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DOMESTI/CITY

THE DISLOCATED HOME IN AUGMENTED SPACE

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KEIICHI MATSUDA / UNIT 15 / YEAR 5 DIPLOMA/MARCH THESIS

THESIS SUPERVISOR: VESNA PETRESIN ROBERT

KEYWORDS

AGGREGATION // AUGMENTED REALITY // AUGMENTED SPACE // BROADCAST // THE CLOUD // DOMESTICITY // ELECTRONOMADICS // HOME // IDENTITY // PUBLIC/PRIVATE // SOCIAL MEDIA // SUBJECTIVE SPACE

ABSTRACT

Augmented Space refers to group of emerging technologies that are unified by their ability to overlay physical space with information. It is a paradigm that succeeds Virtual Reality; instead of disembodied occupation of virtual worlds, the physical and virtual are seen together as a contiguous, layered and dynamic reality. Augmented space disrupts the long established dichotomies of public/private and home/work embedded in the city, and calls for new terms to describe our inhabitation of it. As mobile technology and wireless fields of presence envelop the built environment, the electronomad is empowered to define her own use of space and subjective reading of the augmented city.

The thesis introduces Augmented Reality (AR) as a framework through which to understand the city, and discusses its far-reaching consequences for the built environment and the architectural profession. It reviews our changing inhabitation of the city, focusing on the changing relevance of the domestic programme to demonstrate the dislocation of boundaries.

The invasion of the home by media and technology can be contrasted to a parallel emergence of domestic values in the network. As technology-mediated interactions form an increasingly important part of everyday life, the thesis argues that the dislocation of domesticity will define the character of the augmented city as a domestic space. To demonstrate this migration, the domestic programme is broken down into its constituent elements and defined as a series of connections and emotions, a process of constructing subjectivities. With Augmented Reality (AR) as a site of investigation, this definition is compared to and integrated with the human-computer interface to propose a new model of augmented domesticity.

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CONTENTS

VIRTUAL / REALITY

The emergence of the networked society has provoked much discussion within architectural theory. Virtual reality (VR) first attracted the attention of theorists with questions of disembodiment and the possibility of constructing online virtual worlds. Cyberpunks, gamers and techno-utopists awaited the uploading of the soul, freeing us from the daily grind as we lay motionless, plugged in to our terminals. For a time it looked as if our future was to be lived out in virtual worlds but despite the hyperbole and promise, VR failed to live up to expectations. Virtual worlds have since found a niche with a significant following in the form of online role-playing games and 3D chat, but have on the whole been rejected in favour of the binary engagement between real and virtual.

Now, an emerging paradigm based on physical objects and surroundings is once again connecting us to the city, and providing a rich new framework in which to understand and inhabit space. This *Augmented Space* (Manovich, 2002, 2005), includes wireless location services, ubiquitous computing, tangible interfaces, augmented reality and more emerging technologies unified by their function of reconciling the real and the virtual. While VR attempted to achieve this by removing us from our physical surroundings and immersing us in a disembodied state, augmented space is dependent on its environment, and adds meaning to the city.

The hype and speculation surrounding it recalls its predecessor, but augmented space is already changing our behaviour within the built environment. Wireless networks and mobile devices are contributing to hybrid occupations of public spaces and the deprogramming of architecture. Sensor networks and location-based micropublishing are disrupting our notions

of private and public space. The cyborg self (Mitchell, 2004) has emerged into the city, clutching an iPhone.

Manovich coined augmented space from *Augmented Reality* (AR), a technology that using a graphic overlay to augment the physical environment with data from an information source, usually the internet. It is the most recent technology of the emergent paradigm to pass into mainstream consciousness, and offers perhaps the greatest opportunity yet for architects.

AR still a very young technology and has not been discussed in a sociological and architectural context, but has the potential to liberate the internet and digital media from screens on our desks and laps, changing how space is constructed and consumed. Its ability to visualise and create hidden layers and flows within the city raises questions about perception, subjectivity, and the construction of identity.

This thesis discusses some of the emerging and possible consequences of AR for architecture and urbanism in the context of augmented space. It aims to update the augmented space paradigm with new developments in AR, and introduce AR as a theoretical and practical tool for architects in which to understand current and future changes in the occupation and construction of the city.

Within the discussion surrounding urbanism and the networked society, I will argue that the long-established dichotomies of public/private, home/work are merging into new forms of hybrid spaces and occupations. I will focus on the home, and demonstrate that its boundaries have become disrupted, domestic values leaking out into the public sphere via computer-mediated interactions. Using a model of AR to understand the possibilities of augmented space, I will propose the home of the future, a dislocated domestic construct merged seamlessly with the augmented city.


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6°
HUNGER
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LIQUID WASTE
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THE AUGMENTED SPACE PARADIGM

Augmented Space was coined in Lev Manovich's 2002 essay *The Poetics of Augmented Space: Learning From Prada*. It describes a paradigm shift comprised of a group of emerging technologies, together imagined as the successors of Virtual Reality. Manovich states that "the augmented space paradigm is taking over virtual space paradigm." [1] It has also been called *context-aware computing,*[2] and is linked to the more recent discussion of the human being as cyborg. Although Manovich introduced augmented space nearly 8 years ago, the effects of this change in thought and use of technology have only recently started to become apparent, and with the recent boom in popularity of smartphones and hype surrounding Augmented Reality, many more changes are still to come.

Augmented Space is expanded from Augmented Reality (AR) to include other conceptually similar technologies that coexist and work with physical environments. Along with AR, Manovich includes ubiquitous computing, wearable computers, wireless location services and sensor networks among others as proponents of augmented space, stating that "while the technologies imagined by these research paradigms accomplish this in a number of different ways, the end result is the same: overlaying layers of data over the physical space." [3] Recognising that these separate technologies are conceptually linked and part of a larger paradigm is useful in understanding a shift in the perception of virtuality, from occupying a separate world, to now laying over our own like Borges' map.

Manovich contextualises the emergence of augmented space against the rise of surveillance, *cellspace* (mobile, internet enabled) technologies, and video/computer displays:

1. Lev Manovich, *The Poetics of Augmented Space: Learning from Prada* (2002, updated 2005), http://www.manovich.net (accessed April 26th, 2010).

2. Tom Moran and Paul Dourish, "Introduction to Special Issue on Context-Aware Computing" *Human Computer Interaction 16* (2001): 108.

3. Lev Manovich, op.cit.

> By tracking the user – her mood, her pattern of work, her focus of attention, her interests, and so on – these interfaces acquire information that they use to help the user with her tasks and automate them. This close connection between surveillance and assistance is one of the key characteristics of the high-tech society.[4]

This partnership between surveillance and utility has had important consequences for our perceived boundaries between public and private. This argument was particularly prescient in terms of the current concern over data-mining and monitoring of internet searches by Google and many others in order to more effectively target advertising.

