
Cotton to Computers: From Industrial to Information Revolutions

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INTRODUCTION

In the summer of 1998, Manchester City Council coordinated a series of celebratory events in and around the city centre, to honour (and generate) the memory of a machine: to be specific, a computer dubbed ‘the Baby’. This was the first electronic computer to be built with a working stored program, and it was fifty years since it had been persuaded finally to calculate something by its designers, who were based at the Victoria University of Manchester. The celebrations included building a precise replica of the machine, at a cost of over 1 million, as well as a full programme of artistic and museum displays, theatre performances, exhibitions, conferences, and parties, all focusing on the theme of information technologies. A range of Manchester’s more established institutions—universities, museums, media organizations, and the electronics manufacturer ICL—all committed resources and organized events.

The computer in question was rarely called ‘the Baby’ in 1948; the name evoked a sense of historical ‘natural’ origins intended by the coordinators of the 1998 celebrations.¹ The underlying point from the city’s perspective was explicitly the promotion of an image of Manchester as a key player at the birth of the current Information Revolution, just as it had been a key player in the origins of the Industrial Revolution.² History was being mobilized by the city’s institutional

¹ Interestingly, this habit of seeing early versions of computers as ‘babies’ has not been restricted to Manchester and the stored-program computer. See, for example, Downey’s account of the historiography of CAD/CAM technology, in a section entitled ‘Birth History’ (Downey 1998: 212–14). Downey traces how ideas of origins, genealogy, and ancestry are all involved in this imagery.

² The historiographical irony is that some historians understand innovation in information technologies as being a *development* of industrialization—for example Beniger’s cycle (1986) of industrialization–crisis of control–control technology innovation.

elite in a deliberate act of connection: building on school history knowledge of industrialization and then associating it with today's computer-based developments, the city attempted to justify Manchester's claims to having been one of the places, even *the* place, where the machine that pervades our lives today was first developed.

These connections and histories had to be actively drawn out, detached from alternative understandings of the past, and given precedence. There is, in fact, no necessary link between Manchester's industrial past and its contemporary involvement in information and communications technologies (ICTs). The connection had to be made, and the 1998 celebrations were a part of that effort. Why then were the city's institutional elites interested in promoting this particular claim? How did they go about establishing it? And what were the effects of their activities?

The answers to these questions, which required both archival history and contemporary ethnography, produced a story that, in one sense, is particular to Manchester. However, the aim of this chapter goes beyond description of this city's encounter with ICTs. The study provides an example of the difference it makes to look in detail at the actual circumstances and experiences of ICT developments;³ in line with others in this volume, we have approached the issue of the 'impacts' of new technologies on the social fabric of the city through detailed analysis of the discourses and practices in which these technologies are embedded. That in itself suggested that 'impacts' is something of a misnomer, implying as it does that technologies are separate from the contexts that constitute them.⁴ Evidently, the details of the case relate to the circumstances of Manchester; but the study has wider implications, two of which should be flagged up from the start. The experience of the city cannot be understood without an appreciation of ideas—of motivations, possibilities, interpretations—that have far wider cultural purchase. The people and institutions we describe were deploying ideas drawn from communicational networks going far beyond those operating within Manchester. On one level then, our work identifies key cultural tropes surrounding ICTs (the importance of continual innovation, the imperative to connect, the salience of the technical fix, the promise of virtuality itself) and shows how such ideas are grounded in specific and particular relationships (both personal and institutional) when actually deployed by people in practice. Methodologically, this cultural analysis itself has 'impacts', as it recasts the notion of the 'local social context'. The Manchester case reveals how 'context' is a highly dynamic, a contested and emergent field of social relations from which the technical can never be disengaged. One of the persistent problems with 'impact' studies is that questions about the significance of local context tend to

³ This is a point also emphasized by Cooper *et al.* (this volume).

⁴ In their social psychological study of social interaction on the internet, Watt *et al.* (this volume) also note that social context is crucial to the kinds of social interaction that occur within computer-mediated communication (CMC).

the teleological. Causal relationships are projected back into the past. Our work seeks to reverse this approach by looking instead at how people actively fashion historical significance in the present, mobilizing cultural (historically established) representations and practices as they do so.⁵ Thus, by paying close attention to the ways in which Manchester (as 'context') has been fashioned over time in relation to cultural ideas about technical innovation (both contemporary and historical), we have attempted to provide an example of how to understand the possibilities and limits of the latest technological innovations for urban regeneration.⁶

Our argument is that, in advocating the transformative possibilities of ICTs, contemporary Manchester institutional elites are continuing an established—indeed, institutionalized—recourse to the 'technical fix', a habit that is deeply embedded both locally and within modernist conceptions of the world in Western cultures.⁷ The offering of technical solutions for social problems is both popularly comprehensible in this context and politically expedient.⁸ The promises made resonate with understandings of what technologies are and what they can achieve. We will describe these understandings as they were played out in the Manchester case and show how contemporary 'technical fixes' relate to appeals to technology that have been made in the past. This relationship is crucial for understanding how the 'technical fix' is operationalized. City elites have created a particular kind of urban history, a history that selectively connects (and creates) the Information and Industrial revolutions. We argue that the repetitive mobilization of the past to justify and give meaning to new urban technology was institutionalized in Manchester by the late nineteenth century, cementing the image of *the* (original) industrial city. This had important consequences for twentieth-century civic policy, public image, and urban memory.

⁵ A parallel argument is made about organizational memory by Brown and Lightfoot (this volume).

⁶ The relationship between information technologies and contemporary urban change came under intense scholarly scrutiny in the last years of the twentieth century, mostly from sociologists, geographers, and urban planners. See e.g. Castells (1989) and Hall (1996: esp. 402–22). It can no longer be stated, as do Graham and Marvin in their excellent monograph from 1996, that the subject is 'poorly understood' (Graham and Marvin 1996: p. xiii). An explanation of the centrality of this topic in recent years should be found in disciplinary dynamics, changing funding regimes and political contexts within which the novelty of information technology has been highly valorized. This paper—written by two anthropologists and a historian—can be read as an extension and a critique of such work.

⁷ See Latour (1993, 1996) for an account of the relationship between Western culture and technology; see Downey (1998: ch. 1) for a summary of the development of the idea of technology as a 'fix', and Bijker *et al.* (1987) for a discussion of the socially constructed character of technology.

