

UBIQUITOUS COMPUTING AND THE DIGITAL ENCLOSURE MOVEMENT

Abstract

Popular portrayals of ubiquitous computing tend to downplay the surveillance implications of emerging forms of mobile, networked interactivity. This essay seeks to supplement such accounts with a critical analysis of the emergence of digital enclosures that limit access to interactive networks and services to those who 'freely' submit to increasingly comprehensive forms of monitoring. If land enclosure helped produce the spatial conditions for the exploitation of wage labor, digital enclosures enable the exploitation of information generated by users as they go about their daily lives. Describing interactive networks, in both virtual and physical spaces, as forms of spatial enclosure helps to supplement privacy-based critiques of surveillance with questions about the ownership and control of data collected within the enclosure.

Making an impression

The primordial form of dwelling, Walter Benjamin (1999) observed in his reflections on the bourgeois household of nineteenth century Paris, 'is existence not in the house but in the shell' (1999: 220). This was not solely for protective purposes but, as he put it, because 'the shell bears the impression of its inhabitant' (1999: 220). The desire to make a recognisable impression congealed in the material form of the physical environment took shape, Benjamin suggested, against the background of an industrialised landscape in which human traces were increasingly being erased from the manufactured, mass-produced environment. The sociologist George Simmel, whose work strongly influenced this aspect of Benjamin's thought, described the process of industrialisation as one characterised by 'the growing objectivity of the economic cosmos, its supra-individual independence in relation to the consuming subject with whom it was originally closely identified' (as quoted in Lehmann, 2002: 135).

The reason for invoking Benjamin's reflections on the dawn of industrial capitalism is to discern their echoes in the reports of its dusk. The historical image of a space that registers the presence of its occupants and provides evidence of the impression they have made upon it takes on new resonance in the emerging era of ubiquitous computing and mobile interactivity. One of the promises of the wireless internet is to create interactive spaces that recognise users — spaces that, not incidentally, collect and organise the traces of those who pass through

them. One of the recurring themes of the emerging economic paradigm of mass customisation touted by futurists and new media titans, including Nicholas Negroponte (1995) and Bill Gates (1996), is the eradication of the forms of homogenisation and alienation associated with mass society.

Similarly, the prospect of so-called ubiquitous computing is frequently portrayed as a projection upon the physical world of the capability of networked interactivity to 'recognise' users and register their traces. This version of interactivity might be considered the digital antidote to the anonymity of the urban environment and its 'supra-individual independence', thanks to the creation of spaces that will recognise us wherever we go and respond to our presence in ways that incorporate information about our histories, desires, needs and wants. One such space is being planned by South Korean and US developers for the outskirts of Seoul. The development, New Songdo City, will be equipped not just with wireless networking, but with haptic technology and ubiquitous radio-frequency ID tagging. As a breathless news account put it: 'Imagine public recycling bins that use radio-frequency identification technology to credit recyclers every time they toss in a bottle; pressure-sensitive floors in the homes of older people that can detect the impact of a fall and immediately contact help.' (O'Connell, 2005: A1)

Such accounts reprise the familiar litany of conveniences outlined by the promoters of ubiquitous computing: an environment equipped with devices that not only recognise us, but come to serve as a combination of companion, facilitator and servant. As the promotional material for MIT's ubiquitous computing initiative, Project Oxygen, puts it, embedded interactive devices will 'adopt our information personalities ... we'll communicate naturally, using speech and gestures that describe our intent ... and leave it to the computer to carry out our will' (MIT Project Oxygen, 2004). Such scenarios — perhaps reflecting the idealised conditions of research laboratories — rarely focus on who will own and operate ubiquitous computing systems and to what ends. The rhetoric of 'Third Wave' cyber-euphoric futurism invokes the promise of a silicon revolution that painlessly eliminates the inequities attendant upon the concentration of control over wealth and productive resources by economic and political elites in an ostensibly obsolete industrial era. The key to this silicon revolution, we are told, is not the redistribution of control over material resources, but their supposed *irrelevance* in an emerging information economy. In the preamble to their 'Magna Carta for the Knowledge Age', futurists Esther Dyson, George Gilder and Alvin Toffler (1996) blithely proclaim that: 'The central event of the twentieth century is the overthrow of matter.' (1996: 295) This technological triumphalism persists in the popular media's focus on the gee-whiz gimmickry of ubiquitous computing as well as in the hip radicalism of books like *Netocracy: The New Power Elite and Life after Capitalism* (2002), which proclaims the coming irrelevance of property rights and 'ownership of the means of production' (2002: 255). Against these persistent reminders of what Vincent Mosco (2004) has dubbed the 'digital sublime', this article argues that the ownership of, and control over, the means of interaction and information production, distribution and storage remain core attributes of the emerging information economy. It seems odd even to have to