Manovich argues that although augmented space is a new paradigm in technology, the layering of information onto space is a problem that architects have historically dealt with. Moving from iconography in cathedrals, to Robert Venturi's Las Vegas, to the emergence of value-laden flagship stores for luxury brands (termed *brandscaping*), he argues that the application of meaning on space is a native concern for architecture, and that technology should look to the profession to understand its qualities:

> …the design of electronically augmented space can be approached as an architectural problem. In other words, architects along with artists can take the next logical step to consider the "invisible" space of electronic data flows as substance rather than just a void – something that needs a structure, a politics, and a poetics. [5]

While Manovich recognises differences between the physical and symbolic layering (architecture) and electronic layering (augmented space), the establishment of a conceptual link makes it accessible to architects, and presents new possibilities as the reality and virtuality together constitute the augmented city.

4. Ibid.

5. Ibid.

6. Dan Fletcher, "10 Tech Trends for 2010," Time Magazine Online (March 2010) http://www.time.com/time/specials/packages/article/ 0,28804,1973759_1973760_1973797,00.html (last accessed April 26th, 2010)

7. William Gibson, the cyberpunk novelist who coined *cyberspace* once referred to the real world as *meatspace*. Regulars to the online 3D chat environment *Second Life* call it *RL*, to stand for Real Life (as opposed to *SL* for second life). The terminologies of the real/virtual divide gives bias to the 'real' world, suggesting that it is somehow more trustworthy or genuine. In fact, AR often reveals 'real' data, and meatspace often simulates. I much prefer the abstractions of meatspace or RL when dealing with the real/virtual distinction, but for the sake of clarity I will stick with the commonly (mis)understood *real life/space/world.*

AUGMENTED REALITY

Within the technologies associated with augmented space, one has recently emerged into the mainstream that suggests the greatest implications for architecture within the paradigm yet. Augmented Reality (AR) appeared as point of sale terminals and webcam based toys in the early part of 2009, before becoming mobile later in the year. 2010 has been touted as a breakthrough year for AR, listed in Time magazine's *Top Tech Trends for 2010*.[6]

In AR, a physical object or environment may be augmented with graphic overlays, as in the head-up display of military aircraft or the popular science-fiction motif of 'terminator vision'.

CURRENT APPLICATIONS

AR currently exists in the public domain as smartphone and web based applications, using the devices camera (or webcam) to display a live image on the screen, which is subsequently overlaid with information.

Webcam-flavoured AR usually uses a 'magic symbol' similar to a 2D barcode/QR code, printed on a piece of paper and held up to the camera to allow 3D tracking. The application displays camera feed as a mirror, but also overlays an augmentation, usually a simple 3D model that sits on top of the symbol and can be moved and rotated by physically moving the paper that the symbol is printed on. This gives the user a new intuitive way of interacting with data, movement of the 3D model corresponding to movement of the printed symbol in 'real' space.[7] These implementations of AR generally appeal to a simple fascination with the illusion, and have been used primarily in gimmicky online interactive advertising. There have been arguably more beneficial uses: Metaio's in-store kiosk for Lego[8] dispensed with magic symbols and superimposed the relevant completed Lego model on top of any Lego kit box that was held up in front of it. The US postal service have an applet on their home page[9] which superimposes shipping boxes over a magic symbol, which can then be 'filled' with physical objects to determine the correct size of box to order. As the live feed is supplied by the webcam, the field of view is fixed, an augmented 'magic mirror.'[10] This limited view means that objects must be brought up to the screen to be inspected, and webcam based AR

8. For a demonstration, see http://www.youtube.com/watch?v=mUuVvY4c4-A (accessed April 26th, 2010).

9. This can be used for free at https://www.prioritymail.com/simulator.asp (accessed April 26th, 2010).

10. The Virtual Mirror by Fraunhofer Heinrich Hertz Institute makes this analogy. See http://www.hhi.fraunhofer.de/en/departments/image-processing/computer-vision-graphics/virtual-mirror/ (accessed April 26th, 2010).

applications accordingly focus on objects and symbols.

If webcam AR can be equated to a magic mirror, mobile AR is a magic lens. Smartphone-based applications such as Layar and Wikitude can be pointed in any direction, offering unlimited views and perspectives. They can therefore augment both objects and environments.

The early AR app *Nearest Tube* displays a live feed from the smartphone's camera, which is overlaid with accurately located markers denoting distances to the nearest London underground station. *Layar Reality Browser* extends the concept, allowing the user to choose between multiple layers, depending the information required; the "Qype" layer, for example, allows you to see user-reviews of a restaurant simply by looking in its direction. *Sekai Camera* is a popular Japanese social AR app that allows users to leave virtual sticky notes in physical space, which can subsequently be read by anyone using the same app who comes across it. It is this community based, technology-mediated perception of reality that makes mobile AR interesting, its potential to create and present location-specific layers of meaning allowing new readings of the city.

AR VS LOCATION SERVICES

Of all the manifestations of Manovich's augmented space, wireless location services are perhaps the most commonly used today, due to the invention and widespread success of the smartphone and app store model.

Manovich notes that an immersive, mobile and networked AR system

> …becomes conceptually similar to wireless location services. The idea shared by both is that when the user is in the vicinity of objects, buildings or people, the information about them is delivered to the user – but if in cellspace it is displayed on a cell phone or PDA, in AR it is overlaid over user's visual field. [11]

Indeed, the functions of current AR smartphone applications do not currently provide any advantage over

11. Lev Manovich, op.cit.

graphic overlays on Google maps, but AR may soon start to differentiate itself from wireless location services. Wireless location services provide geo-tagged information, but AR has the potential to go beyond representation and become a generative medium. The addition of 3D meshes into an AR overlay could allow the creation of new spatial configurations and interactive events; its potential to become a form of new media will be discussed later.

AR VS VR

Manovich sees AR as sharing many characteristics with virtual reality (VR), while conceptually opposed to it:

> "With a typical VR system, all the work is done in a virtual space; physical space becomes unnecessary and its vision is completely blocked. In contrast, AR system helps the user to do the work in a physical space by augmenting this space with additional information." [12]

He states that "the virtual and the augmented - are the opposites of each other: in the first case the user works on a virtual simulation, in the second she works on actual things in actual space". AR and augmented space are not simulations or representations, but are intended to enrich the real.