⁸ Swann and Watts (this volume) have identified this popular comprehensibility of 'innovation' as a key factor in whether or not new products will 'take off'. The existence of a 'paradigm' through which new technologies can be understood is, they suggest, important in building this 'common language'.

As the ethnographic sections of this chapter make clear, ICTs became embedded within social, historical, and political contexts in ways that ran counter to the supposed characteristics of the technologies themselves: space defying, boundary crossing, ubiquitously linking.⁹ Our argument is that, despite all the claims to ‘dislocation’, or freedom from spatial location that these technologies offer, what happened in practice in this case was a process of ‘relocation’.¹⁰ Far from removing the relevance of place, the technologies have been used to shore up the idea and presence of ‘Manchester’ as part of a deliberate policy to promote a particular image of the city: the ‘city of glass connections’ that is put forward as the successor to the centre of industrial production.¹¹

We start with the story of the Manchester Host, a publicly owned file server that was set up in Manchester in 1990. It was this project that involved several Manchester organizations in attempts to provide the city as a whole with public networked computing. As such, it provided a framework—both an ‘origin myth’ and links between groups both within and beyond the city—upon which future developments have built. Despite it being a very recent story, it has already been written up several times.¹² The people involved, many of whom are still in Manchester and still involved in telematics in the city, strongly felt at the time that they were doing something revolutionary, that they were amongst the first to recognize the potential of telematics and actually to do something about it. It is important, therefore, to say a little about what these key individuals felt that telematics could be used for, and what they believed they were involved in doing.

We then move on to look at how the story of Manchester’s relationship with public telematics was actively connected to previous technical projects. This raises the issue of how and why people make historical connections. Urban history unfortunately, and surprisingly, rarely asks whether there is in fact a necessary connection between two periods, let alone how that connection has been constructed: it is not self-evident that simply because Manchester is the place where certain events occurred in two different periods that the earlier events influenced the later ones. Urban history is a product of cities not a description. Even if influence across periods appears to occur, the form it takes and the reasons for that connection being created need to be analysed. In this case, a strategy previously used (the ‘technical fix’) was repeated and attention

⁹ See e.g. Mitchell (1995) for an explicit expression of this view in relation to cities; and Springer (1996) and Hayles (1999) for examples of how the ‘space-defying’ characteristics of ICTs entirely alter our understanding of our bodily selves and location. See also Augé (1999) for an example of the argument that ICTs ‘dislocate’ people socially and culturally.

¹⁰ In a parallel point, Cooper *et al.* (this volume) also note that ICTs are actively located by users.

¹¹ As Wittel *et al.* argue (this volume), the new economy increases the importance of face-to-face sociality as the ability to create and demonstrate connectivity becomes ever more important. In this sense location is integral to networked sociality. See also Liff *et al.* (this volume), who suggest that place does indeed continue to matter in the notion of the ‘virtual’.

¹² See e.g. Graham and Marvin (1996: 363), which draws on Manchester City Council (1991).

was drawn to the repetition, and *that* made history: it formed part of what Manchester was and is imagined to be, in its essence.¹³

Finally, we turn to the ethnographic account and compare three connected telematics initiatives: the development of the Greater Manchester Information Network Group (G-MING), a consortium set up to install and run high-speed connections between the computers of several institutions within the city; the Museum of Science and Industry in Manchester (MSIM), which attempted to make use of the G-MING network in setting up a museum project associated with ICTs; and the Manchester Communities Information Network (MCIN), a community computing project, which became involved in a European-funded ICT programme led by the City Council, through which it was charged with setting up public access 'kiosks' in Manchester. These provide examples of the now oft-observed fact that technology is not separate from the social conditions in which it exists.¹⁴ But, more than that, we suggest that technologies are not separate from the *spatial* conditions in which they exist either, something that is particularly significant in the case of ICTs, which are supposed somehow to erase the relevance of space and place.¹⁵ In each case, a combination of understanding of these technologies, pre-existing relationships between those involved, and the context of Manchester itself deeply informed how the introduction and use of ICTs was experienced in practice. If anything, the use of ICTs reiterated spatial divisions and distinctiveness rather than assisting in ameliorating them.

To that extent, the technologies were used both to shore up an idea of what 'Manchester' was supposed to be and to reinforce pre-existing distinctions and divisions within the city. However, and this is important, that is *not* the same as saying that ICTs failed to change anything. Rather, it is to say that what changed was not due to the 'impact' of these technologies, but more to do with the kinds of connections people and organizations forged between themselves, the constructed past and imagined future, their spatial location *and* the technologies.¹⁶ Making such underlying processes visible is one aim of this chapter, so that changes that do occur along with the introduction of ICTs are understood in their historical and spatial context, rather than described in terms that simply

¹³ In Gourgouris's terms (1996: 15–16), this process is similar to the generation of the idea of 'nation'; the 'technical fix' becomes part of what was always already true about Manchester, a timeless truth about the way Manchester 'is', as a place.

¹⁴ See e.g. MacKenzie and Wajcman (1985) and Downey and Dumit (1997). Studies that imply such a separation include most 'impact studies'—e.g. Mitchell (1999) and Slouka (1996).

¹⁵ See Smith and Agar (1998) for further discussion of science, technology, and location.

¹⁶ This appears to be somewhat similar to Downey's comment (1998: 21) that 'impact studies' ignore 'the process of technology development itself, including the so-called "knowledge contents" of the technology. They keep hidden the complex activities of technological development, leaving decision makers both invisible and in control.' However, our argument goes beyond this point, in that it focuses on the relevance of *place and location* in these 'invisible' processes; Downey's point relates to the experience of machine–person interactions, and to that extent has no need of the history or location of such interactions.

reiterate cultural rhetoric about technology and its effects. One element of such rhetoric, related to notions of novelty and innovation ('there has been nothing like it under the sun before'), precisely generates ICTs as somehow history resistant and context resistant.¹⁷ This chapter, by analysing the histories and contexts of the introduction of ICTs in Manchester, attempts to reach underneath such rhetoric.

And what of virtuality?¹⁸ Ironically, if anything was 'virtual' in this research, it was the idea of Manchester itself. Indeed, as new possibilities for the social organization of the city were debated in relation to the potential impacts of ICTs, the 'city' itself emerged as a highly contested location,¹⁹ particularly in relation to how the city was represented in bids for development funding. Attempts to fashion Manchester as an 'information city' highlighted the competing versions of both contemporary Manchester and the relevant historical Manchesters through which such versions sought to legitimate themselves.