say this, but matter still matters — and so, obviously, does control over material resources. The question of who owns and controls the networks that make ubiquitous communication and interactivity possible has important implications for questions regarding who benefits from information markets and who, by contrast, is subjected to increasingly detailed forms of surveillance as a condition for access to information resources. When we are confronted with the abstract promise of intelligent spaces and cities — like those described in the utopian versions of ubiquitous computing — the question of ownership forces us to get concrete: who is it precisely that has access to and control over the detailed information about our comings and goings, our interactions and transactions? And what are they doing with this information? The abstract, celebratory portrayal of autonomous ‘smart’ devices — floors that know where we are, trash cans that know what we’ve purchased, computers that know where we go online and what we do there, iPods that monitor our listening practices — tends to background the fact that, thanks to the galloping privatisation of the information infrastructure, all of this information will become the property of those who own and operate the networks. This is information that increasingly has value — for rationalising both marketing and, as we are learning within the context of the so-called global war on terrorism, policing. The more we are inundated with paeans to the benefits of interactivity and interactive participation, the more rigorously we should ask who benefits and how.

This essay seeks to trace the limitations of the promise of ubiquitous interactivity — not to dismiss the conveniences on offer, but to highlight the all too often overlooked costs and consequences of the privatisation process for which they serve as alibis. Drawing on the shift in economic relations associated with the land enclosure movement, I propose the model of a ‘digital enclosure movement’ as a means of interrogating the relationship between monitoring and the forms of economic exploitation characteristic of the emerging interactive economy. Interactivity-enhanced spaces — digital enclosures — both physical and virtual, make it possible for those who own and operate them to claim ownership over information generated by the users who navigate them. Surveillance — the centralised collection, storage and use of information collected through the interactions and transactions enabled by these enclosures — is taking the shape of an exchange relation in which users submit to increasingly comprehensive forms of monitoring in order to avail themselves of the services provided by ubiquitous networks.

Consider, for example, the proposal by Google and Earthlink to equip the city of San Francisco with free wireless internet access, a project that was to be financed by so-called ‘contextual advertising’ — custom-targeted ads based on tracking the location of individual users throughout the course of the day.¹ Google’s hope was that users would be more likely to click on offers from nearby advertisers: ‘It could be the difference between seeing an advertisement for Macy’s, if a user happens to be in Union Square, or a seafood restaurant if the user is near Fisherman’s Wharf’ (Kopytoff, 2006: C1). Thanks to its myriad interactive applications, the potential exists for Google to supplement its customisation algorithms with

information gleaned from users' search engine inquiries, their Gmail accounts, their map requests, and so on. Google has already filed a patent application that, as one account puts it, 'involves a system in which targeted ads are served to wireless internet users based on the geographic location of the wireless access point (WAP), as well as the behavior and demographics of the WAP's users, and other criteria' (*Telecommunications Industry News*, 2006). The wider the expanse of Google's informational embrace, the tighter the targeting of its advertisements. Taken to its limit, the goal is to be able to serve users with real-time advertising that reflects not just their positions in time and space, but their moods and states of mind as well as their social lives and their life histories.

A digital enclosure movement

The Google Wi-Fi proposal is just one example of an attempt to un-tether users from wired connections and thereby to exploit the economic potential of their interactivity-enhanced visibility. Ubiquitous computing, understood more generally as the creation of an infrastructure — both wired and wireless — that facilitates constant connectivity with data resources and with other users, is typically portrayed in terms of both freedom and mobility. As the Project Oxygen website puts it, ubiquitous computing is about 'bringing abundant computation and communication, as pervasive and free as air, naturally into people's lives' (MIT Project Oxygen, 2004). In the near future, the site predicts, 'computation ... will be freely available everywhere, like batteries and power sockets, or oxygen in the air we breathe' (MIT Project Oxygen, 2004). The notion of 'freedom' invoked in this airy rhetoric begs for qualification. Neither power nor batteries are 'free' in the sense of being available to all without consideration of access to economic resources. They both come with a charge, as it were, and so will mobile, ubiquitous, networked computing.