In *The Nerd and the Noosphere*, Michael Heim discusses the mind/body problem and the caveats of disembodiment in virtual reality. Heim cites the 17th century philosopher Leibniz as an important figure in defining the mind/body problem:

> The human being appeared to be an amphibious creature, a composite stretched over two separate worlds. The animal body, Leibniz thought, develops irrational attachments to local space and time.[13]

Heim opposes the extropian solution.[14] He argues instead for the simultaneous occupation of multiple realities: "We need not choose between beaming ourselves up to the noosphere or rejecting virtual communities as decadent. We can acknowledge that we inhabit more than one possible world at a time, that

12. Ibid.

13. Michael Heim, "The Nerd In the Noosphere," *Computer-Mediated Communication Magazine,* Jan 1, 1995, 3.

14. The extropian solution refers to the "uploading the psyche to silicon," (Ibid. 3) achieving total disembodiment.

life is multi-tasking. We can learn to overlap worlds. The worlds of the primary body and the cyberbody need to reinforce one another." Although Heim does not refer to AR (which was at an embryonic stage at the time of writing), his model of an aggregated VR environment bears many similarities to it. Stephen Perrella also suggested a post-VR mixed reality environment based in the physical world:

> Instead of commuting into cyberspace, we might instead establish real connections throughout a hyperreal environment, interweaving realities into a continuous, multiplicitous fabric.[15]

A defining characteristic of AR is that the disembodiment discussed in VR does not apply. AR does not require the user to inhabit a single world, but is based on the simultaneous occupancy of 'reality' and one or many virtual worlds (although the term 'virtual world' seen as a complete and distinct reality is misleading). Despite its other similarities to VR, AR represents a re-embodiment of the network, giving abstract data flows and feeds spatial and navigable form, using the body and environment as interface.

INTERFACE/MEDIATION

Using a smartphone to view the augmented city quickly results in sore-arm syndrome. For AR to become useful in everyday life, it must be unobtrusive and always-on. AR head mounted displays (HMDs) currently use front-mounted cameras to display a live feed to the user, effectively making them 'transparent', but they are bulky and very unlikely to become widespread. However, lightweight semi-transparent head-mounted displays are currently in development,[16] and contact lens displays have also been postulated,[17] offering an immersive augmented environment. An AR spatial interface mediated through an HMD distinguishes itself from location services and frees us from other devices. Monitors, telephones, maps and many other physical devices may be combined in a single wearable computer. Interfaces can be mapped out in three dimensions; space itself may be modulated, the user creating or customizing their own visibility of virtual layers and

15. Stephen Perrella with Laurent-Paul Robert and Vesna Petresin, "Hypersurface Architecture: Age of the Electronic Baroque. Studies for a Virtual Campus," in *The Paradox of Contemporary Architecture*, eds. P. Cook, N. Spiller and L. Allen (London: Wiley – Academy, 2001)

16. Vuzix are currently the market leaders in AR goggles: http://www.vuzix.com/iwear/ (accessed April 26th, 2010).

17. Babak A. Parviz at the University of Washington has already developed prototypes for AR contact lenses. See: Sean A. Stauth and Babak A. Parviz, "Self-Assembled Single-Crystal Silicon Circuits on Plastic," (Proceedings of the National Academy of Sciences, 19 September 2006).

objects. This is a VR-like understanding of space as a tool and interface, but allows the mapping of this onto physical objects. It creates the opportunity for spontaneously creating immersive environments that VR offered, but anchors these in real space. AR is a *mixed reality*, able to slide between small augmentations and fully immersive virtual environments.

AR AND ARCHITECTURE

With the materialization of AR as a viable technology, Manovich's thoughts on the architectural implications of augmented space can be expanded.
Commenting on Robert Venturi's work regarding digital ornamentation, he suggests that architects may integrate the virtual and physical to a level beyond the use of computer displays.

> While Venturi's [argument] logically connects the idea of surface as electronic screen to the traditional use of ornament in architecture and to as such features of vernacular architecture as billboards and window product displays, this historical analogy also limits our imagination of how architecture can use new media. In this analogy, an electronic screen becomes simply a moving billboard, or a moving ornament.
> Going beyond surface as electronic screen paradigm, architects now have the opportunity to think of the material architecture they are normally preoccupied with, and the new immaterial architecture of information flows within the physical structure, as one whole. [18]

In AR, the information flows become visualized, and gain their own structure. Virtual surfaces and objects combine to create new spatial configurations and ambiance. Far from simply representing information flows, this augmented layer may define the parameters of the space itself. With augmentation fulfilling roles of both information carrier and the delineation of special boundaries, the remaining functions of the built environment are brought into question. It increasingly seems though that an augmented future would place an emphasis on the inexpensive and dynamic augmented overlay, leaving the built environment

18. Lev Manovich, op.cit.

as infrastructure, a shed to be decorated via AR.

Manovich wrote that augmented space would provide "a challenge and opportunity for many architects to rethink their practice,"[19] pointing to a future where built space and corresponding contextual information together define a spatial experience. This is an exciting prospect for the architect, who may start to operate increasingly within the virtual sphere, the practice shifting into new and unexplored territories.

THE AUGMENTED CITY

The augmented city is already under construction; geo-tagged location data, notes, blogs, metatags, reviews, photographs, memories, videos, sounds, guides, recommendations, paths, zones, transactions and movements constitute its fabric, given order and meaning as it is inhabited. It cannot be viewed with the naked eye, so its true character is inexorably linked to the technology and interface that facilitates its perception, the mediating agent between the self and the city. Against the backdrop of the vast, intangible and rapidly expanding networks of the augmented city, I want to show that its occupation will not be an unknown and frightening experience, but a personal, domestic one. Among the many possibilities for discussion afforded by augmented space and AR, it is this subjective, meditated perception of the augmented city that my argument is based in.

In order to contextualise the migration of domestic values from the home to the human-computer interface, I want to stop for a moment to trace the domestic programme back to its origins, and show that the technology induced dislocation of domestic values is already in effect.

19. Ibid.


BETHNAL GREEN
WHITECHAPEL
ALDGATE
Clapton Pond 38
Nintendo
Vaseline
Esso
Ford
Dove
STARBUCKS
JOLLY TIME
ARRIVA

A NEW ENGLAND KITCHEN.

A HUNDRED YEARS AGO.

THE DOMESTIC PROGRAMME

The domestic programme can be viewed in terms of practices and activities that are commonly carried out in the home, such as washing clothes, preparation of food, and sleeping, but the significance of the home is much greater than these practical functions. The home carries a nuanced emotional and symbolic character, and can be understood as a state of mind. It is this reading of domesticity that allows comparison with and translation to virtual media.

The design of the house is the oldest function of architecture. Before academic, social and economic institutions required built manifestations, human beings built dwellings for the simple purposes of shelter, warmth and security. Since then, the concept of home has been constantly reshaped by changes in social values toward women and work, movements in architecture and art, technology and the media, taking on new roles and functions accordingly. Our conception of what 'home' represents is a result of many influences and historical events.