THE ORIGIN MYTH: THE MANCHESTER HOST STORY

The Manchester Host story begins, according to most accounts, in the late 1970s/early 1980s at the University of Sussex, where a group of students who had come to know each other through their involvement in socialist politics shared an interest in the potential of networked computing for the international labour movement.²⁰ In 1983, some of these friends founded a company in London called Soft Solutions Ltd, a worker's cooperative, which developed software, but also came up with the idea of an alternative to Prestel, which had been launched by the Post Office in 1979.²¹ Others of the group, and two in particular, left the south and moved up to Manchester, where they began to become involved in both city council politics and the trade-union movement. Meanwhile, Soft Solutions approached the then left-wing Greater London Council, proposing an alternative to Prestel; eventually, a grant was agreed. The new service, Poptel,

¹⁷ This kind of notion is not a view that is held so much as an assumption from which various culture-specific views are formed. See e.g. Shawn Wilbur's exploration of this issue Wilbur (2000).

¹⁸ We refer here to the representational and referential notion of virtual reality in which there is 'an attempt to match experience with a series of representations, to copy the shapes of external realities, and to make participants live these copies as if they are real or actual' (Kapferer 1997: 181).

¹⁹ At one point there were two entirely independent and quite distinct 'virtual Manchesters' on the Web.

²⁰ We are grateful to Steve Walker for adding corrections to an earlier version of this chapter on this point. Walker was one of the students in question.

²¹ At the time, there was also the Post Office's Viewdata. Further, the French Minitel experiment, which had its user trial between 1981 and 1982, provided an example of a more interactive and popular provision of electronic services. See Cohen and Walsh (1995) for details of the Minitel experience.

began by selling an e-mail service, mostly to trade unions, and by 1989, the turnover from this was as high as Soft Solution's software business. Poptel acted as the UK agents for GeoNet—a PC-and-modem system for electronic mail and databases (Lane 1990: 40).²²

Several members of the original group had by this time secured jobs in Manchester, at the City Council and at what is now Manchester Metropolitan University (MMU), where the Manchester Employment Research Group, later renamed the Centre for Employment Research (CER), was housed. CER was asked by one of the group who now worked for the council to do a feasibility study for setting up a public e-mail service in Manchester. The underlying motivation for the public e-mail service, which was supported by CER, was (in contrast to, say, the alternative of business-focused Teleports) to help forge links within the international labour movement.²³ But another formal aim was added at this point, as Manchester City Council was now involved as a sponsor of putting the project into practice: the council's main role was to serve the people of Manchester. The public e-mail service was going to have to serve Manchester's public, whatever it may or may not do for the international labour movement. The council also made support conditional on Poptel moving to Manchester. Thus the Manchester Host, run by Poptel and sponsored by the council, started with at least two (different) underlying aims, neither of which was about commercial profit.

CER's feasibility study for the council suggested that one public use for this service could borrow the idea of setting up 'electronic village halls' from Scandinavian countries—that is, providing local communities with access to telematics via a community centre housing a cluster of computers with modems. Following a call for tenders, three bids were accepted, and subsequently Bangladesh House, built up from a pre-existing Asian community centre, Chorlton Workshop, built up from a pre-existing Chorlton community centre, and the Women's Electronic Village Hall (WEVH), an entirely new venture, were founded to serve their respective 'communities'. All three were initially located in the same area of south Manchester, although the WEVH later moved to a more central location.

²² Lane shared many of the ideals of Poptel, especially an interest in getting non-commercial and non-governmental organizations online. GeoNet Mailbox Systems GmbH was founded in 1981 by the Brunswick-born Guenther Leue, who had worked since 1953 for a large American computer manufacturer. GeoNet's strategy was based on 'distributed processing' to share systems across a network. This meant relatively cheap services, which in turn meant that, even though GeoNet was a private company, it was one of the first companies that could sell its e-mail services to cash-poor organizations, in particular small to medium-sized enterprises (SMEs) and political groups. By 1994 GeoNet had grown to include many 'hosts' from America to Siberia.

²³ Note the contrast between these developments and those only thirty miles distant in Sheffield, described by Hakken (1991), where 'computerization was used by public officials... to justify the view that traditional forms of trade union struggle were an anachronism in an information age. These public officials simultaneously pushed legislation that undercut the powers of trade unions'.

The underlying political project of linking the international labour movement together through the host initiative did not initially fade from view.²⁴ However, the host did not achieve that goal, and by 2000 no longer existed, having been funded for only five years and not subsequently refunded. Not much is now said about the international trade-union movement, as Poptel soon moved away from its earlier political ideals (a source of tension within Soft Solutions) and now, like Prestel, is a small internet service provider.²⁵

However, the international focus provided by pre-existing links with international labour organizations did have some consequences. Once the initial funding was provided, telematics links were rapidly made with groups in Bulgaria and St Petersburg, with which Manchester is twinned, but also in European Union member states. The connections to the EU were later used to great effect to attract European funding for further projects.²⁶ In 1994, Manchester became a key member of Telecities, a consortium of over fifty European cities involved in developing telematics strategies and links throughout Europe (Carter 1997). Three years later, the city helped to initiate Infocities, a consortium of seven cities that were provided with funding to experiment with and share information about high bandwidth applications across their networks; and the existence of the host project has been acknowledged to have influenced Brussels's view of Manchester's 'advanced' position in telematics, which has apparently helped a range of projects, including the G-MING project, to be funded with European money.²⁷

In short, gaining a reputation for being an 'information city', however successful or unsuccessful the host project was in retrospect, has opened a fairly substantial avenue into European funding. In that respect, the presentation of Manchester as being (once again) on the 'cutting edge' of a technological revolution has most certainly paid off. Under such circumstances, we can begin to see how and why so much money was spent resurrecting 'the Baby' in 1998.

Finally, the host project shaped alliances and divisions within the city, alliances and divisions that were central to the way public telematics was introduced, and that remain active. The importance of this point is related to the way funded projects such as Infocities relate to different parts of the city. The Manchester Host, not having been initially motivated by the dynamics of the city itself but by the international labour movement, later being incorporated into the city via council funding, but rapidly moving on to being funded by Europe and consolidating its links with MMU, led to a very particular kind of location within the city. It was one that was markedly based on the rapidly 'urban regenerating'

²⁴ See e.g. *On-Line News*, 4 (Winter 1994), 4. *On-Line News* was the host's users' newsletter.

²⁵ Steve Walker, personal communication, 23 Feb. 2000.