Wired magazine uses a similarly ethereal metaphor to invoke the return of the server-client model of interactivity envisioned by ubiquitous computing. The magazine greets the attempts of companies like Yahoo and Google to encourage users to store their personal data — everything from documents and email to photos and, eventually, music and video — on private servers, available via the internet, by proclaiming the imminent demise of desktop computing: 'Computing is moving off your machine and into the cloud.' (Tanz, 2007) Such descriptions are at best misleading: the version of mobile interactivity they describe is one in which personal data is captured and stored in bricks and mortar facilities controlled by commercial enterprises seeking to profit from the capture, storage and manipulation of increasingly voluminous data mines.

Constant connectivity, in the contradictory world of contemporary capital, relies on the separation of users from their data. On the one hand, we are confronted by the overlay of physical space with interactive capabilities — space as interface. On the other, we are witnesses to galloping private-sector investment in the construction of giant data-centres around the globe to store and process the information captured in the nets of the digital enclosure. Rather than a cloud,

the concrete spatial formations associated with such enclosures are vast digital repositories — so-called ‘server farms’ — sprouting up in locations where land and electricity are relatively cheap: along the Columbia River Basin in Washington state and Oregon, in Texas, North Carolina and elsewhere. Google reportedly budgeted US\$1.5 billion in 2006 as part of a project to build ‘a worldwide string of data centers’, nicknamed ‘Googleplex’ (Markoff and Hansell, 2006), and its rivals Microsoft and Yahoo have embarked on similar data warehouse construction projects. Data warehouses form an integral part of what this essay describes as a digital enclosure movement: the attempt to gain private control over personal data on an unprecedented scale via the commercialisation of ubiquitous computing.

Digital enclosures literalise the physical metaphor of what legal scholar James Boyle has described as a ‘second enclosure’ movement devoted to the ‘enclosure of the intangible commons of the mind’ (2001: 37). In more concrete terms, ‘second’ enclosure refers to a variety of strategies for privatising, controlling and commodifying information and intellectual property. As Benkler (2006) and Schiller (2007) have argued, this process relies not just on expropriation of previously non-proprietary information, but on the construction of an increasingly restrictive legal regime for the extension and enforcement of property rights over a growing range of information. Boyle offers the example of patent claims for human genes, which has been expanded to include life forms — not just strains of wheat or corn, but also, for example, cats with hypo-allergenic fur. The movement he describes, driven by attempts to profit from the commodification of information, is omnivorous and Borg-like in its drive toward total assimilation: ‘In the new vision of intellectual property ... property should be extended everywhere — more is better. Expanding patentable and copyrightable subject-matter, lengthening the copyright term, giving legal protection to “digital barbed wire” [encryption] even if it is used to protect against fair use.’ (2007: 40) Schiller describes the privatisation of collective or shared knowledge — as in the case, for example, of patent claims on traditional medicines — and the commodification of publicly subsidised or not-for-profit intellectual labor in the university. The expanded role of information in the era of ‘digital capitalism’ has been met with what Schiller refers to as ‘elite programs of political-economic reconstruction’ devoted to ‘enclosing the immensity of global communication and information provision ... the paradigm for which was set via enclosure of common lands in England during the epochal transition to agrarian capitalism hundreds of years ago’ (2007: 43).

The model of England’s land enclosure movement is pivotal to critical accounts of capitalism because it facilitates the transformation of violent expropriation into voluntary forms of exploitation associated with waged labor. The forcible separation of workers from the means of production — a process that Marx (1992) describes as ‘primitive’ accumulation — is, he argues, a necessary precondition for the institution of wage labor insofar as it creates a working class ‘freed’ up to sell control over its labor power. It is a form of freedom that is, in turn, reliant upon a spatial reconfiguration: workers must be *separated* from the land so that their access to it can be contractually regulated. With the advent of industrialisation, entry into a labour contract also meant entry into a physical space operated and

controlled by its owners. The spatial correlative of the emergence of a ‘free’ working class in the capitalist era is the formation of clearly bounded, privately owned and operated enclosures to which worker access is strictly monitored and regulated. Similarly, the freedom of ubiquitous computing is (thanks to galloping privatisation of interactive networks) increasingly reliant upon the formation of interactive enclosures — both physical and virtual — where access is closely monitored and regulated.