In *Negotiating Domesticity: Spatial productions of Gender in Modern Architecture,* Hilde Heynen offers a history of the factors that have shaped western domesticity. She explains that the pre-industrial house

> …was not a private shelter for the members of a small family, but rather a large structure that comprised workshops as well as residential accommodation … Before the nineteenth century, the house was far less a part of the public/private dichotomy that we have come to associate with it, nor did it bear the clearly

> gendered overtones that suggest that the house first of all belonged to the mother.[20]

Walter Benjamin observed that the "private individual" came into existence in the early nineteenth century, as a result of the industrial revolution.[21] Mechanisation removed the site of production from the home, and established it as a private space, opposed to the public place of work. This separation of home and work was responsible for the creation of domesticity, the home becoming associated with privacy, family and the woman, while the public sphere became the territory of work and the man.[22]

The home now gendered and belonging to a separate private sphere, became concerned with providing a place of rest and comfort for the male worker, and an environment in which to raise children. Benjamin saw the nineteenth-century home as a "receptacle for the person,"[23] a personalised 'shell' that encased its occupant/s. The home would mould to the patterns and beliefs of its inhabitants, becoming a representative and subjective space.

This model of living was opposed to the ideals of the modernists, who viewed this externalisation of the self onto material possessions as constrictive, oppressive and a result of capitalist commodity culture.[24] The decoration and ornamentation, which by then had become a part of domestic life was viewed as bourgeois and extravagant.

Heynen writes

> Modernist discourses have thus often hailed the struggle for authenticity and integrity, and have denigrated the needs for comfort and consolation … Architects … advocated the virtues of simplicity, authenticity, and integrity, contrasting these sober and "virile" qualities with the sentimentality, ornamentation, and ostentatious pretensions associated with ["effeminate"] eclecticism.[25]

Architects such as Adolf Loos, Ludwig Mies van der Rohe, and Le Corbusier attempted to reinvent the home as 'machines for living', by reducing the domestic programme to its most practical elements. Heynen notes that "modern

20. Hilde Heynen, "Modernity and Domesticity: Tensions and Contradictions," in *Negotiating Domesticity; Spatial Productions of Gender in Modern Architecture, ed. Hilde Heynen and Gülsüm Baydar* (Abingdon: Routledge, 2005), 6-7.

21. Walter Benjamin, *The Arcades Project*, trans. Howard Eiland and Kevin McLaughlin (Cambridge, Massachusetts: Belknap Press, 1999), 19.

22. Hilde Heynen, op.cit., 6.

23. Walter Benjamin, op.cit. 120

24. Hilde Heynen, op.cit.18.

25. Ibid., 3.

architecture was to provoke a revolution in dwelling culture by the introduction of themes and concepts such as the open plan, transparency between inside and outside, collective housing, rationalization, hygiene, efficiency and ergonomics."[26]

The model proposed was radically different to that of nineteenth century domesticity, and while the modernists undoubtedly had an influence on the home, their ambition to revolutionise it were overshadowed by the enduring capitalist ideals of property and ownership. Heynen states that "the ideas behind [modern architecture] were part of an elitist culture that was out of touch with the desires and concerns of the working classes."[27]

Heynen concludes with the view that home-making is now a form of *mimetic appropriation*, in which we "go through a mutual process of moulding in which the house and inhabitant become adapted to one another."[28] She states that "The traditional home is never completely absent from the modern home,"[29] that instead of revolution, modernist themes were absorbed into the persevering culture of domesticity from the nineteenth century.

I would also speculate that this integration of the seemingly opposed modernist ideals into domestic life led to new additions to the domestic programme. Modernist themes of transparency and openness merged with the nineteenth century representative and subjective space to define the home as a place of presentation. This view of the home as a semi-public manifestation of the self was demonstrated in the 1950s US house-proud revival of the cult of domesticity.

26. Ibid., 16.

27. Ibid., 19.

28. Ibid., 21.

29. Ibid., 24.

I recently visited the Ideal Home Show held annually at Earl's Court since 1908, hoping to gain insight into the current popular conception and idealisation of the home. The show is organised into seven categories with names like 'Ideal Gardens' (barbeques, tiki huts and Jacuzzis) and 'Ideal Woman' (nail extensions, holistic therapies and liposuction). As well as selling gadgets and labour saving devices, it also contains many 'futuristic innovations', including several show-houses, which present idealised models of domesticity.

Based around a nuclear family (with "exciting options for extension in the case of growing families!")[30] soft furnishings

30. From the promotional leaflet of the "Cub" modular housing system showcased at the exhibition. See http://www.cubhousingsolutions.com/ for more details.

promote the home as a place of relaxation, large tables and places for 'entertaining' suggest another function, a model of presentation, implying that the home is a representation of the self, and that the presentation of the home describes its occupants.

The revolutionary spirit that rejected the nineteenth-century model of the home as "a receptacle for the person" was absent, replaced by a preference and nostalgia for this model of personalised luxurious living. Domesticity now seems to inhabit a middle ground, taking occupancy patterns from the nineteenth century, and aesthetics (such as open plans and fitted kitchens) from modernism, as if the modernist image has become part of the bourgeois lifestyle.

Domestic ideals from the nineteenth century such as ownership, comfort, family and subjectivity are still very much a part of the home, and the superimposing of the transparency and ergonomics of modernism has also placed a focus on the presentation of the home as an expression of identity, driven and encouraged by consumerist culture. As a symbol of identity in capitalism, the home can also offer validation to its occupant as a quantifiable status symbol, with the sense that the self is legitimised and elevated through the tangible outward manifestation of identity it embodies.

These values constitute the domestic programme as an ideology. In addition to the practical functions that the home fulfils, domesticity can be seen as a state of mind, a set of emotions, and a process of constructing and presenting subjectivities.

POPULAR SCIENCE

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MONTHLY

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PAGE 9


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DISLOCATION

The model of domesticity I defined is a persisting ideology, but the practical manifestations of home and family continue to diversify. Since the latter part of the 20th century, technology and the media have had a particularly significant impact on the home, both in reinforcing the domestic ideal and transforming how it is practiced.

Since the introduction of print and radio into the living room, the home became the primary focus for media, with prime-time television designed to be viewed in the certain context of the home. The notion of the home as a 'separate world', unconcerned with the world of work became disrupted.

Joshua Meyrowitz argued in 1985 that technology and the media (particularly referring to television) have broken down the boundaries between the public (male/work) sphere and the private (female/domestic) sphere, liberating information from the control of men and democratising the distribution of knowledge.