²⁶ Indeed, some of the founders of the host, who subsequently left, said that this development was one of the reasons that they left: the host appeared to have become an effective vehicle for raising European funds, and became rather distant from its original aims as a result. Steve Walker, personal communication.

²⁷ Dave Carter, interview with Penny Harvey and Sarah Green, 1998.

city centre and, more recently, on the arts and music industries based in that area. It was not focused on the more economically deprived areas such as Moston in north Manchester, where MCIN, discussed below, was based.

This sketch of the more recent origins of Manchester's relationship with public telematics illustrates a fairly straightforward point: that ICTs do not simply 'appear' in a place. They are made to appear, and much work had to go into accomplishing that impression. This inevitably means that how they appear will be associated with the motivations and perceptions of those who work to put them in place, which also means they will be located and perceived as being connected to particular people, organizations, interests, and so on. And, as the City Council has played such a key part in this story, we now turn to the municipal mobilization of history, the way in which Manchester has repeatedly constructed itself as a city of 'technology'. Such associations make it appear 'natural' that Manchester should embrace ICTs; but, again, much work had to go into that impression.

MAKING HISTORICAL CONNECTIONS

A brief sketch of the history of Manchester will enable several important points to be made. The first industrial 'shock city' rapidly expanded from the mid-eighteenth century in conditions that many authors have noticed as being relatively unregulated (although other more regulated cities also grew). Historians have cited this lack of regulation, environmental advantages, and early specialization in cotton as reasons for Manchester's growth (Briggs 1968); (Kidd 1996: 21–36). By 1838 Liberal agitation had achieved a measure of political independence for the city, and the Manchester Corporation was set up as a local government body to run the city's own affairs. At this point, free-trade liberalism was in the political ascendant, and the corporation acted to protect the city's businesses from too much regulation. However, in the later nineteenth century a quiet revolution occurred, with the corporation taking on more and more roles, in particular providing more services and building very large technological projects requiring massive quantities of capital. As Kidd (1996: 154) asks: 'how and why did the living symbol of free trade succumb to corporate provision on such a scale?' Why, in other words, did the city renowned for free trade become dominated by a centralized and powerful local government? The solutions he gives to this paradox are only partially satisfying: the practical advantages of good utilities overcame liberal doubts, an argument that civic responsibilities gained 'a momentum of their own', and an acceptance that the city's public institutions, rather than industry, should provide technical and further education.

During the nineteenth century, Manchester's corporate growth is well described as 'imperial'; both in its relations with the world (the city was a centre of

trade links that stretched in the case of cotton from the southern USA, the Caribbean, and the Levant for raw cotton, to worldwide markets such as India) and with neighbouring authorities, the corporation absorbed a succession of smaller townships (Redford and Russell 1940; Rose 1996). In the early to mid-twentieth century, corporation activities were marked by the extension (and professionalization) of 'planning', best illustrated by the new 'garden suburb' of Wythenshawe and the first industrial estate, Trafford Park, and to public celebrations of municipalism. Post-war Manchester saw decline, in the cotton industry particularly. However, new urban technological systems were still significant, especially the expansion of the airport and road systems, such as the peripheral motorways that eventually encircled the city, and inner-city 'fly-overs' such as the Mancunian Way opened by Harold Wilson to gushing praise in the press announcing Manchester as the 'super space city'.

The history of Mancunian technological systems forms the basis for a series of claims. First, public bodies in Manchester have been the most significant local agent of technological systems growth. For example, Manchester is quite unusual in that the gas supply was publicly owned, after great struggle, from the early nineteenth century. Revenue from this municipal monopoly was used to bankroll other projects, including new technological systems (Turner 1994). The corporation developed water supply systems on a massive and politically sensitive scale: urban control stretching out to reservoirs built eighteen miles east in Longdendale in mid-nineteenth century, and 100 miles north to Thirlmere in the Lake District by the late nineteenth century (Redford and Russell 1940: ii. 171–204, 333–52). Sewerage, and connected public health systems, were publicly run. The greatest of all the city technological projects, the Manchester Ship Canal, which sought to connect inland Manchester to the Irish Sea, thus cutting out Liverpool dock charges, started as a private initiative but finished in 1894 as a public project (Farnie 1980; Owen 1983; Harford 1994). These nineteenth- and twentieth-century schemes contrast sharply with older projects, such as the Bridgewater Canal, built in the eighteenth century, and the first modern canal, which were private ventures. Second, during Manchester's period of imperial growth, technology was a crucial tool in inter-authority politics. Access to gas, for example, was used as a lever for persuading smaller local authorities to merge with the corporation. If a technological system necessarily passed through another authority (for example, clean water from the Lake District, or the Ship Canal through Salford or Cheshire), the process of negotiating agreement over access tied neighbouring authorities to Manchester. This technological strategy in inter-local authority politics developed early compared to other UK cities.

Third, while the major historiographical theorization of technological systems, the model put forward in *Networks of Power* by Thomas Parke Hughes, stresses the work of private inventor-entrepreneurs in the early phases, in Manchester, in a way that would be entirely alien to Hughes's private entrepreneurs, technology was closely bound to strong local commitments to 'self-government',

and therefore public bodies (T. P. Hughes 1983: 14). The liberal free-trade economic philosophy that was espoused by the Manchester political elite celebrated 'self-government', to which Alfred Waterhouse's gothic Town Hall of the 1870s is a monument. Publicly developed and owned technological systems were not seen as inimical to the creed; *indeed for the elite they embodied it*. For example, gas revenue gave them 'freedom' to pursue their projects in the city, whereas the ship canal was a bid for 'freedom' from Liverpool dock rates (in Hughes's terminology these were 'reverse salients').²⁸ In this way we can resolve Kidd's paradox: the reason that the city of free trade had succumbed to corporate provision on a large scale was because technological systems became the physical representation, the embodiment of the city elite's liberal virtues of self-government—there was, for them, no contradiction.

Finally, there was a curious feedback effect. Self-governance might have become embodied in technological systems, but incorporating the management of these systems also altered the administration. Redford, for example, argues that

in the early [1870s] some members of the City Council and some officials of the Corporation realized the complexity of the problems which they had to face. The civic machinery was beginning to be reorganized in such a fashion as to centralise the general control of administration, while leaving the separate departments adequate freedom in the organisation of specialised work. (Redford and Russell 1940: ii. 294)

Thus as governance and technological systems became entwined, local bureaucracy grew, a trend deepened by legislation such as the Local Government Act (1888), which placed more responsibilities on the shoulders of the corporation. The organization of the city was also subject to extensive external criticism—for example, from Beatrice Webb and the journalist Joseph Scott—which hastened change.²⁹ Intermeshed with these factors was the growth in the city's population, growth encouraged by the attention to infrastructure paid by the corporation. Overall, bureaucratic centralized power in Manchester grew, and at the heart of the transformation was an identification of technological systems as a source and tool of local power, and a symbol and example of urban order.