As conceptualised in this article, the process of digital enclosure combines the spatial characteristics of land enclosure with the metaphorical process of information enclosure described by Schiller (2007), Boyle (2001) and Benkler (2006). As information commodities become increasingly valuable resources in the era of digital capitalism (Schiller, 1999), the construction of privately owned and operated interactive enclosures serves to separate users from the means of interaction, transaction, communication and expression. This process of separation is what the resurgent model of server–client computing envisioned by the internet cloud achieves. To the extent that information generated by consumers as they interact with one another, surf the web, shop online and off, and interact with networks throughout the course of the day becomes economically valuable, the creation of interactive spaces facilitates its capture. Thus the construction of privatised infrastructures for ubiquitous computing has become one of the economic drivers of investment in the digital media industries. According to the chief of research at computer chip manufacturer Intel, the company has devoted most of its \$4 billion annual research and development budget to products that anticipate the advent of an era of ubiquitous and ‘proactive’ computing (Intel, 2005). In South Korea, a consortium of private developers in partnership with the tech company LG CNS plans to raise \$25 billion to build New Songdo City — the first comprehensive urban digital enclosure in which wireless computing will be ubiquitous (O’Connell, 2005). In the United States and Western Europe, mobile telephone companies are spending billions of dollars to develop ‘third-generation’ wireless networks that will enable cell phones to serve as mobile internet connections and data storage devices.

The value of transactionally generated information about the use of information technologies derives in large part from its anticipated uses in rationalising the marketing process through the customisation of goods, services and advertising. In anticipation of the value of such labour, the proprietary claim made by private companies upon transactionally and interactionally generated information might be considered a form of accumulation of ‘titles to existing [and anticipated] assets ... for speculative reasons’ (De Angelis, 1998: 4). Consider, for example, the patent filed by Google, proposing to custom tailor advertising to online computer game players based on detailed observation of their style of play. According to the patent proposal, both player dialogue and play preferences will be analysed ‘to characterise the user (e.g. cautious, risk-taker, aggressive, non-confrontational, stealthy, honest, cooperative, uncooperative, etc.)’ (Bantick, 2007). The goal is to use this information to provide in-game ads, in real time, customised to fit the player’s psychographic profile. The more ubiquitous access is to video games,

the more comprehensive will be the data gathered by Google, and the harder consumers will be working as they play.

Digital enclosures are not exclusive — they can overlap with, contain and be contained by other delimited spaces that facilitate information gathering and transmission. We might imagine layers of enclosures, both virtual and physical, with varying spatial reaches and informational scopes: cellular networks enveloping Wi-Fi networks that embrace smart homes or offices equipped with RFID systems, all of which are embraced in turn by GPS satellite systems. At any given time, a user may occupy several enclosures at once — a cellular phone network, a satellite-based GPS network, a wireless hotspot, and a ‘smart room’ equipped with embedded interactive devices. Whereas the enclosure or ‘cell’ encompassed by a mobile phone network might be able to gather information from and transmit carrier signals to handsets that pass in and out of range, a smart room might be able to gather biometric information and a digital cable network information about viewing habits. Such physical digital enclosures facilitate the collection and storage of an increasing range of information to which property rights can be attached.

Different types of enclosures operate with varying levels of symmetry and transparency: book shoppers who go on Amazon.com are able to view why particular recommendations are being made for them: the information-gathering process is relatively transparent to individual users. This isn’t always the case when, for example, cell phones are used to gather geographic data about users, or even when Amazon.com conducted an experiment in ‘variable pricing’, offering a DVD for a lower price to a user who hadn’t logged on as a repeat customer than to a friend who had. In many cases — as when search engines gather information about our web surfing behaviour — we are largely unaware of what information is being gathered, how and for what purposes. Those applications that foster transparency — the ability to monitor the monitoring process itself — may perhaps serve as the basis for resistance against less obtrusive forms of data collection. Or, as in the case of Amazon.com, they may serve as an invitation to make the collection process more accurate and efficient. There is room for a much finer grained analysis of varying ranges of information collection and degrees of transparency within privatised digital enclosure, much as there is room for an analysis of different types of labor within the factory workplace. The goal of this essay is to make a broader point about the privatisation of the interactive networks that facilitate everything from ubiquitous communication to wireless internet access and the creation of ‘smart’ homes and cities. It is possible to imagine interactive networks that are not privately owned and operated — indeed, the internet started out this way. The model of digital enclosure is meant to highlight the costs of privatisation, in terms of both the loss of public control over transactional and interactional data, and private exploitation of the work performed by users in the production of information commodities.

