The digital city: challenges for the future

Serge Wachter

What is the impact of digital technology on the city and its architecture? Serge Wachter analyses the way in which new information and communication technologies (NICTs) influence not so much the physical form of cities as the individual and social experiences of their inhabitants, and explores the different channels that are leading to a dematerialisation of public space and urbanity.

The digital city is in vogue and those local councils and other public bodies that have not launched projects aiming to support and encourage the more widespread use of information and communications technologies (ICTs) in their areas are few and far between. These initiatives reflect the growing omnipresence of digital networks in the everyday life of city-dwellers, and the way in which this phenomenon has significantly modified access to the city's services and resources. The Internet, smartphones and the various digital assistants and devices that most people now use have all become essential vectors of communication and socialisation today – and are likely to be even more so tomorrow. It cannot be denied that ICTs and digital networks are becoming more and more "embedded" in our lifestyles and are now also a key component of the way in which environmental and urban infrastructures operate. And yet, despite this surge that marks the advent and triumph of the information society, can it be said that the digital city is distinguished by specific forms and arrangements that characterise its built environment, its urban fabric, its streets and roads and its public spaces? Is it a tangible, physical reality? Or does it remain to a great extent a virtual construction that is primarily located in "cyberspace"?

The morphology of the digital city: flows or places?

Let us be clear: the growing importance and power of digital networks and the communications flows they create have so far had very little effect on the physical form of the city. The omnipresence of networks, connections and facilitated access to websites, platforms and databases concern individuals more than urban spaces. It is true that the spatial repercussions of virtual relations inevitably involve the mediation of individuals, organisations and social practices. It is, in fact, the use – not the material presence – of networks and their associated services that exerts spatial effects. However, it cannot be denied that it is much more the individual than the city that is becoming digital. It is the individual who is connected to cyberspace, who has several email addresses, who is able to access a multitude of information and services via a PC or a mobile telephone and be located and monitored by various sensors and video cameras who best embodies the true bedrock of the digital city. Thanks to information and communication technology, individuals can develop new or "augmented" sensory and intellectual faculties that enable richer interactions with their ecosystem. It is these individuals who are, first and foremost, the anthropological substrate – both subject and object of the changes brought about by the IT revolution.

Paolo Fusero asked whether, in the future, digital networks will have "the capacity to modify the physical form of the city by taking on the role formerly fulfilled by transport infrastructures".[1] Such a hypothesis would seem risky, and indeed proves to be of limited scope, owing to the significant inertia exhibited by the urban form. The changes which occur in the materiality of the city seem inversely proportional to those which affect the lifestyles and the new digital condition of social stakeholders. To paraphrase Baudelaire, the physical form of the city does not change more quickly than the heart of a mortal,[2] and the information society has not yet made its mark on the urban landscape and urban morphology. According to W. J. Mitchell, such physical resistance or lack of flexibility with regard to change is due to the pervasiveness of the urban frameworks formed by the road networks. Indeed, "the immutability of street plans is one of the reasons that changes in the configuration and physical appearance of cities are so slow to occur. Once established, street plans generally survive for decades or even centuries."[3] The permanence of highway infrastructures, and more specifically streets, can be explained by the fact that they structure the city, and by their ability to evolve and adapt to changes in the urban fabric. Streets and roads make up the "genetic heritage" of the city; the plots of land and buildings may vary over time and to differing degrees, against the geographical permanence of the street plan.