The consequence of these developments was that technological systems became highly significant for the image of Manchester. This argument differs from the usual explanation that Manchester was the first industrial city, and

²⁸ M. J. Turner (1994) is right to stress that the struggle over gas ownership was a conflict over governance; our point is that governance; and the technological systems are intimately connected.

²⁹ Redford and Russell (1940: ii. 430–1, 443). Another example is Horsfall in 'The Government of Manchester' (1895): 'A very imperfectly governed town' which 'expressed only the worst qualities of our race, our disbelief in the need of a system, our belief that the most difficult work can be well done by untrained people.' The tide of criticism led to the publication of the *Manchester Municipal Code*, six massive volumes by 1901 and five supplementary volumes by 1932. Agar has argued elsewhere that the process of making rules explicit, especially in government, is often connected to mechanization. See Agar (forthcoming).

therefore it was identified with industrial machinery: the public image of Manchester had to be fashioned by public bodies, and public bodies had to have a good reason for doing so. The good reason here was the way in which it could be used in local politics, in particular as cause and effect of the city's elite's liberal values of self-government. From the late nineteenth century onwards, this technological representation of Manchester was recycled and mobilized for the purpose of justifying further projects: the Manchester Ship Canal, for example, was portrayed as a means of *restoring* commercial prestige, by doing something old—building canals—now new. At a time of perceived competitive slippage, Manchester planners turned to a very expensive technological fix and over time this reaction came to be seen as inevitable, as part of the substance and inherent character of Manchester: it came to be institutionalized. In the process the role of technology also had to be historicized. It is not entirely unconnected that the Industrial Revolution as a historical event rather than as a tag for contemporary radical change was an invention of the late nineteenth century.³⁰

The institutionalized technological fix has survived in Manchester's public institutions. Some more recent examples are the high priority given to the airport in the post-war period in another period of perceived local economic decline, or the optimistic rhetoric of the 'second industrial revolution' of the 1960s (the public promotion of private corporations, such as MetroVicks, Ferranti, ICI, Courtaulds).³¹ The G-MING project, discussed below, was justified by rhetorically connecting to past systems: like the Ship Canal, it would supposedly 'pipe prosperity' back into Manchester. With the 'Birth of the Baby' this historicizing process has been taken to another level.³² The remarkable project to rebuild an identical replica of the first stored-program computer marks the *absence* of a thriving computer industry in the area, while expressing a hope for future prosperity—either for computing (the University of Manchester's interest) or more likely cultural heritage (the City Council's and the MSIM's interest). It is, therefore, a cargo cult, an attempt to create something out of nothing through the belief that the assertion of the possibility is key to a successful outcome.³³ And resources continue to flow into Manchester: in 1999, a year after the well-publicized celebrations, a Cray T3E-1200E, financed through a public-private consortium and then the fourth fastest supercomputer in the world, was installed at the University of Manchester.

There has thus been continuity in the connection between Manchester and technology, a connection made for a particular reason. This continuity justifies

³⁰ In Britain, Industrial Revolution as a past historical event, lasting between 1760 and 1840, was promulgated by Arnold Toynbee in 1884 in his *Lectures on the Industrial Revolution in England*. See Hudson (1992: 11).

³¹ For the 'second industrial revolution', see Kidd (1996: 189).

³² Discussed in greater detail in Agar (1998).

³³ The use of the phrase 'cargo cult' is here used in its popular understanding, rather than its more complex anthropological meaning. See e.g. Kulick and Stroud (1990).

the study of urban history when thinking about recent or contemporary change. However, it is important to stress that the continuity exists because historicity is built into contemporary understandings both of the city and of the technologies, which would otherwise be stratigraphically unconnected. The process has been selective, remembering certain past events (the Ship Canal) but not others (Peterloo), but the creation of historicity was crucial to the actions of local institutions.

This historical account has demonstrated the particularities of, and the justification for, making connections between the city and the Information Revolution. The question that remains to be considered is the *content* of the concept of the 'technical fix' in the current period in Manchester: what happens in practice, within social networks and across different groups in the city, when the new information technologies are actually introduced? In order to get at this issue, three examples from the ethnographic research will be introduced here. The first, concerning G-MING, continues the story where the host left off, and looks at the conditions that led G-MING to have to confront the (non-technical) issue of 'users'; the second, about the MSIM, looks at the way much wider cultural understandings of the 'technical', particularly the idea of technology being 'autonomous' or 'neutral' with respect to the social context in which it is applied, confronts the practicalities of having to be *somewhere* and for *someone*; and the third example involving the MCIN, considers what happens when you are located in the 'wrong' place.

G-MING: TECHNICAL FIX MEETS SOCIAL LOCATION

The G-MING network was funded in 1994 under the EU's 4th Framework to the tune of 2.9 million Ecus, with Manchester securing one of only four such funded networks.³⁴ It 'went live' in 1995, and was conceived as an academic fibre-optic network that would gradually grow to become a Metropolitan Area Network 'serving a wide range of non-commercial uses, covering schools, colleges, libraries, advice centres, hospitals, health centres and residential homes'.³⁵

As a project, G-MING was not presented by anybody as ground-breaking or innovative in the way the host was, but it did enable Manchester to build new projects (and acquire new funding), particularly in the fields of telematics and cultural heritage. The initial funding was acquired because of Manchester's

³⁴ This was related to an overall European strategy to develop an 'Information Society' in Europe. See CEC (1993) and the Bangemann Report (Bangemann 1994).