The model of enclosure invokes the creeping restrictions not just on new informational resources but on existing ones. Thus, for example, digital rights management technologies make it possible to restrict the number of devices that a downloaded music or video file can be played on — or where and when they

can be played. Consider the anecdotal but telling example provided by a friend who, while visiting Australia, attempted to play a high-definition DVD movie on his laptop computer. He had purchased the DVD legally in the United States and carried it halfway around the world with him to Australia where, upon trying to play the movie on a laptop he had also brought from the United States, he was greeted with a pop-up box instructing him to register online. When he did so, and entered the DVD's registration code as instructed, he was informed that the movie wouldn't play because he wasn't in the right region. He didn't have to enter his location when he logged on — the network knew where he was. Compare this to the old days of travelling the world with, say, a cassette tape and a Walkman — no need to log in and no long-distance control over data.

Insofar as it implicates the dimension of physical space, this example gets to the heart of the process of digital enclosure. The presupposition built into the movie's coding was that DVD, player and viewer would have to be situated within a broad-ranging interactive network that could track the user's whereabouts. As I write, the Apple iPod is going wireless — it is being enfolded into the double digital enclosure of local Wi-Fi networks and the internet. This heralds an era of unprecedented downloading convenience. In the San Francisco of the future envisioned by Google, we may be able to purchase or stream music wherever we are in the city. Indeed, we may decide to store our music on Google's servers so we don't have to worry about filling up the digital memories on our increasingly tiny music players. At the same time, the conjunction of networked iPod and ubiquitous internet access heralds an era of unprecedented monitoring and control over digital music. Perhaps Google is already working up a patent application for a process to customise ads to us based not just on where we are, but also on what music we're listening to. The networked iPod will not only know whether the video or music users attempt to download or stream has been legally purchased (when, where and for how much), it will also be able to keep track of every detail of their viewing preferences. We might think of the expansion of such enclosures as a way of completing the process of spatial de-differentiation inaugurated by broadcasting. If TV and radio signals were able to overcome the boundaries between sites of leisure and domesticity alike, bringing the messages of advertisers into the privacy of the home, digital enclosures — including internet connections, cellular phone networks and digital cable — complete the circle by allowing marketers to extract information back from these same sites.

Implications

The concept of digital enclosure highlights the relationship between three aspects of the emerging information economy: the extension of interactive networks from the virtual space of the internet to the physical spaces of daily life (ubiquitous computing and mobile networking in a variety of forms), the commodification of an expanding range of information previously impractical for marketers and other information intermediaries to gather, and the resurgence of an enhanced server-client model of computing. As the informational slack is eliminated from

commercial enclosures, every message will become traceable, every transaction and interaction monitorable and recordable.

All of which is not to dismiss the conveniences attendant upon mobile computing and associated forms of networked interactivity. It would be wonderfully convenient to be able to access all the music one has ever purchased wherever one happens to be, and to be able to share information, data files and photos effortlessly with distant friends, family and co-workers, and so on. The economic model I have been describing would be untenable if there weren't real advantages to the communicative capability of such enclosures. It is, however, crucially important to consider the cost of such conveniences in the form of increasing asymmetries of control over information resources. Among those costs we could include the creation of increasingly unbalanced information architectures in which information generated by users is deployed to manage and manipulate them as consumers. Will those who currently adopt a sanguine attitude towards proliferating consumer surveillance find cause for concern when they learn that details of their love lives, combined with their web surfing habits, the search terms they've entered in search engines, the places they've travelled, and their daily commuting habits are used not just to inform them about products, but to trigger anxieties and insecurities as well as hopes and fantasies? Will they balk when advertisers start to use biometric information and highly sophisticated algorithms based on detailed data portraits to determine when consumers might be most inclined to respond to advertising appeals?

We might also include among the costs of digital enclosure the ability of corporations to regulate via 'code' rather than law (Lessig, 2000). When our iPods go interactive, they will double as stylish monitoring devices, ensuring that files are used only in approved times and spaces, while keeping track of all of the details of our media consumption. The heady Napster era of unregulated downloading was reliant, paradoxically, on a relative *lack* of interactivity and the resulting anonymity afforded users. The emerging interactive regime is designed to eclipse this anonymity in the name of customisation. Such costs are masked by the metaphors of unfettered digital freedom so frequently invoked in discussions of next generation interactive technologies.