Make no mistake: the impact of new means of virtual communication on the urban space is powerful and undeniable, but it involves a sort of "production detour". In reality, it affects lifestyles and the individual and social experiences of the city more than physical features, neighbourhood morphology or the appearance of buildings. In this respect, Rem Koolhaas was spot on when he declared that the "hypermodern" metropolis is marked less by a transformation of places than by an escalation in the physical and virtual flows that connect these places. From certain standpoints, the city may be considered a mere collection of objects or buildings; however, above all, the city is a relational entity. The city is not a factory, despite fashionable statements to the contrary, but rather a form of coexistence and a set of relationships between flows and places that are joined together neither formally nor visually. This line of thinking reflects the visionary approaches of Archigram, which, in the 1970s, equated the metropolis of the future not to a new urban form or a new kind of architecture, but rather to images and representations of flows, networks, connections and movements.[4] All in all, just as the inexorable rise of IT has not caused urban polarisation or mobility growth to slow down, neither has it so far affected the physical form of the city or the typology of its buildings.
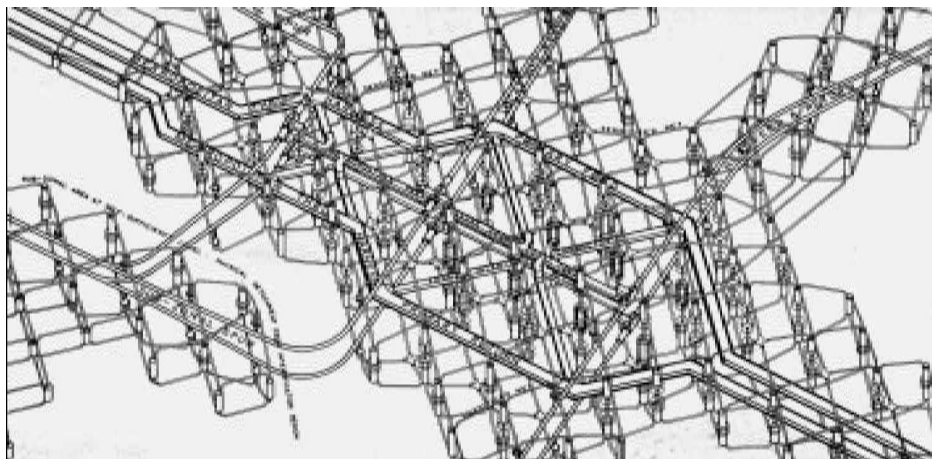
Dennis Crompton, "Computer City" project, 1964 (Collection Centre Pompidou).

[1]   Fusero, P. 2008. "E.planning: urbanistica e reti digitali", in Sacchi, L. and Unali, M., *Abitare virtuale*, Rome: Edizioni Kappa, pp. 108–127.

[2]   Gracq, Julien. 1985. *La forme d'une ville*, Paris: Éditions José Corti.

[3]   Mitchell, W. J. 2000. "L'avènement des cyberquartiers ?", *La Recherche*, no. 337, p. 14.

[4]   Sadler, S. 2005. *Archigram: Architecture Without Architecture*, Cambridge, USA: The MIT Press, pp. 90–139.

A public cyberspace?

Ambient intelligence and Web 2.0 have already accelerated the development of information flows between individuals, as well as the interactions between these individuals and the various communications objects that populate the urban environment. All sorts of digital traces, tags and signs now adorn public spaces and provide web surfers on the move with information, data and other sensitive markers in the places they frequent or through which they travel. Such an ecosystem establishes a new relationship between city-dwellers and the public space. A street is a technical object – a physical infrastructure – but it is now also a digital and informational infrastructure. It houses and concentrates clouds of data, which can be collected, annotated and "augmented" by passers-by and residents. This data might be fun or arty; it might be incorporated into blogs or message boards; it might even be used to create community and citizen platforms with the aim of raising awareness or mobilising people. In this way, walls and other surfaces can potentially become screens on which to display information, images and colours that communicate and interact with the people who pass in front of them. Locations can be digitally "tagged" by those who visit them, thus leaving comments, notes and impressions for future visitors and passers-by – so much so that "the way in which we experience our environment in the street will perhaps soon be defined by that which is invisible to the naked eye."[5] Ultimately, in the street, objects will communicate between themselves and with us, making ICTs a completely normal part of the everyday environment, just like electricity. Indeed, the public space is already "covered" by cyberspace: it is enhanced and mirrored by a digital layer.
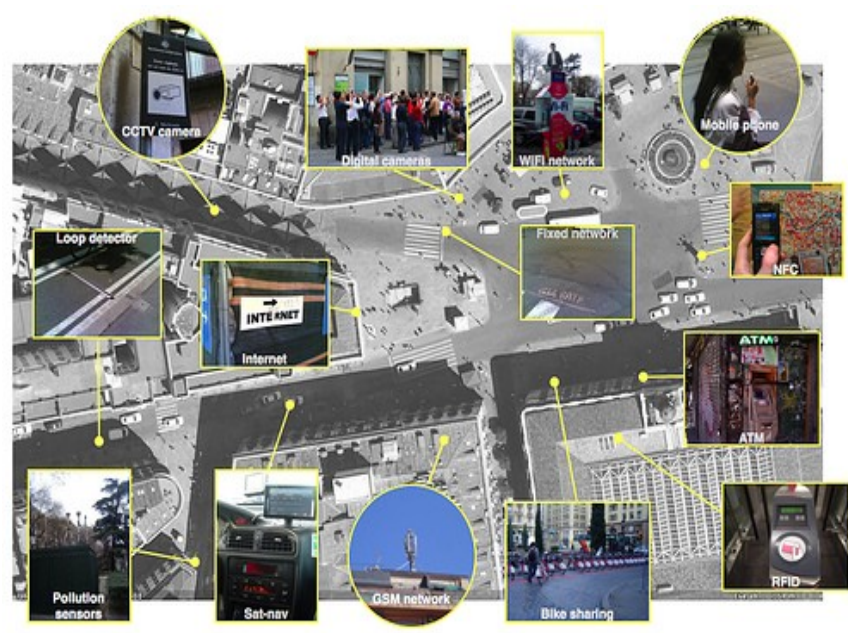
The city and ambient intelligence, FING 2008.