³⁵ Carter (1997: 150). Ironically, given the later tensions that we discuss, Carter expressed hope that G-MING would serve to connect: 'the challenge here is not the profit motive of multinational corporate decision-making but rather an inherent conservatism and elitism within higher education institutions that sees developments such as this as enhancements to internal systems rather than an essential element of wider urban and regional development.'

established reputation as a city that could and would 'grow' the uses for such technologies, a potential that certain people in the council were quick to exploit when the opportunity arose. The rationales that were mobilized for the location of this network in Manchester were the issues that preoccupied all the Telecities partners—that is, how to regenerate the urban centres of post-industrial cities. The G-MING funding thus brought with it an implicit connection to the Telecities agenda to harness telematics to the cause of promoting 'cities' as attractive places to live, to try to get people to use the city 'in more flexible ways', and to repopulate the city, treating city centres as new suburbs. For Telecities, in order to do this it was very important to build networks, to put in the physical connections, to invest in real infrastructure. Furthermore, this was a grant that required matched funding. The key partner who came in with this funding was Norweb, the local electrical services provider. Finding its core business heavily regulated, post-privatization, the company was looking for alternative sources of income and was quick to use its established name as a reliable, local service provider to move into the growth market for telecommunications. Norweb was particularly interested to develop a market lead in carrying high-bandwidth applications. The company's key interest in its involvement with G-MING thus seems to have been the hope that, through G-MING, it would, first, boost its image as a high bandwidth telecommunications provider in the north-west and, secondly, learn more about the kinds of applications that people might want to use these networks for in order to expand its customer base. G-MING's 'customers' were limited to their funded commitments to various public-sector institutions—initially the universities, then the City Councils of Manchester and Salford, the MSIM—and more recently hospitals.

G-MING as an organization formed around people with strong engineering and computer science backgrounds, unlike the charismatic and politically motivated creators of the host. In 1998–9, it was presented in public for what the network offers in terms of speed and bandwidth: 155 million bits per second, 5,000 times faster than a standard modem dial-up connection. They emphasized that they had the infrastructure to cope with huge numbers of users and with applications that need speed. G-MING, like Norweb, was less sure about how these capacities might be required by genuine commercial users, and it tended to discuss applications in terms of generic services rather than specific uses: video conferencing, real-time video, desk-top conferencing, web caching. And, while committed to the premiss that the most important thing was to find 'users', as users directly represented the ongoing funding base for such technological projects, there was also a strong sense that 'you have to know there is a solution as well as a problem', and in that sense the technological 'solutions' came first.

Despite this overt technological focus, there was also a sense that G-MING was a located service, operating for the people of the north-west. In demonstrations of their work, representatives of G-MING always represented themselves as north-western, and the name itself (Greater Manchester Information

Network Group) was a reminder of that. The local benefits were seen as threefold. In the first place, there was an explicit recognition that the existence of an area network could help produce a regional base to extract public money in a European context, where metropolitan regions are seen as a key focus of expenditure. Second, one of the reasons why money went to money in this way was because the network represented a concentration of technological expertise, both in running the network and in being able to advise others in terms of equipment, installation, and programming. Finally, Manchester users could, through this network, should they so wish, get more information at 'reasonable' access speeds.

It was not long before G-MING was used to draw more money into the city from Europe. The Infocities project, which began early in 1997 and involved a consortium of seventeen European cities (a subgroup of Telecities), was jointly managed, for Manchester, by G-MING and the City Council. Manchester was the lead city for 'Culture'—developing and testing applications—one of which was located in the MSIM. The link seemed very promising in the cargo cult atmosphere that we described above: the coupling of computing and cultural heritage seemed set to deliver new users, both to the MSIM and to G-MING. However, the relationship between the museum and G-MING was problematic and provides us with a clear example of how technologies become embedded within social, historical, and political contexts, often despite the technologists, best efforts.

THE DISPUTED SOCIALITY OF TECHNICAL NETWORKS

The Museum of Science and Industry in Manchester (MSIM) is an unusual organization. It grew out of an earlier foundation, established at UMIST in 1969, with a strong academic bias and a mission to use its collections of industrial artefacts to explain and teach visitors. Strictly speaking, the MSIM dates from 1983 and in more recent years it has worked to embrace a more communicative approach. Operating since 2000 as a charitable foundation, it aims to integrate itself into the fabric of the city, to become part of the city, a resource for more general public use.

In 1998 there were still tensions within the museum between the idea of the museum visitor as passive consumer of expert knowledge, and the visitor as a person who brings his or her own experience (and expertise) to what is conceptualized as an interpretative and interactive process. Backed by extensive visitor research, the new approach within the museum had the upper hand, and visitors were encouraged to touch and feel, to get personally involved in science, thoroughly to mix the social and the scientific, and to produce new unexpected artefacts from the fragments of past industrial production. ICTs have in many ways worked as catalysts in enabling a conceptual move away from the idea of museums as places where objects are (re)-stored, held, and displayed—to

places where the relationships between people and objects are brought out and explored. And, as in many contemporary museums and science centres, visitors are encouraged to think of knowledge as experiential, the machines as expressive and communicative (P. Harvey, forthcoming).

In June 1998, the museum opened 'Futures', a new gallery, which traces the history of communications from the railway, through telephony, the birth of the computer with stored memory to the contemporary networked society. In fact, the entirety of the Futures gallery was based around 'the birth of the Baby', which, after it had been rebuilt at the University of Manchester, was to be permanently located at the museum. The progression from the Baby to the contemporary 'networked' world is represented in various ways, but includes a suite of networked PCs for public use. G-MING, through the Infocities connection, installed the network.

However, there were problems: most importantly, it did not work. At one time, every time the machines were switched on at the museum they were rebooting the whole of the University of Manchester. The server was continually crashing. Museum staff were very frustrated that their new exhibit was basically 'out of order' before it had even opened. A tense but interesting relationship developed between G-MING and the museum, for what emerged in the dispute was a clash over fundamentally divergent ideas about responsibility, about the nature of networks, and about the way in which the user-provider relationship was conceptualized. It is this lack of fit to which we wish to draw attention.

The museum staff understood G-MING to be the provider of a service. They expected G-MING to communicate with them about their needs and constraints, to understand how they wanted to use the network, and to take the technical decisions accordingly. G-MING did not see it in the same way. The G-MING staff saw themselves in this context as technologists; when the network failed, their analysis of the situation was based on two related ideas: that human beings cause problems through lack of understanding and interference, and technologies offer solutions to problems.³⁶ Thus, while G-MING was able to acknowledge that the problem might well be a human one, the solution would be technical. Within this scenario, there were various possibilities: had the museum purchased the wrong 'switches', or had these 'switches' been configured wrongly? Alternatively, the problem might well have been technical: was there something in the way that these 'switches' operated that caused an automatic and unsustainable volume of 'traffic' over the network, such that the system crashed each time anyone tried to use it? In any event, it was clear that, as far as G-MING was concerned, there was no need to consult with the museum over the solutions, although it seemed likely to G-MING staff that the lack of technical expertise within the museum was largely to blame for the wrong

³⁶ See Downey (1998) for an excellent ethnographic study of this approach towards technology; and see also Traweek (1988) for a study of technologists' habit of giving sociality to their machines, rather than to the people for whom the machines are theoretically built.

configurations that were causing the problems. Within this more technical framing of the situation, the relationship between user and provider is more hierarchical and one way. The provider offers a technical solution to an ultimately passive user, for the user is not required to take an active role for the solution to work. In this scenario a user has 'needs' that the technologists then respond to, and those 'needs' are understood in very abstract terms, as something generic, which manifest themselves in use. In this idiom, the technical fix can in fact produce prior needs, via a kind of functional teleology.

