
On Technology, Infrastructure, and the Contemporary Urban Condition: A Response to Coutard

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I very much welcome Olivier Coutard's (2002) further examination of the concept of premium network spaces that I developed in a recent *IJURR* article (Graham, 2000). As he states, in the current period of rapid transition, the most glaring issue in the analysis of the complex relations between technology, infrastructure and urban space is the need for more detailed, critical, nuanced and comparative empirical work. Indeed, one of the aims of 'Constructing Premium Network Spaces' was to deliberately concentrate on some of the most visible, exemplary cases of contemporary change to try and help generate much-needed debate on the issues. Along with the much larger and detailed exposition of a broader thesis, encompassing the premium network space concept, now published in my book with Simon Marvin, *Splintering urbanism* (Graham and Marvin, 2001), my aim was to try and raise the status of analyses of infrastructural and technological mobilities within urban studies.

Too often, treatments of the materialities of infrastructure and technology remain marginal within critical urban and social science. Most usually, they are simply ignored altogether. Even when they are addressed, treatments are often trapped within the simplistic language and 'impact' metaphors of prevailing technological determinism. They are implicitly steeped in assumptions of the political and technological rationality of urban engineering and 'public works'. Or they are reified as simple progenitors of the urban and social forms functionally necessary to the particular urban 'age' in question: the 'steam' age, the 'auto' age, the 'electricity' age, the 'information' age and so on. In short, infrastructure, technology and mobility are cast not as necessary or legitimate concerns of critical urban research but as purely technical, and rather dull and banal installations which deserve scrutiny only when they fail or collapse. As Coutard has argued elsewhere, 'because these systems include complex technological artefacts, they are often viewed as 'engineers stuff', not worth the interest of the social sciences' (Coutard, 1999: 1). In adopting such positions, however implicitly, critical urbanists — especially Anglo-Saxon ones — have unintentionally helped to obscure the dynamic relationships between the technological materialities of the urban, the various flows that this sustains, and the exercising of social and political power (see Urry, 2000).

The ironic result is that contemporary urban research, whilst now heavily influenced by notions of flow and network mediation such as Manuel Castells' (1996) concepts of the 'network society' and the 'space of flows', tends still to dramatically underestimate

the critical importance of technological mobilities, and the hard, real, material infrastructures that make them possible, to the modern city. It neglects the ways in which the changing material basis of cities and infrastructure — as evidenced by the tantalizing views into the muddy urban underground revealed by utility cuts and by the exposed palimpsest of networks revealed in the World Trade Center attacks — is both supporting and responding to globalization, deregulation, socio-economic restructuring and the changing symbolic, discursive and legal practices that come together in the production of urban space (although see Gandy, 2002, this issue).

In short, the failure to develop a critical and cross-cutting tradition for analysing the relations between technology, infrastructure and the restructuring of urban space is both a symptom and a cause of the prevailing technical ideology of the networked city so long promulgated by discourses of urban engineers, from Haussmann on. It is in this context that 'Constructing Premium Network Spaces' and *Splintering urbanism* seek to build on the relational, socio-technical and critical analyses that have emerged (most notably in Coutard's home nation, France). They are efforts to try and construct cross-cutting, interdisciplinary and international analyses of the changing relationships between technology, mobility and urban space on our urbanizing planet.

Coutard's analysis of contexts and examples where the reconstruction of systems of infrastructural mobility do not appear to match the premium network spaces thesis is therefore a very useful one. It helps to expose some of the limits of our theorizations. And it provides counter examples which underline both the complexities of contemporary change and the risks of falling into ethnocentric binary transition models when mobilizing broad concepts across a diverse range of contexts. Nevertheless, I would like to counter some of the key arguments in Coutard's paper. In this brief response, and adopting his spirit of friendly dialogue, I would like to address his three key points in turn.