> Electronic media undermine all previous societies' dependence on physical location as the prime determinant of access to and isolation from other people. Electronic media weaken the notion of men's spheres and women's spheres, of special huts or buildings, of places that are either sacred or profane. The new potential of electronic media to transform both work and home may finally remove the seeming necessity of the split in domestic and public domains and reintegrate men and women in a single social sphere of work and family.[31]
>
> ...

31. Joshua Meyrowitz, No Sense of Place: *The Impact of Electronic Media in Social Behaviour* (New York: Oxford University Press, 1985), 225

> With telephone, radio, television, and computer, the home has, in many ways, become a part of the larger world in which we have merely "roofed over and lighted fire in"[32]

Meyrowitz is referring to the invasion of the home by media, allowing its inhabitants access to the larger world from a domestic setting, and disrupting previously defined hierarchical values. This utopian vision has to some extent come true, but not without cost. Lynn Spigel argues that the invasion by technology and its requisite surveillance has turned the home into a site of *conspicuous production*, the merging of home and work spheres causing an environment where the occupants must be seen to be working at all times.

> The ultimate paradox, then, is that the postmodern luxury home has become the ultimate work terminal – a place where the resident is in a perpetually interactive state of preparedness – never allowed to simply 'waste time'. [33]

She contrasts this new high tech integration with an older model of labour-saving domestic technology, stating that the smart home "is specifically tailored to defy an older view of robotics that rendered humans passive."[34] This focus on the active (augmented space) as opposed to the passive (virtual space) is embodied in the *Smart Lifestyle*, a technology enhanced/mediated melding of home and work, production and consumption, public and private. Spigel argues, however, that rather than liberating women from domestic responsibilities, the smart lifestyle "promise[s] not so much a reduction in labor time, but rather an idealized view of multi-tasking that encourages women to juggle jobs."[35] She argues that technology and the media are agents in enforcing and expanding the domestic ideal, and further imprisoning women.

Despite the discrepancies created by practical realities, Meyrowitz and Spigel both see that the technological invasion of the home is disrupting the boundaries established in the nineteenth century. The home is becoming a hybrid site of production and consumption, due to media, technology and

32. Ibid., 225

33. Lynn Spigel, "Designing the Smart House: Posthuman Domesticity and Conspicuous Production" *European Journal of Cultural Studies Vol 8* (2005): 415.

34. Ibid., 415.

35. Ibid., 419.

the network. It is taking on new meanings and associations, and losing others.

THE NEW SITES OF DOMESTICITY

The discussion surrounding the disruption of domesticity by technology focuses on the effect within the home, but there is a parallel, less discussed emergence of domestic values within technology and the public sphere itself. With the merging of the public and private spheres, domesticity is not only invaded, but also invasive, leaking out into the city and the cloud. Using the definitions of the domestic programme I previously established, I will examine the invasive, externalised manifestations of the home.

THE OPERATING SYSTEM

In his essay *Virtual Domesticity: Renewing the Notion of Cybernetic Living and Working Environments*, Nick Caldwell compares the computer operating system (OS) to a domestic space:

> A computer is a domestic space for power-users. It has to be cleaned, maintained, customised and made unique. Like a house, it is a text that has inscribed on it every change and renovation that the occupant has seen fit to implement within it. [36]

He argues that an OS will start to take on character over time, in the same way that a house does. In the "disastrous" event of having to reformat, "Idiosyncratic settings that give the machine a unique personality for the user will invariably vanish."[37] He sees the OS as a customised and familiar landscape comparable to the home, stating that "…considered semiotically, [operating systems] relate very strongly to our patterns of interaction with living environments."[38]

A standard graphical user interface (GUI) will allow the user to customise the desktop background, colour schemes, screen saver, text size, and assign shortcuts or aliases that allow quick access to frequently used files, folders or applications via the desktop, taskbar or dock. Application GUIs may be further customised, with 'workspaces' that allow the saving of customised window layouts, and also allow the customisation of

36. Nick Caldwell, "Virtual Domesticity: Renewing the Notion of Cybernetic Living and Working Environments," *M/C: Journal of Media and Culture 3, no. 6* (2000), http://www.api-network.com/mc/0012/virtual.php (accessed April 26th 2010).

37. Ibid.

38. Ibid.

keyboard shortcuts, creating a personal kinaesthetic link between body and machine. The open source browser Firefox is one of the most customisable commonly used applications, with over ten thousand free third-party add-ons, skins and mods that change both its appearance and functionality.

Distinctive patterns of use also appear in the file structures and naming systems applied to personal data, specific to the user. Walter Benjamin's criticism of the nineteenth century house as hostile to outsiders[39] as applied to an OS can be understood by anyone who has tried to locate a file on somebody else's personal computer. It is this level of subjectivity gradually embedded into the OS that creates the need for user profiles on machines with multiple users.

The user must learn how the OS works, but the OS also moulds to the subjectivities of the user, a process of mimetic appropriation as described by Heynen. The OS becomes a domestic 'shell' (Benjamin), embodying nineteenth century domestic themes of ornamentation and subjectivity.

Different operating systems embody this to different degrees; MacOS is modernist, with limited options for customisation and enforced file structures (dedicated folders for music, pictures and movies, often accessed through another application). The lack of customisation is compensated for by the attention paid to interface design. In the same way that the modernist investigations obsessed over distances between appliances and ergonomics of storage to optimise cooking and washing, interaction designers use time of flight studies to optimise tasks on the screen.[40]

On the other side of the scale, the various UNIX builds are extensively customisable, and are sometimes edited at code level by their house/OS-proud users.

THE PERSONAL HOME PAGE

The world wide web allowed the virtual domestic space to become an externalised representation of the self. The personal home page was one of the first products of the web, and sites offering hosting and customizable templates to allow to creation of simple static pages without the needing to know HTML soon emerged. Personal home pages were sometimes linked

39. Hilde Heynen, op.cit., 17.

40. Fitt's law is an equation used in interaction design to determine how easy it is to click on a certain area of a 2D human-computer interface (HCI). It is expressed as Time = a + b log2 (D / S + 1), where D is the distance from the starting point of the cursor, and S is the width of the target. For more information, see http://www.codinghorror.com/blog/2006/08/fitts-law-and-infinite-width.html (accessed April 26th 2010).

by interest-based webrings, but were mostly disconnected and functionally private, constructed for the satisfaction of the author. The names of the hosting sites framed the home page as a personal space, with names such as Homestead, Geocities, and later Myspace, suggesting that this new colonisation of cyberspace was a personal property, a piece of the web to call home. As such, they became about the expression of identity, often including a bio and personal information, favourite books, films and music etc. Myspace and Hi5 added an element of community and a greater level of customisation, with the ability to add contacts, music and video, plus a commenting system on each page. More advanced customization was carried out through HTML and javascript hacks that required the user to directly edit the source code. Many scripts could be found on dedicated websites.