Not surprisingly, real 'users' saw things rather differently. Museum staff saw G-MING as having emerged from the social agendas of the EU, and furthermore as having been paid for locally out of the Infocities budget. They were expecting a far more personalized service than G-MING was in fact offering. They saw themselves as an example of the kinds of 'users' who had motivated the technical development, and were inclined to test the efficacy of that technology in terms of how effectively it worked for them, to what extent it met their specific needs. It was thus axiomatic to them that they would be involved in all discussions over the problems that they were having, as only they, as users, could know when they had got what they wanted.

It became clear that the museum and G-MING had different understandings of what the information technologies were ultimately for. The museum staff's interest was in the 'communicative' potentials of these technologies; their understanding of a network was of a linkage of persons and machine, of distributed responsibilities and dynamic outcomes. G-MING's interest was in providing the hardware for other people to do things with; what other people did was largely up to them. The G-MING staff did not pretend to understand that, nor were they particularly interested, beyond their need to identify users in order to find new markets for the network. In a forum for users from the cultural sectors of the city, one of the G-MING managers presented the Manchester Area Network (MAN) as 'a Manchester MAN for all reasons'. He added that this allusion to the nineteenth-century stock literary figure, the 'Manchester Man', would be all that he had to say about culture.³⁷

In the G-MING concept the agency of the technologists (or the machines), and the agency of the users are not of a kind. The technologists have knowledge and expertise and are thus able to construct and link machines, which in turn are able to perform certain kinds of machinic activities. Users can take advantage of these machines to do whatever they might want to do. G-MING can thus be seen as fulfilling its project of using technologies to stimulate change, while perpetuating integral and mutually exclusive human and machinic agencies.³⁸

³⁷ For 'Manchester Man', see Kidd (1996: 72–3). The contrast was between the 'Liverpool Gentleman' and the coarse self-made 'Manchester Man'. Examples are Dickens's Josiah Bounderby and Thomas Gradgrind in *Hard Times*, and, far more sympathetically, G. Linnaeus Banks's eponymous hero. The G-MING manager's self-deprecating joke is an insightful one.

³⁸ The question of how G-MING employees regarded *themselves* and their agency with respect to the machines is another matter, and one that is not touched upon by this chapter.

The museum, on the other hand, was working with a very different understanding of 'network', one that links humans and machines in mutually constitutive relationships of possibility, in which science and politics are thoroughly entangled, and in which agency depends on exchanges of information and expertise.

This example has drawn out the way in which different notions of the technical confronted those of practical application; it remains to consider how the way in which ICTs were 'located' in Manchester resulted in an inability for those technologies to do what they apparently do best: connect across a distance.

THE DISPUTED POLITICS OF TECHNICAL NETWORKS

The Manchester Community Information Network (MCIN) was founded in 1993, only a few years after the Manchester Host, and on the surface, it appeared to be doing what the formal intentions of the host project had in mind. MCIN had the official aim of bringing together 'community information' from diverse places, to reduce duplication of this information and to make it as widely and as transparently publicly available as possible, both on the internet and via a network of public access points in places such as libraries, Asda supermarkets, and the Manchester office of the *Big Issue*. The underlying idea was to make public information accessible to people who would be highly unlikely to own a computer, or even have any interest in doing so.

What brought MCIN into conflict with the Infocities project were not these formal aims, but the organization's history and involvement in one particular part of Manchester, Moston. Before its involvement in ICTs, MCIN had a previous life as a community mental health services project in Moston, one of the more economically deprived areas of the city in north Manchester. MCIN remains strongly based in north Manchester, where its offices and most of its public access points are located, despite its public aim to serve the whole of Manchester. This places the centre of MCIN's activities outside the 'urban regeneration' area of the city centre, where the post-host projects are focused, and its history also places it outside the 'centre of gravity' of the council's telematics strategy, born of the host experience, combined with the influence of EU strategies.

An IT consultant company, Sema, first involved MCIN in Infocities. Sema had been given a small contract by the council to set up six multimedia kiosks in Manchester, and six in Barcelona. The company then contracted MCIN to develop the content for the six machines in Manchester, and this project was included under the Infocities umbrella. So, in fact, MCIN never did have an

Again, see Downey (1998) for a thorough ethnographic treatment of the idea of agency with relation to machines and those who use them (in that case, computer-aided design systems).

unmediated relationship with Infocities. The project's manager and her only co-worker, who fixed bugs in the software, repaired the machines, and developed the web site, regarded it as a fundamental responsibility of the council to make the advantages of new information technologies accessible to everyone in Manchester. The manager was keen on involving 'members of the community' themselves in designing what kind of information should be provided, and, for her, this meant going out to meet people and becoming a part of the community. Her perspective on ICTs was that they provided an improved way to get information that members of a community wanted anyway, and as such they would serve to support the continued viability of local communities. This approach explains MCIN's continued strong link to Moston: it requires the public information service to be a part of a spatially located community.

At the same time as seeing the advantages of networked computing, MCIN's manager was deeply suspicious of technophiles, and was exasperated by the regularity with which the software crashed and the machines broke down. She put this tendency down to the computer industry's habit of constantly altering and expanding the size of software, which, apart from making it unstable, meant people with small machines had no access to it, or did not understand how to use it. In fact, people running a variety of community ICT projects in Manchester often expressed the opinion that people and their computers were being over-fed with stuff that was also fairly indigestible.