Post-monopolistic networks and relative (re)distributions of social powers of mobility

Coutard's first suggestion is that the shifts away from monopolistic provision that surround 'unbundling' and infrastructural liberalization do not necessarily lead to increased social and spatial disparities of access. He backs up such claims with analyses of water re-regulation in various developing cities, where, in some cases, shifts towards post-public and post-monopolistic provision — especially via the franchising of whole service areas — has paralleled widening access to water. He argues that unbundling can lead to a diversification of standard services, allowing more suitable provision in unserved low-income spaces (especially in developing cities). He also stresses that social resistance, from middle as well as low-income groups, can combat pressures to rebalance tariffs from privatized regimes, as in Buenos Aires.

I would not dispute these claims. However, I would stress that in other water privatizations, in South Africa and Southeast Asia in particular, the reduction of social and geographical cross subsidies has led to efficiency gains and better service for well-off and served users, whilst the needs of the unserved poor have continued to be overlooked. This has worked to keep the unserved poor locked into informal and expensive provision through water vendors (see, for example, Bond, 1998; Kalbermatten, 1999). An example comes from the South African town of Stutterheim. Here, post-apartheid privatization of water 'was carried out in such a way that a large foreign firm 'cherry picked' the lucrative white and colored areas which receive dependable water supplies at present, but which left much of the official Stutterheim township unserved' (Bond, 1998: 162).

Another point to stress is that water is the network sector with the strongest and most resilient ‘network monopoly’ characteristics. This means that real alternatives to monopolistic network provision tend not to materialize even after privatization, liberalization or unbundling. It tends to be uneconomic to build overlay water networks which bypass prevailing systems, or to open piped water to any form of competition. People and institutions thus have limited opportunities to secede from public, monopolistic networks or to benefit from premium network spaces (which, in the case of water, are limited to private boreholes or bottled water). With electricity, gas, telecommunications, television and even urban streets, by contrast, the monitoring and filtering capacities of information and surveillance technologies provide real opportunities, within supportive regulatory contexts, to:

- Introduce competition and contestability;
- Introduce commodified and pay-per, rather than flat-rate, tariff charging (as in electronically-charged road space or pay-per-view TV);
- Completely bypass incumbent suppliers (mobile phones instead of land line; satellite or cable TV instead of terrestrial; cable Internet instead of dial-up modem; shopping mall instead of traditional street; competitive energy supplier instead of incumbent monopoly; TGV instead of old rail. . .); and
- Configure premium network spaces for privileged users.

Water, then, is perhaps the least ‘typical’ of all the network sectors.

In addition to the examples mentioned in Graham (2000), it is worth considering some further examples of how other networked technologies are being reconfigured as premium network and relatively marginalized network spaces and users in many cases:

- The recent introduction of face-recognition in urban CCTV systems in the public streets of Newham, East London, which actively seek to track and exclude known offenders from access by scanning for their faces 24 hours a day;
- The widening use of electronic road pricing, smart cards and car transponders in cities such as LA, Melbourne, Singapore and Toronto to support the development of privileged road and highway spaces and corridors for users who are able and willing to pay premium prices to bypass traffic congestion on public highways and streets;
- The recent construction of private overlay Internet trunks by private media conglomerates which, along with new ‘smart’ routers, allow certain people’s traffic to bypass Internet congestion whilst less privileged users face non-functioning services (with neither group necessarily aware that this is occurring);
- The use of new call-centre systems by many infrastructure companies to automatically answer the calls of ‘good’ customers before ‘bad’ ones, without either knowing that this has occurred;
- The use of IT innovations in the UK utilities sector to support privileged access to value-added energy, home security and other services for targeted, profitable users, whilst utilities effectively cease to have any contact at all with over 4 million users of ‘pre-payment’ meters (who have to physically travel to top up their tokens in advance of energy use); and
- The use of biometric hand scans in the INSPASS international migration system to allow privileged business travellers to bypass airport migration controls whilst ‘illegal’ immigrants face the use of more and more capable IT and surveillance systems, configured to try and prevent them crossing such spaces.

I would argue that such examples, and many others discussed in *Splintering urbanism*, demonstrate that the current conditions of privatization and liberalization, combined with the biased configuration of technology, is, in many cases, leading to the relative exaggeration of mobility and social power for more privileged users whilst marginal users can face relative, or sometimes even absolute, loss of mobility and social power.