The home page was a subjective space, but one specifically engineered to be presented. While the OS forms organically around preferences and patterns of use, the home page was a more conscious expression of identity. John Seabrook (1995) described the home page as opposed to the home in terms of privacy and expression:

> A home in the real world is, among other things, a way of keeping the world out… An on-line home, on the other hand, is a little hole you drill in the wall of your real home to let the world in.[41]

While the home page is unarguably more public and accessible than the home, I take issue with Seabrook's view of the twentieth-century home as a purely separate sphere. Since the 1950s and the integration of modernist values, the home has also functioned as a medium for presentation, also observed in the Ideal Home Show's emphasis on spaces for entertaining guests. The home page not opposed to the home, but an extension of this externalised presentation of the self.
In the same way that the home is often constructed as an expression of identity through abstract associations of style, taste, cleanliness and adherence to social norms (or lack thereof), as well as more specific markers of identity such as bookshelves, ornaments and décor, home pages constructed

41. Quoted in Daniel Chandler, *Personal Home Pages and the Construction of Identities on the Web,* (2000) http://www.aber.ac.uk/media/Documents/short/webident.html (accessed April 26th 2010).

identity through text, design, finesse at code manipulation and hyperlinks.

THE HOME SCREEN / AGGREGATOR

The home screen can be found on any websites that requires a login, including social networking sites, online banking, online retailers and media sites such as youtube and flickr. Part of a tradition in technology of equating virtual concepts with spatial/architectural terms (gateway, domain, desktop, portal, window), the home screen can understood as an entrance to a building, a point of reference that usually links to common functions allowing orientation within the site, and almost always some degree of customisation and personalisation. The OS used to live only on the desktop, a domestic space within another, but mobile technology and remote logins have made the customised user profile accessible almost anywhere. The home screen resides in the formless, placeless cloud, accessed by username and password rather than lock and key.

Businesses such as Amazon have capitalised on this by creating deliberately structured home screens that respond to our domestic urges for familiarity and personalisation. While Amazon asserts that this space belongs to the user (welcoming you by name, showing you previous purchases, recommendations, and allowing you to create wish lists on a home screen entitled 'the page YOU made'[42]), content is provided and arranged by the service.

This marks a shift from the desktop/homepage domestic space as something created and maintained by the user, to a multi-authored, aggregated, dynamic and remote space that is still familiar, subjective, and has a sense of ownership. Twitter, facebook, friendfeed, LinkedIn and almost all other social media sites are based on the aggregation of user-selected feeds; in facebook's case, this takes the form of updated content and connections from friends, aggregated in the home screen. RSS readers such as Google reader combine user-selected news and personal feeds in a home screen that acts as a personalised newspaper. They are able to express familiarity through the layout's syntax, and subjectivity through the aggregation of feeds, even though the content may be completely different between logins.

42. Manovich's link between surveillance and utility is apparent in personalised services. Google search and mail, facebook and Amazon all display targeted advertising based on activity within the site.

Domesticity was born in the private home, but technology now invites users to appropriate an ever-expanding range of virtual sites. As the public and private spheres merge, previously recognised and located manifestations of gendered space and domesticity are migrating to the network:

- Email addresses and social networking profiles may turn out to be more permanent than postal addresses.
- Operating systems, common human-computer interfaces, and social networking sites are now thoroughly familiar and inherently ubiquitous, accessible even in the most unfamiliar physical environments. That may not mean much to you now, sitting in your usual surroundings, but means a great deal to the migrant or traveller, to whom facebook is the most familiar environment they can access.
- Families separated by distance can use email, blogs and social networks to feel connected to one another, and video conferencing to talk face-to-face, functionally occupying the same time and space.
- Our house still speaks about us, but we now have many more ways to broadcast our identities, via status updates/tweets, profile pictures, online bio pages and public conversations on bulletin boards.[43]
- Portable devices and streaming media can transmit entertainment on demand to any location that has wireless or 3G reception.
- Even the capitalist urge to own a space and fill it with possessions is breaking down in the context of network-distributed digital media; on-demand subscription services such as netflix and spotify negate the need to physically own films and music, and cloud services such as Google's docs and books allow access to both personal and shared files. Ownership is becoming a loose term, replaced by access rights to infinitely reproducible commodities.

The strongest domestic characteristic manifested on the network though, is the construction of subjectivities. Customising an

43. Interestingly, although the internet has the potential to afford great anonymity, people rejected the username or handle for the real name, real-life connections. Crafting your own persona and presenting yourself to the world was obviously more alluring than doing it for an anonymous avatar.

interface and aggregating feeds creates a set of subjective filters through which the network is viewed. Behaviour on the network is dictated by interests and responsibilities, forming a shell perfectly moulded to the user; a technology-facilitated manifestation of nineteenth century domesticity.

Right: two 'modded' desktops, customised to display various personal live feeds and information of personal interest.

This is an organic and natural migration. It is almost too obvious to say that the spaces we spend most time in are the spaces that we are most inclined to appropriate, but as an increasing amount of time spent is mediated by technology, it is understandable that these spaces—the OS, the home screen and the aggregator—would be the spaces that come to embody domestic values.

FIREFOX .HTML | OUTLOOK .EXE | ONENOTE .ONE | MSN IM | WINAMP .MP3 | NOKIA SUITE | µTORRENT CLIENT

FOLDERS: Alfred | DL | MSW | RA | Music | Videos | Images NOTES: 1 | 2 | 3 | 4 CPU: 15 RAM: 77 NET: 3.0 MB | 1.1 MB BAT: 100 RSS: Y! | BBC | ESPN

GMAIL
READER
CALENDAR

Y! SPORTS
ESPN.com
REALGM.com

NBA.com
NFL.com

NOTES

Periodically updating the image as I'm tweaking.

Slimming down the menu bar at the moment... for the most part it still looks the same as before: www.flickr.com/photos/alfurd/3541643518

Most of the content on the desktop was modified from my setup from December through March: www.flickr.com/photos/alfurd/3337687486

The wallpaper here is the black version of "Painting" by Mickka. The rest of the desktop is 100% Rainmeter.