Such an all-encompassing and widespread interactivity raises questions and challenges concerning the status of the public space in the digital era and concerning its roles and functions as an agent and essential medium of urbanity. In the context of the city, streets have a specific vocabulary (pavements, surface treatment, street width, carriageway, street furniture, etc.), which forms part of urbanity and neighbourhood identity. As things stand, the physical and protective qualities of the street can be enhanced by a digital offer that is capable of further increasing its degree of urbanity – and, in the future, this may be even more true. Indeed, there are lessons in

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[5]   Guillaud, H. 2008. "La rue comme plateforme", *InternetActu*, 25 March. Retrieved on 20 November 2011. URL: http://www.internetactu.net/2008/03/25/la-rue-comme-plateforme.

urban design to be learnt that seek to incorporate this new interactive aspect of the street in redevelopment operations, thus making ICTs a key component of urban design approaches.

Should we be worried? American architecture critic Paul Goldberger decries not just the growing importance of this environment saturated with information and digital signs, but also its harmful effects on the public space and in terms of the dissolution of social bonds and places. He observes that "the telephone makes public space less public; it turns the pedestrian into an isolated or captive individual, and transforms the idle wanderer into a figure of the private sphere."[6] According to Goldberger, digital networks claim to release social stakeholders from the constraints of space and time, while in fact locking them away in an individualistic bubble. The virtual worlds created by Wi-Fi and global positioning have certainly pushed back the boundaries of geography. In doing do, they have revolutionised, or at the very least had a significant impact on, the reference points of time and space, and have rekindled fantasies of omniscience. However, the effect of this has been to disembody or reify the relationships between individuals and the public space. It is the public space that has lost out, and which is set to lose even more in the future – such as its role as an intermediary between fellow citizens, or its role as a creator of sociability. As things stand, there is a risk that the existing tendency for social relations that are increasingly virtual and increasingly disconnected from public spaces and places where urbanity is traditionally built could be amplified.

According to certain media specialists, such a vision is excessively pessimistic. We are not currently seeing a widespread movement towards the dematerialisation of social contacts. On the contrary, the addition of a virtual dimension to the physical space can act as a lever to multiply and diversify human interactions and can contribute to the invention of new social relations and new forms of urbanity. In reality, we are today facing new challenges that invite us to explore new roles and functions for the public space in the era of the information society. Indeed, one of the major challenges for the future will be to find ways to fruitfully and desirably combine real urbanity and virtual urbanity.

Changing "selves" and changing architecture

Although the urban landscape has not really been marked, so far, by the growing importance and ever more widespread use of ICTs, this increased presence of ICTs has, on the other hand, resulted in quite profound changes in architectural approaches and practices. The impact of digital technology on architecture includes various expressions and experiments, ranging from "show architecture" that obeys the laws of urban marketing, through to formal research conducted via parametric models, exploring new geometrical figures that break with the "standard" rules of aesthetics and construction.[7] In this regard, several expressions of digital architecture currently seem to be heralding changes in terms of project approaches and the moral and cultural role of architecture in the context of the information society.