It is worth stressing the crucially important point here that infrastructural power is always relative. This means that even when previously unserved people gain access to lower quality infrastructure services, they may still be, relatively, highly excluded, as better-off users have gained access to premium conditions. Often, this segmentation occurs without users even realizing that this disparity exists — such is the often invisible and computer-mediated nature of so much social and technological power today. Whilst early users of the Internet with PCs, for example, can enjoy the full galaxy of interactive opportunities it offers, those using so-called ‘set top’ boxes to access the ‘Internet’ through cable are offered a very narrow choice. Normally this consists of commodified, pay-per, commercial services and e-commerce opportunities from only those companies under the control of the transnational media conglomerate that owns the cable provider. The ‘horizontal’, interactive opportunities available are often limited, whilst ‘vertical’, commercialized relations and ‘press now to purchase’ buttons dominate their consumption experience.

Such distinctions in infrastructural power are especially important in computer-mediated societies where software algorithms and IT systems operate to automatically exclude and include, without discretion, through what Latour (1993) calls ‘obligatory points of passage’ — PIN numbers, computer IDs, ATMs, card-readers, CCTV-surveilled walkways etc. These are increasingly linked to databases which enable them to treat different users in starkly different ways according to aggregated, or individualized, judgements of potential or actual user profitability or risk. As Lianos and Douglas (2000: 263) argue:

Nowadays spontaneous norms respond to prior changes in socio-technical environments and to the laws which maintain these environments. Electronic information technology designs ways of organizing. These can be anything from magnetic gates and password-protected computer networks to automatic turnstiles and image analysis systems. [Such socio-technical constructions], once made, do not involve human participation. Their internal workings are impenetrable for the user who receives their responses. It is meaningless to try and establish what is wrong with the magnetic band of an underground ticket, with the PIN of our bank card or with the password for reading our e-mail ... [Such technologies] *radically transform the cultural register of the societies in which they operate by introducing non-negotiated contexts of interaction* (italics in original).

Such processes of mediating access to, and exclusion from, infrastructural systems are subtle and complex; they resist cartoonish stereotyping of the all-powerful transcending the surrounding spaces of the impoverished. Strategies for constructing simple, exclusionary, premium network spaces are exactly that: strategies by coalitions of interests working within complex governance and urban contexts. Only very rarely do they work in the stark ways intended; commonly, they fail to police boundaries and do not allocate differentiated access and mobility authorizations as hermetically as intended (although the porosity and error rate vary between networks and cases).

Moreover, new practices and networked constructions inevitably need to maintain a wide range of connections to the wider metropolis. Efforts to support, maintain and even strengthen public mixing and the collective distribution of network services continue to exist. The unavoidably ‘messy’, embodied, socio-technical practices of urban life inevitably tend to creep back in. Regulatory responses, from the local to the transnational, can respond to social movements, themselves stimulated by glaring inequalities, reinstating measures to ensure the ‘publicness’ of the networked and urban spaces under question. Finally, the widening diffusion of technologies like mobile phones and the Internet, once they mature to become widely accessible, provides all manner of opportunities whereby the disenfranchised can assert their counter-hegemonic claims to technological, infrastructural and expressive power.

Spatial specialization, fiscal equivalence and the geographies of redistribution

Coutard's second argument is that disparities among social and economic spaces are inevitable and they are certainly not always undesirable. Unbundling tariffs can, as in the telephone and electricity sectors in France, be used to update the geographies of cross-subsidy so that they fall more into line with the contemporary conditions and locations of the poor. The privatization of sets of urban and network spaces, especially 'glocal' business enclaves and their interconnecting infrastructures, is therefore not a clear case of fiscal secession and fortification.

I would agree that such spaces are major growth poles; their multipliers and beneficial spin-offs and connectivities inevitably do 'trickle down' to some extent to wider hinterlands — necessarily transcending the intensifying efforts of boundary control in the process. I also agree that the key question is the way in which national and local state regimes regulate such 'glocal' economic spaces (whether we call them enclaves or not), and attempt (or do not) to use various forms of taxation to redistribute the fiscal and remunerative flows that they anchor. Some examples, such as the Ile-de-France case Coutard discusses, are certainly massive exporters of income and corporate tax, which is redistributed through state welfare and public service programmes.