12:36 am | folders | notes | bookmarks | stats | 06.08.09 | 14°C

14°
Cloudy

12:36 am June Mon


Teas
Coffees

ELECTRONOMADICS

As technology-mediated interactions form a greater part of our lives, previously programmed spaces may be occupied in new ways. Spigel showed that telecommuting allows the home to become a site of work and production, while Meyrowitz saw the home transformed into a centre for the consumption of media. As wireless networks and mobile devices proliferated, public spaces also became sites for new patterns of occupation. *Postmodern nomadology,* in its varying forms has been discussed by Paul Virilio (1986, 1997) and Deleuze and Guattari (1987) as a post-industrial process or condition. The terms *technomadism* (Roberts[44]) and *electronomadics* (Mitchell, 2004) have also appeared, referring to the technology-mediated (re)occupation of the city. William Mitchell writes

> There is a strong relationship between prevailing network structure and the distribution of activities over public and private places. … where networks go wireless, they mobilize activities that have been tied to fixed locations and open up ways of reactivating urban public space[45]

This customised augmentation of space with programme has consequences for the previously defined dichotomies of public/private, settler/nomad and home/work. It allows a new type of 'soft' occupation, in which the power to define programme in a space is partially returned to the user. The new sites of domesticity (as previously discussed) dislocate from the sedentary home computer, spreading across the city in clusters of momentary technology-mediated encounters, in cafés, hotels and park benches.

44. Steve K Roberts is the original technomad, and also coined the term. His Nomadic Research Labs can be accessed at http://microship.com/ (accessed April 26th 2010).

45. William J. Mitchell, *Me++; The Cyborg Self and the Networked City* (Cambridge Massachusetts: The MIT Press, 2004), 158.

The frequent flyer, whose most familiar surroundings are the ubiquitous non-places (Augé) that she inhabits for the majority of her time, has been joined by a new wave of urban nomads, who find that they are spatially liberated by wireless infrastructure:

> Anyplace was now a potential workplace. And this condition would only intensify as the technology of nomadics developed and proliferated. … the emerging, characteristic pattern of twenty-first century work is not that of telecommuting, as many futurists had once confidently predicted; it is that of the mobile worker who appropriates multiple, diverse sites as workplaces. [46]

Mitchell implies that work is the primary occupation of the electronomad, but mobile devices may equally be used as entertainment or social tools. The power afforded to us by the network and portable device has led to an increasing amount of technology-mediated encounters, and an understandable reliance on the infrastructure and devices that support them. When cut off from the network, or separated from our devices, we are forced to revert to behaviours that are dictated only by our surroundings, which is at best frustrating, and at worse debilitating.

The amount of time spent using devices and interfaces may be an important factor in our domestic appropriation of them, the virtual environments of the OS, application or home screen becoming our most frequented and most domesticated spaces.

PRIVATE/PUBLIC

As built space is gradually separated from programme, qualities that were once intrinsic to a given environment must be re-examined. Public and private are concepts larger than architecture, but ones that have found themselves deeply embedded in the design of buildings and cities. The network has expanded the concept of privacy away from these spatial definitions, and surveillance of space manifested in CCTV and sensor networks is undermining the ability of built boundaries to delineate private and public. Mitchell writes

46. Ibid., 153.

> Once, the natural condition of cities was opacity; architects created limited transparency by means of door and window openings, enfilades, open rooms, and public spaces. Today, the default condition is electronic transparency, and you have to work hard to produce limited zones of privacy. [47]

As the home is increasingly becoming a point of broadcast via social networks, and previously private practices (such as speaking on the telephone) are extended to the public sphere, we may conclude that our privacy is diminishing.[48] Surveillance and ubiquitous connectivity have and will probably continue to infringe on our sense of personal freedom, but the network has evolved a complex system of filters, encryption keys and privacy controls to allow us to limit the scope of our own transmissions. Online activity has become increasingly sophisticated in allowing users to define their own level of broadcast, e.g. (in ascending order of publicity) emails to a single recipient, password-protected videos hosted in the cloud, tweets to followers, status updates to friends and publicly broadcasted blog posts. These controls do not offer complete privacy (specifically placed bugs and wire taps have translated into mass electronic surveillance of innocent communications), but allow most of us an unprecedented amount of control to modulate and filter our own levels of privacy, irrespective of physical surroundings. Giambattista Nolli's famous map of Rome has become impossible to update as a 2D plan, as public/private are now temporal, graded and subjective concepts. They are less entrenched in spatial boundaries, instead being parameters controlled by the user via a system of nuanced, dynamic, automated and subjective filters and controls.

As Mitchell points out, personal private spaces may also be created by media and portable devices in public space:

> Audio headsets can create private acoustic bubbles in the midst of public spaces, and video headsets can create even more dramatic disjunctions.[49]

47. Ibid., 29.

48. See Ondi Timoner's 2009 documentary *We Live in Public* for an extreme scenario of living under surveillance.

49. William J. Mitchell, op.cit., 28.

This framing of privacy as a disembodied experience is very different to architectural notions of what constitutes 'private', but essentially achieves many of the same qualities of sensory seclusion, limiting your information input and output. Architectural definitions may be based on line of sight or acoustic insulation, but as more of our communications and actions exist outside of these sensory realms, we may be able to tolerate a shift away from the notion of privacy as physical boundary and towards privacy as an individual experience.

This experiential privacy, with the digital privacy afforded by the filters and controls discussed above, allow private and public space to mitigate spatial boundaries, becoming a programmatic characteristic that may be applied to a space through soft occupation.

CLOUD ARCHITECTURE

The 'soft' occupation of space empowers the electronomad to individually impose programme on to a space. This has led to hybrid, mixed-use spaces appearing throughout the city. Coffee shops for example, may simultaneously accommodate multiple programmes by providing a flexible environment with seating, toilets, refreshments and network connectivity. Mitchell writes

> There are far fewer good reasons to separate activities—such as working, being entertained, and pursuing your social life—when they are all supported by the same wireless, portable devices, and when unobtrusively handled in this way, they do not interfere with the activities of others. [50]

Architecture may be compared to cloud computing, in which processing and storage requirements are removed from the local disk and handled by a distributed network of servers (termed the cloud), accessed over the internet. Faster connection speeds have made this a viable alternative to owning local processing and storage resources, which lay dormant for most of the time. The cloud simultaneously serves multiple users performing a wide variety of tasks; it is an on-demand infrastructure that facilitates any operation requested by the user. The built environment becomes comparable to the

50. Ibid., 165.

servers that constitute the cloud's infrastructure, providing basic shelter and 'backend' facilities, while programme is 'soft', handled in the augmented perception of space. While Superstudio and Archigram explored these themes last century, (later represented by Rogers and Piano's Pompidou centre in Paris), cloud architecture proliferates now in the form of arenas, stadiums, theatres, lobbies, galleries, TV and film studios, parks, squares and coffee shops, providing basic facilities to allow the temporal 'soft' occupation of space. The augmentation may be as complex as a stadium-rock show, or as simple as a picnic blanket.