The economic logic of enclosure further suggests that maintaining and naturalising the private character of interactive networks will remain an economic imperative for players in the emerging information economy. Telecommunication companies in the United States, for example, have been lobbying hard to thwart fledgling schemes for publicly funded Wi-Fi access. The state of Louisiana's ban on free municipal Wi-Fi gained national notoriety when telecom giant BellSouth invoked state law in an attempt to shut down a Wi-Fi network relied upon by storm-ravaged New Orleans residents after Hurricane Katrina. BellSouth's challenge demonstrates just how much is at stake for such companies in preserving the privatised character of digital information enclosures.

More often than not, public deliberation over the regulation of digital enclosures focuses on increasingly vexed privacy rights claims — hobbled not least by the apparent willingness of the public to relinquish them so casually. The model

of digital enclosure considers why this willingness might seem so prevalent by foregrounding the property relations that allow data collection to appear as the result of a 'free exchange' that entails willing submission to multiplying forms of monitoring. When, for example, all retail outlets implement forms of electronic surveillance and payment, the 'freedom' to avoid monitoring becomes, in practice, a theoretical one. Consumers will be free not to divulge information about themselves as long as they don't buy anything. Users will have the freedom to access their data and become online publishers as long as they submit to the verification procedures and data-gathering regimes of those who control the enclosure. In anticipation of this prospect, it is no longer enough to call for the cultivation of participation as an antidote to the undemocratic character of mass consumer culture. Perhaps the most important implication of the model of digital enclosure outlined in the preceding pages is that participation needn't necessarily be progressive or empowering. After all, sweatshop workers and child labourers *participate* in the production process. This doesn't mean they control it. The challenge facing those of us who would like to see the democratic potential of interactive technologies actualised is to distinguish forms of participation that facilitate control and surveillance from those that enable deliberation and power-sharing. The all too familiar critique of the industrial-era mass media as being top-down and non-participatory has led to an uncritical embrace of participation in all its forms. Just as we remain critical of attempts to equate democracy with the market, we should interrogate the assimilation of participation in the commercial sphere with political power-sharing. This assimilation — with only occasional qualifications — has become the trademark of media scholar Henry Jenkins, who once observed that 'the [participatory fan] response to reality TV teaches modes of engaging critically with television that may slide into activism around the Iraq war' (Jenkins, 2006b). The equation of willing submission to economically productive forms of surveillance with participatory empowerment is highlighted by Jenkins' criticism of the ending of the movie *The Truman Show*. According to Jenkins, the movie doesn't take account of the fine opportunity that has been handed to Truman — a character whose daily life, unbeknownst to him, doubles as value-generating labor by providing the content of a popular TV show: 'It never occurs to anyone that Truman might stay on the air, generating his own content and delivering his own message, exploiting the media for his own purpose.' (2004: 37) By the same token, it doesn't occur to Jenkins that Truman's newfound media power is strictly delimited by those who own the networks and control both the enclosure that has become his world and every detail of his public portrayal. To argue that Truman is empowered by the architecture of media control he inhabits is to reproduce the paradox of what Žižek describes as the process of mediatisation, whereby the subject is 'imperceptibly stripped of his power under the false guise of its increase' (1999: 15). In celebrating this mediatisation process, Jenkins (2006a) echoes the marketers of the digital enclosure, a fact which helps explain why he dismisses those who critique the privatisation of information resources as 'critical pessimists'. It is perhaps not surprising that attempts to naturalise the private enclosure of public networks take place at a time when the technology makes

it easier than ever before to create collaboratively controlled public information spaces that facilitate free and inexpensive information sharing and communication. The model of digital enclosure highlights the socially constructed character of networked interactivity — we have choices, as a society, about how to build and manage interactive technologies. In making such choices, we must consider the costs of convenience and the unfreedom of ‘free exchange’ in order to start thinking outside the privatised digital enclosure.

Note

- ¹ As of this writing, Google’s original proposal for free Wi-Fi in San Francisco has fallen through, after the withdrawal of its partner, Earthlink, but the company still claims to be interested in finding a new partner for the plan (Nuttal, 2007).

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