (Newsweek 1995b) is the latest manifestation of an effective incremental and interstitial use of relatively low tech aspects of the emerging global infrastructure first seen in the Russian Interfax news agency.

However, the ‘hacker’ in the spare bedroom has been demonised and Sterling (1992) recounts the lengths to which national authorities may go to control such activities. Criticism of the sub-culture focuses on the genuinely criminal and destructive activities of a minority. Such activities themselves grew out of the fringes of the anti-war movement in the United States in the late sixties and early seventies, with the traditional telephone system being the first target for the ‘liberation’ of resources (Bowcott & Hamilton 1990). ‘Phone phreaking’ used purloined engineering codes and simple electronic devices to access the resources of the state sanctioned monopoly telephone system.

**Policing Cyberspace**

In a post-cold war environment it is clear that a number of institutions are reassessing their roles. Some cold war warriors are viewing this non-space arena as their new fiefdom. In the United States, the National Security Agency (NSA) has become deeply involved in the development of data verification and encryption, to the extent of proposing software and standards for commercial transactions. Key personnel who passed though the British Government Code and Cypher School (GCCS) at Bletchley Park during World War II played a leading role in the postwar development of electronic computing, both at Manchester University in the United Kingdom and in the MIT Whirlwind project in the United States. In 1952, the United States equivalent of GCCS, the Signals Intelligence Service, based in Arlington Hall, Virginia, and comparable in its origins to GCCS, emerged as the National Security Agency. The wartime successes of the Ultra code-breaking project (Winterbotham 1974) served to legitimate the massive postwar infrastructure developed by the General Command Headquarters (GCHQ), successor to GCCS in the United Kingdom and NSA in the United States. The continuing role of the signals intelligence community at the cutting edge of computing...
developments in the post war period ensures that the information economy is inseparable from the surveillance state.

The NSA promoted joint development with IBM of second generation general computers with features such as the high speed tape drives, prominent in every sixties movie featuring computers. They also sponsored the first Cray supercomputers. This pioneering work continues with the Special Processing Laboratory, established in 1990 for in-house fabrication of highly specialised microelectronic devices. The end of the Cold War and the dual nature of the NSA’s mission statement (publicly available on the World Wide Web) which distinguishes between external foreign signals intelligence and ‘classified and unclassified national security systems’ has allowed the NSA to promote its own Clipper encryption chip as the answer to commercial security problems on the information superhighway. There is a distant irony here. The Enigma code machine, target of the Ultra program, was adopted by the German Navy after it had been displayed at trade fairs across Europe by its inventor who marketed it as a commercial security device. Sixty years later the distant descendants of this innovation are being offered to the world of business by the NSA.

Joint development and commercial programs have already provided a direct link between military and diplomatic concerns and the world of commerce. Control of encryption standards would enable them to monitor traffic. Meanwhile the United States Secret Service has conducted a number of high profile raids on individuals and small companies seizing equipment and data allegedly associated with illegal access to data networks. The IT community response has been the formation of the Electronic Frontier Foundation which defends, in first amendment terms, access to cyberspace.

This contestation is of significance to the future of the household and its relationship to community. Community-based networks and bulletin boards, such as Pegasus in Australia and the WELL in the United States are a reworking of the bottom-up alternative networking seen in the community-based movements of the seventies. These movements emerged in developed urban regions based around contestation over redefinition of the social wage in terms of housing and related living conditions. With satellite television as leisure space and computer networks as a workspace, home computing and bulletin boards may serve as the ‘street’ for the next generation. The ‘illegal’ activities associated with the cyberpunk culture may indicate that the social reproduction function of the post-industrial household is not delivering
acquiescence to the potential techno-economic hegemony. Rather than an isolated, fragmented private realm, the household may yet become a locus of resistance on the electronic frontier.

Back to the Future?

This paper has identified a widespread and conscious deployment of technology in the household sphere in the postwar period. The increase in social wages led to improved living conditions at lower densities and access to private transport to overcome the negative aspects of this. However, the increasing availability of information technology and its substitution for physical movement also coincided with a general reduction in social wages. Consequent changes in employment opportunities have brought renewed awareness of the household as a locus of production. The household had already become the management site of other aspects of economic change through the privatisation of the experience of postwar mass unemployment. This is in marked contrast to the public visibility of the pre-war unemployed population.

The impact of unemployment and underemployment and the casualisation of work, means that part-time and home-based work is becoming a more significant component of many household incomes. Emerging technology opens up new prospects and possibilities, but the question remains to what extent the reconstruction of gender relationships and assumptions is possible as households are redefined around shifting relationships between work and leisure.

If technology is capable of supporting the reintegration of production and consumption within the post-industrial household, will it simply allow the logic of late capitalism to overwhelm this private sphere? Is the alternative paradigm of bottom-up, reflective development capable of providing an alternative?

The novelty of the technologies driving current change notwithstanding, the household has been continually subject to such shifts since before the industrial revolution. However, the emergent characteristics of globalisation require new responses, not attempts to reinstate some previous balance. The paradigms of community advanced by Etzioni (1993) to underpin notions of communitarianism are backward-looking and inadequate in comparison to Webber's model, yet Anderson and Davy (1995) give an account of influence on British politicians from across the political spectrum which can be
repeated for North America and Australia. Rose (1996) challenges Etzioni's premises with specifically non-place examples of voluntary community.

Castells (1989) argues that despite the impressive capabilities of information and communication technologies, physical location still matters, and that a range of contingencies is required to establish the 'creative milieu' which will allow a region to participate fully in the informational economy. He sees a continuing and central role for physical proximity in terms of necessarily specialised labour markets and other forms of communication.

Poster (1990) argues that the 'mode of information' is still an emergent phenomenon and claims that Marx theorised the 'mode of production' at a similarly early stage of its manifestation. The implications of the technologies entering the household for the processes of urban development and the nature of community are likely to be far reaching, even if they presently only impact on a minority. Sproull and Kiesler (1991) have demonstrated that the most significant effects of computer-mediated communication in formal organisations are the social effects which are only observable over considerable time.

At the level of the household, we must ask what leverage can be achieved in influencing outcomes. The perspective appropriate here is that of the seventies 'intermediate technology' movement which developed in the decade following Webber's paper, in conjunction with concepts of participative design and community action. Lepietz (1992) offers a reinterpretation of these issues in the context of the economic expectations of the nineties.

For Australia, public policy over a decade has been dominated by the question of what can be achieved by a relatively small player in terms of influence over an emerging new 'techno-economic paradigm' (Perez 1984). The Federal Government's promotion of the development of the Asia Pacific Economic Co-operation zone (APEC), in conjunction with a decade of micro-economic reform, demonstrates a commitment to active participation in change at the national level. An economic zone which includes Alaska and Malaysia, Chile and South Korea, as well as Australasia may best be regarded as a 'virtual' or 'non-place' region. The long-term effect of recent government policies may yet be the direct incorporation of the Australian household into the economic life of that region.
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