It is worth noting, however, that in France these programmes, along with strategic spatial planning regimes, have managed to resist political and economic pressures for deregulation and liberalization far better than have most places in the Anglophone or developing worlds. Coutard also fails to see that, under conditions of intensifying urban competition and the deepening scrutiny of supply-side conditions by transnational corporations, there is enormous pressure to increase the level of public support going into maintaining the infrastructural connectivity of key financial centres, technopoles, airport spaces, foreign direct investment spaces, export processing zones and the like. Under such pressures, and in many contexts, developmentalist and Keynesian regional and urban planning and coordination, aimed at securing some degree of inter-area convergence, is often being replaced. Instead, elaborate strategies of 'strategic localism' (Jones, 1997) and 'glocal rescaling' (Brenner, 1998) are underway, focused exclusively on enhancing the mobility and infrastructural powers of dominant enclaves and cores.

As a result, in a wide variety of urban contexts, large chunks of public sector supply-side investment, at all state levels, go in to parallel already huge private sector infrastructural investments, in trying to establish nodal positions on networks of glocal infrastructures for strategic locales. Whilst surrounding spaces may benefit from labour market spin-offs and some degree of development 'trickle down', often they also indirectly, and regressively, subsidize the new glocally connected spaces through regressive public taxation. This is the case, for example, in Malaysia's Multimedia Super Corridor. Here, a massive portion of Malaysia's national public investment is being strategically concentrated on constructing a 50km urban corridor south of the relatively prosperous city of Kuala Lumpur, in an effort to attract global transnational and information firms to locate there (see Graham and Marvin, 2001: Chapter 7).

As Gleeson and Low (2000: 275) point out, from the perspective of Australia, the deregulation of spatial planning has, paradoxically, often coincided with intense state fiscal, legal and discursive support to 'privilege certain investment environments in Australia's cities for local and international elites'. As in many nations, such 'entrepreneurial' urban planning has supported state-backed redevelopment of river and waterfront spaces and major urban festivals and events. The problem with such strategic localism (Jones, 1997) is that the social opportunity costs of these public investments — the infrastructure not supplied, the hospitals, schools and social services not upgraded or provided — have conveniently been overlooked in the boosterist discourses that have

overtaken what remains of strategic planning. Urban policy has come to focus on the redevelopment and promotion of central cities and adjoining areas, whilst the suburbs (where the bulk of the Australian population lives) have been residualized, all but ignored in strategic thinking (Gleeson and Low, 2000: 275).

I would also stress the ways in which information infrastructures, especially corporate IT networks and the Internet, are being constructed to support the sharpened exploitation of geographical divisions of labour, to intensify corporate capital's efforts to escape public scrutiny and state taxation in the first place. Such trends are utterly regressive both spatially and socially. For, as George Monbiot (2000: 13) argues, it is increasingly apparent that transnational corporations of all forms are starting to:

install their web servers where taxes are lowest, disguise their trade in goods as a trade in services, and even launch their own virtual currencies. The tax burden, in other words, is shifting to those who are unable to move their assets offshore or out of the old economy into cyberspace. With little else to offer, poor countries [and spaces] end up giving everything away in a desperate attempt to attract 'investment'. If taxation is not to become wholly regressive, we will have to revolutionise the means by which the rich are charged.

Boundary control as socio-technical power

Coutard's final argument is that the privatization and 'splintering' of urban space, intrinsic as it is to the development of advanced societies, is a result of wider processes of economic spatial specialization. Here it would be hard to disagree. But I would argue against his further suggestion that the intensified practices of surveillance and (attempted) boundary control around glocal network spaces is somehow a benign process keeping out people who would not have wanted to enter them anyway.