The first relates to the new sensitive interactions that can now be established between "biological individuals" and their "built environment": Indeed, *homo digitalis* can today be equipped or fitted with digital assistants and prostheses, enabling him (or her) to discover and experiment with new sensory relationships with built reality. A new human – a "pre-cyborg"? – has been born ready and able to test new relationships with its surroundings. In other words, a new "augmented being" or "digital body" can come into contact with buildings. Similarly, these buildings can incorporate sensors and other sensitive devices authorising new interactions with visitors or residents. Such experiments have proliferated in recent years. For example, interactive sound architectures have been tested, with real-time reactions to the motion of visitors: the building responds to visitors' requests and movements via a series of sensors connected to a row of blue lamps, which in turn are

6   Goldberger, P. 2003. "Disconnected Urbanism", *Metropolis Magazine*, November, p. 66.

7   For an overview, see: Picon, A. 2010. *Culture numérique et architecture*, Basel: Birkhaüser; and Wachter S. 2009. "Promesses et impasses de l'architecture numérique", *Flux*, no. 78, October–December, pp. 24–37.

connected to a sound system. The architecture then partly obeys the mobility of occupants, their speed and their movements. In other projects and experiments, based on the same principle, the surfaces of walls interact with visitors or passers-by, via images and sounds, thus building a "common territory" between the electronic space and that of the body.[8] In a similar vein, "architecture, defined as an active interface between the body and its surrounding environment, emanates from concepts relating to temporality, desire, ambiguity, eroticism and the unforeseen."[9] Formal and stylistic questions have made way for a new heuristic approach to uses, and for "nodal transfers between virtual and physical bodies."[10] Architecture, now transformed into an artificial environment, is no longer defined by its spatial and physical forms, but instead produces environments where colour, light, temperature, acoustics and ventilation encourage the immersion of the occupant into a world of sensations. In this way, architecture exercises a "cathartic" function whereby the individual is returned to reality and "naturalised" to the digital condition. Furthermore, this variant of cyberarchitecture brings with it the promise of a sensual city and architecture, completely at odds with the idea of a cold, anonymous and disembodied metropolis described by Andrea Branzi.[11]

Next, access to cyberspace makes it possible to navigate without any discontinuity between the global and the local. The universal and the global network rub shoulders with the individual blog and local interactions. Today, the city and urban lifestyles are increasingly being organised on the basis of physical and virtual activities. These activities interconnect and are constantly renewed through new networks and communication systems. The result is a hybrid reality, mixing physical and digital data. The rise of virtual communications and the digital world encourages the creation of "digital territories of the self" that lend themselves to individualised narratives. Everyone builds his or her micro-universe(s), where the "self" can reproduce, split up and fantasise. Through these phenomena, sociologists see the principle of an extension and fragmentation of the moral personality, as Durkheim might put it. Metaphorically, such a fragmentation can be likened to the form of an archipelago. In other words, the personality splits according to the image of metropolitan territories made up of islands interconnected by flows. *Mutatis mutandis,* architecture undergoes the same process of fragmentation. Buildings appear as deconstructed ensembles – clusters of modules connected by flows and by beings that inhabit them. In concrete terms, this process refers to two decisive changes that concern the external appearance and the allocation of internal spaces of buildings. For example, a building that formerly accommodated several functions may see some of them externalised to other buildings, with the totality of these functions and activities then connected by flows. In other buildings (banks, for instance), certain functions have been dematerialised and it is thus essential to rethink their architecture and their internal spaces in order to take account of the new links between real and virtual functions. These two examples illustrate a phenomenon of dissociation between form and function.

In this context, a building no longer occupies just one physical site; it is connected to a virtual network of functionalities, which the architect must take into consideration. Up to now, a building was generally designed and defined according to the functions that it was to accommodate and house. But how is it to be designed today, and what aspects should it include tomorrow when its functions or activities are dematerialised? How are we to imagine buildings that operate in networks with a distribution of tasks and physical and virtual activities? In this context, the rise of digital interactions, the dematerialisation of certain functions and the creation of networks of buildings all run the risk of destroying, or at the very least distending or distorting, the relationship between the building and its environment.

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[8] For other examples of projects and experiments, see: Fox, M. and Kemp, M. 2009. *Interactive Architecture*, New York: Princeton Architectural Press.

[9] Ito, T. 2007. "Image of architecture in the electronic age", *Teameyes Files Word Press*.

[10] *Ibid.*, p. 22.

[11] Branzi, A. 1992. *Nouvelles de la métropole froide : design et seconde modernité*, Paris: Éditions du Centre Pompidou.