There was a distinct difference between this perspective and those expressed by people involved in the host project and later involved in designing Infocities. While the founders of the host were concerned about providing access to the technology for all, their commitment was also fundamentally to the technology, and to the prospect that the technology could potentially provide a whole range of 'fixes', once the barriers of training and cost were overcome. The manager, in contrast, felt that only so much of the technology as was necessary to enhance what local communities were doing anyway ought to be used. As a result, her worries about the excesses of the computer hardware and software industries, and her geographical location within the city, gave her a somewhat marginal position within the Infocities group. When she turned up at meetings, she often said little and looked distinctly uncomfortable; when she did speak, it was in a conscious effort to remind the group of their public access responsibilities, or simply to remind them of the existence of MCIN. There was a tendency in Infocities meetings not to mention MCIN at all if she was not present. The monthly Infocities coordination meeting was held only once at the MCIN offices. People who were quite happy to fly around Europe for a meeting expressed dismay at the idea of going to Moston and had to be tempted out of the city centre on that one occasion with promises of an excellent lunch.

Things came to a head during the summer of 1998 celebrations marking the 'birth of the Baby' and Manchester's position as an 'information city'. During these events, there were to be several opportunities to display public access kiosks. Unbeknown to MCIN, the council, in partnership with the Multimedia

Centre at MMU, had entered into negotiations with an international computer company to develop a new public kiosk project. The MCIN manager discovered several days before an exhibition to be held at the Town Hall that the computer company was going to be exhibiting its kiosks, and nobody had thought to ask MCIN to do the same. At the last minute, MCIN secured agreement from the council to exhibit its machines, but this did not assuage the manager's fury about the council's failure to consult her about the bid with the computer company, which appeared to be excluding MCIN altogether.

In this example, the problems of linking MCIN's community-based approach with the dynamics of Infocities and the council led to a serious rupture, which in the end was irresolvable. In this case, the rupture had to do with fundamental disagreements about the purpose, nature, and, in a sense, *location*, of public information. The history of MCIN made it committed to a sector of the population and an area of Manchester that was increasingly invisible in both the City Council's and the EU's rhetoric about urban regeneration and ICTs. Most of the organizations we have studied experienced similar kinds of conflicts, but either had different histories that linked them to Manchester and their telematics projects in ways that were not quite as incompatible, or had shifted their ground somewhat, at least publicly, to secure the funding base needed to continue.³⁹

CONCLUSIONS

If there is one overall conclusion from the historical and ethnographic examples in this chapter, it is that ICTs are always and everywhere *actively* embedded within the social networks through which place is constituted and histories made relevant. In the case of Manchester, an assertion of what the place represented (its 'ancestry') was interwoven into the introduction of these technologies to the city. The originators of the host did not initially imagine it as being 'located', but, through its being sponsored by the City Council, it was located and associated with Manchester from the beginning. And that intimacy of association between technology and the city turns out to be an old habit, one expressed in practice through an institutionalized predilection for the 'technical fix', which itself was made to *appear* axiomatic through a particular construction of the city's past. The historiography of Manchester as having been built upon large technical projects and technological innovation (a story that goes

³⁹ MCIN did in fact survive and has even expanded. It has since secured a substantial amount of Lottery funding, and has aligned itself with WEVH in Manchester, rather than the City Council. WEVH explicitly aimed to exist independently of the types of connections and links provided by the council early on in its history. It consciously worked towards generating links between them that suited the broadly feminist aims of the organization. WEVH has, therefore, generated its own 'location' in the city, with which MCIN has been able to align itself much more easily than it did with the council.

back to even before the Manchester Corporation's activities, and the practices of particular elites) in resulted both technical solutions seeming to be 'natural' for the city, and depicted the city's political authority as being the 'natural' manager and instigator of such solutions.

Moreover, the city's more recent pursuit of 'urban regeneration', of which the promotion of Manchester as an 'information city' was a part, has been nostalgically oriented, aiming to reconstruct the city centre as the 'cultural heritage' of the Industrial Revolution. To do this with the tools provided by the new 'revolution', the Information Revolution, closes the circle, and allows the future to be firmly constructed within the past. The 'birth of the Baby' finally gives flesh to this history, embodies it, and invites one to look backwards towards the future.

It has also been seen that none of this was inevitable: a great deal of effort and work went into constructing ICTs as technologies that 'belong' to Manchester, work that could be realized only through the mobilization of existing alliances, networks, and, of course, ideas. Those kinds of connections importantly also entailed *disconnections*, from places and organizations that did not, for one reason or another, fit the image and understanding of these technologies and their location in Manchester. MCIN was an example of that; but so too were some of the founders of the host, who began to experience the images surrounding *their* 'Baby' drifting in a direction that went beyond their own interests in international labour organization, and, quietly, they left.

For those who remained engaged in the city's projects, such as the MSIM and G-MING, there were drawn-out confrontations between diverse understandings of what ICTs *are*, exactly. This eventually led to experiencing the practical impossibility of maintaining a separation between the agency of technologies and the agency of persons. Members of G-MING found that the use of deeply held notions of 'technology' as an autonomous and neutral object in the field of sociality did not hold up in practice, and that created continual problems in actually implementing proposed projects.⁴⁰

Beyond the city, ICTs were also used to forge and consolidate links to other European cities; but, while ICTs provided a vehicle for these connections, they were not created by the technologies themselves. In some cases they pre-existed the ICT initiatives (the twin-city connection to St Petersburg is a particularly good example of contingency); in other cases, they were created by funding opportunities, opportunities that were not dependent on ICT innovations, but controlled by, for example, EU aims to generate links between regions

⁴⁰ These kinds of notions are, of course, stereotypical, but they are powerful tropes that strongly inform the way technologies become embedded in social life. See Dumit (1997) for an exploration of how this kind of idea has the effect of constituting people's understandings of the world and themselves in relation to ideas about technologies, and see also Traweek (1988) and Haraway (1997) for other analyses of the consequences of these kinds of cultural constructions of technologies.

across member states and to build up effective competition with North America in the area of ICTs.

Finally, if there was anything 'virtual' in the transition from cotton to computers in Manchester, it was not the product of ICTs' technical capacities, but the creation of the place itself, in finding and making a location for those technologies. Global connections are clearly always located in practice. However, in this chapter we have argued that 'place' cannot simply be added as a further variable when formulating policy for the introduction of ICTs. It is the social *process* of location, as an active engagement with both past and future, that needs to be considered. Whatever the potential for social change, people apprehend novelty in relation to existing social knowledges. Technological innovation is thus always embedded in historical representations and practices. The Manchester study exemplifies this process. The institutional predilection for the 'technical fix' emerged as a key feature of the social contexts of virtual Manchester, effecting how, for better or worse, institutions have, over time, conceptualized social problems and the ways in which answers are sought in technical solutions.