Rather, I would suggest that such strategies are about the entrenchment of dominant rhythms and spatialities that most meet the demands of finance and transnational capital and its associated interests and employees under advanced capitalism. Real people are excluded, most notably beggars, vagrants and anyone whose visual appearance is not seen by dominant power-holders as befitting these privileged locations. In the 29-acre Broadgate redevelopment in the City of London, for example, modern financial services companies are gathered around what looks at first like a genuinely 'public' plaza and atrium complex, replete with ice rink, bars and cafes, and public performances (Sumo wrestling, Spanish horses, dog shows...). However, beyond the visual appropriation of the semiotics of 'public space', this domain is restricted to people in 'smart dress' through intense surveillance and security practices; those 'undesirables' deemed not to 'belong' for whatever reason 'are rapidly escorted off the scheme' (Borden, 2000: 228). Moreover, whilst the City traders enjoy the stage-managed events above the surface, others are allowed only provisional access but are, literally, pushed underground. 'Service workers and many office cleaners and maintenance staff are kept out of sight, hidden beneath the surface in a dark, subterranean undercroft of access roads and maintenance circuits' (Borden, 2000: 229).

It must also be stressed that premium network space strategies are not static. They are dynamic and embedded within the swirling and contested geopolitics and governance regimes that characterize the construction and reconstitution of contemporary urban mobilities. Also in London, huge public subsidies are likely to go into the construction of a major urban rail link connecting the City financial core, and possibly Docklands, directly to Heathrow airport. This is as a consequence of the pressure of finance capital and property developers in those spaces to improve their glocal connectivities at public expense. Meanwhile, other less affluent parts of London face worsening transport connections. Moreover, the boundaries of the City of London

are moving into, and appropriating, many of the old adjacent ethnic neighbourhoods in East London. This is leading to the predictable and exclusionary spirals of gentrification as analysed recently by Solnit and Schwartzberg (2000) in San Francisco's dot-com development bubble.

Similarly, at the national scale, several billion pounds of UK state money is going in to ensure that the fast 'premium' rail link between London and the Channel Tunnel (and so on to the glocal city cores of Paris, Brussels and Amsterdam...) is completed, despite the effective bankruptcy of the rail track company, Railtrack, in October 2001. At the same time, plans for upgrading the deteriorating rail links between London and the cities of the Midlands, the North and Scotland have now collapsed because the UK state has failed to promise the required level of public investment.

Finally, the distributional effects of the electronic road pricing of premium urban road spaces need to be considered. There are clearly major environmental arguments for using new computer and communications technologies to support the pricing of road space in places like Singapore and Central London. However, it could also be argued that another powerful (and often hidden) rationale for such a strategy is to use the commodification of road space, and the legitimizing arguments of environmentalism, to help shift 'time-rich-cash-poor' drivers out of the way of the 'cash-rich-time poor' ones associated with glocal and transnational network spaces.

As Khan (2000) reports, for example, the Hong Kong city council is now thinking of imitating its main rival Singapore's new electronic road-pricing scheme. This is not primarily because of the 'environmental sustainability' that it will bring. Rather, it is because the CEOs of major transnationals, now used to arriving in Singapore's corporate buildings on time and in air-conditioned comfort, are complaining vociferously that they sometimes have to walk the 'last mile' to similar meetings in Hong Kong, in searing heat and humidity, because of traffic congestion.

In sum, I would strongly emphasize that the reorganization of mobility systems surrounding corporate enclaves and premium network spaces is unlikely to be distributionally benign from the point of view of social power. Rather, it is about the reconstruction of systems of flow, mobility and state support and subsidy to support some interests at the direct (absolute or relative) cost to others. As Eric Swyngedouw (1992: 322) has argued, the crucial point to stress here is that:

the changed mobility, and hence, power patterns associated with the installation of new mobility commodities and infrastructure may negatively affect the control over place of some while extending the control and power of others... Being trapped in particular places and subject to processes of restructuring and depreciation undermines the control and command of spatially imprisoned individuals and social groups, while this very restructuring and depreciation is organized by those Cyborg men and women whose ability to command place is predicated upon their power and ability to move over hyperspace.

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