Of course, sustainable or "bioclimatic" architecture today stands out as the obligatory case study – a stereotype of cyberarchitecture. The interactivity between a building and its ecosystem forms a centuries-old basis for architectural design, but this interactivity can now considered in a new light with the possibilities that digital technologies now open up. For example, a growing number of building projects incorporate a series of components that are designed to change and evolve according to variations and events affecting their ecosystem. This property implies that architecture is now a kind of mutant organism that interacts with its surroundings. For instance, in a project designed recently for EDF, "(Un)Plug Building", François Roche includes a building covered in photovoltaic cells, with thermal sensors transformed into energy condensers that draw their resources from interactions with the environment.

François Roche, (Un)Plug Building, Paris 2003 – *Designboom Newsletter*, 2007.

The envelope of the building produces electricity through the use of renewable solar and wind energy. Such an arrangement enables simultaneous energy consumption and production; in this regard, the approach adopted is similar to that used in the "Passivhaus" model. Moreover, this endogenous production makes it possible for the building to be connected ("plugged") or disconnected ("unplugged") to or from the urban electrical network according to power needs and the time of year. When it is connected to a "smart grid", it is then ready to help regulate energy consumption in the neighbourhood or district where it is located. In accordance with the "cyberarchitecture" approach, the building is thus presented as "an atmospheric machine open to context-related interdependence".[12] This design or this interactive architecture, connected to its environment, opens up some promising prospects. It heralds the advent of an architecture that seems predisposed to adapting to the continuous transformations of its surroundings – an architecture that reacts to the climate, light levels and pollution; in short, an intelligent form of "green architecture".

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[12] Brayer, M.-A. 2005. *Machines atmosphériques*, Orléans: Éditions HYX – collection FRAC Centre, p. 24.

As we have seen, the expressions of digital architecture discussed here are quite diverse, but they all converge towards a radical questioning of project approaches focused on the notion of buildings designed as a physical object with aesthetic or stylistic properties. It now takes more than buildings alone to define architecture, let alone the urban context in which it may be found. On the one hand, these approaches favour the establishment of a series of situations and events that proceed in particular urban environments and which question the new meanings of the relationships between individuals and their environment, which is now comparable to a hybrid ecosystem that mixes physical reality and virtual data. In this respect, as Rem Koolhaas[13] observes, the city or metropolis is more a "condition" than an assortment of buildings and monuments. Furthermore, architecture is not – or is no longer – a built form intended to mark its era and its environment, but rather a service, likely to be specific and temporary, in a particular context, adapted to the uses and needs of city-dwellers. Such a trend towards the dematerialisation – and deconsecration – of architecture, and indeed the incorporation of architecture into a wider range of environmental and urban services, had already been predicted by Reyner Banham in his pioneering work on Los Angeles and the impact of technological changes on architectural production.[14]

These perspectives forcefully reiterate the cultural and moral questionings relating to the new roles and status of architecture in the context of the interactive city and the information society. They also call into question both the potential and the limits of technological innovations, as well as the social and political illusions and contradictions that they convey, carried by the growing pervasiveness of communication networks in the urban world. From this standpoint, it should be remembered that digital networks are neither good nor bad – it is the use of these networks which may bring improvements in well-being or social regression. Does the digital city promise us a radiant future? Let us be under no illusions; the answer is clearly, "It depends". The digital city is a by-product of the risk society, and consequently its continuations may fluctuate between better and worse. At the very least, it calls for "virtuous" institutions and rigorous *ad hoc* regulations that seek to contain any excesses in terms of power or manipulation targeted at digital networks and endangering citizens' rights and freedoms.

Further reading

Picon, A. 2010. *Culture numérique et architecture. Une introduction*, Basel: Birkhäuser.

Carpo, M. 2011. *The Alphabet and the Algorithm*, Cambridge, USA: The MIT Press.

Serge Wachter is a professor at the École Nationale Supérieure d'Architecture de Paris-La Villette, where he lectures on future-oriented urban planning and architectural and urban projects. He recently published *La ville interactive. L'architecture et l'urbanisme au risque du numérique et de l'écologie* (L'Harmattan, 2010).

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[13] Koolhaas, R. (dir.) *et al.* 2001. *Great Leap Forward – Harvard Design School Project on the City*, New York: Taschen, pp. 124–140.

[14] Banham, R. 2009. *Théorie et design à l'ère industrielle*, Orléans: Éditions HYX, pp. 389–403; Banham, R. 2000. *Los Angeles: The Architecture of Four Ecologies* (introduction by Anthony Vidler), Berkeley: University of California Press.