Cloud architecture must accommodate unpredictable and dynamic patterns of use, distinct from the programme-driven design of the 20th century. Mitchell notes that modernism's clear programming of space "makes little sense when wireless electronic devices can support many different activities at a single location or the same activity at many different locations."[51] While cloud architecture may exist as faceless infrastructure, Mitchell is optimistic in its potential to provoke a revolution within the profession:

> Architecture of the twenty-first century can … be far less about responding to such rigid programs and much more about creating flexible, diverse, humane habitats for electronically supported nomadic occupation. [52]

SEDENTARY SPACE

I have been focusing on the migration of domestic qualities from the home to the network, but the conversation surrounding electronomadics suggests that the sedentary physical home—the house or flat—may become obsolete with the shift to nomadic occupation.

The home is less decidedly private than the 19th century version of domesticity, but the complete disappearance of the home as a private and personal space would require vast shifts in our thinking and institutions. Irrespective of the experiential and information based privacy afforded by portable devices and privacy controls, physical private space is still required for many activities associated with the home. While we may protect ourselves from online attacks with antivirus software and

51. Ibid., 162.
52. Ibid., 162.

firewalls, built boundaries offer a physical security that cannot be achieved through these means. Private space is also usually preferable for intimate relations and personal maintenance tasks such as washing and bathing.

The electronomad is not homeless; rather she is empowered to appropriate any space via technology. Mitchell points out that "the ancient distinction between settlers and nomads … is eroding in subtle but important ways,"[53] – it is the soft and subjective occupation of space that defines the electronomad, not the lack of fixed abode. Rather than arguing that the home is disappearing, my thesis focuses on the dislocation and proliferation of domestic values across the city through mediated technology.

53 Ibid., 159.


Lazy
Beggers.com

AUGMENTED DOMESTICITY

In augmented space, where the real and virtual are constructed as part of the same urban fabric, users can simultaneously engage in private and public activities. The terms public and private themselves are becoming less useful in augmented space, as we deal with more subjective and less clearly defined distinctions. As the public and private spheres established in the nineteenth century merge, and space is perceived differently by each person, this terminology can no longer express universal spatial qualities. The boundaries and dichotomies through which we have constructed our cities are failing. Distinctions between public/private, home/work, mine/yours, male/female, settler/nomad, virtual/real, are becoming obsolete. We must find a new vocabulary with which to build the augmented city.

In lieu of public and private, I have found *broadcast and aggregation* to be useful terms when considering augmented space.[54] I use *broadcast* to refer to the information that is projected by the user, and *aggregation* to refer to the user-specific assemblage of feeds that forms a subjective reality. Instead of discussing the experience within the city in terms of access to a space or action, these terms distinguish what is sent, and what is received/recombined/represented.

Broadcast is a lifestream,[55] continuously feeding the network with location data, biometrics and published content. Each person curates a channel or unified feed, within which privacy levels for individual items can be assigned. The augmented city consists entirely of broadcast information, a gestalt of multiple subjectivities dynamically shifting to represent its inhabitants. Content produced in augmented reality can supplement the real with blogs, tags and markers, but also

54. *Open* and *proprietary* may be useful additional terms in discussing access and authoring rights within the augmented city. *Soft* and *hard* may also help in distinguishing the subjective and dynamic from the objective and fixed.

55. For more on the concept of lifestreaming, see Erick Schonfeld's article entitled *Jump Into the Stream* at http://techcrunch.com/2009/05/17/jump-into-the-stream/

mutate into new and original forms of games, storytelling, temporal art, and organisation of space. As augmented space is location based, users can create 3D textured meshes to overlay the built environment, allowing the construction and modulation of spatial boundaries and facades. This may be the digital restoration of historic buildings, visualisation of future projects, or a reinvention of architecture as virtual practice. Far from being placeless like VR, the augmented city depends on collaboration between those that physically inhabit it. The globalisation-induced homogenisation feared around the time of the millennium is replaced by localised booms of cultural expression and development.

Charles Leadbeater predicts that new media (also including AR) will lead to cloud culture in the next decade, a "vast cultural eruption" brought on by three factors expressed in an equation:

> More cultural heritage stored in digital form
> + More accessible to more people
> + People better equipped with more tools to add creatively to the collection
> = Exponential growth in mass cultural expression
> = Cloud Culture.[56]

New media and the network-facilitated distribution have turned more people into both the consumers and creators of culture. While individuals may create and publish content independently, multi-authored channels may also be created. This could lead to comprehensive virtual worlds, referred to as 'belief circles' in Vernor Vinge's science fiction novel *Rainbows End*. Due to the scale of participation involved, these are likely to be non-corporate open channels based around common world views. In *Rainbows End*, belief circles are user generated and are mostly dedicated to the visions of science fiction/fantasy writers such as Terry Pratchett. I believe that the framework must be progressive to be viable, favouring more general circles with potential for evolution such as 'Women's Institute' or 'Graphic Art' over prescriptive themes. These could of course exist and be viewed simultaneously.

An open framework for an AR system would allow

56. Charles Leadbeater, "Cloud Culture: The Promise and the Threat," (Edge: 2010), http://www.edge.org/3rd_culture/leadbeater10/leadbeater10_index.html/.

anybody to freely contribute to the city. Architecture is no longer a symbol of power and dominance by property owners, to be subverted by graffiti artists, but a collaborative and democratic expression of culture and occupancy of space. As Jane Jacobs notes, "Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody"[57]; using collaborative open-source values, the augmented city could be truly democratic.

Architects are presented with unprecedented opportunities. Freed from the laws of physics and restrictions of budget, (virtual) architecture becomes solely concerned with the experience and utility of space. Where we once found beauty in the elegant resolution of a detail or the acoustic and tactile qualities of a space, augmented cyborgs will appreciate the narrative/temporal structuring of a space, the quiet simplicity of an intuitive spatial interface, the intelligent crafting of emotive scenes, resolution and detail. Architecture will merge with the filmmaking, game design and programming, an experiential form of new media to be practiced and broadcast by anybody so inclined.

The notion of the fixed 'ideal' space as manifested in the Ideal Home Show is replaced by a temporal, dynamic and interactive construction of reality. While AR affords the possibility of escape into virtual worlds, simulated landscapes and manufactured personas, the failure of VR and the success of web platforms anchored in the real has suggested that a collaborative, imperfect but developing environment is preferable to a simulated 'ideal' space.

As the construction and modulation of space becomes an inexpensive and collaborative process, it can start to separate itself from capitalist ambitions and hierarchies, focusing not on the individual, but on the collective. The decentralised power structures and democratisation embodied in the open-source developer community may be translated to the organisation of space using AR. Modernist ambitions toward a classless, collective society are resurrected, but not at the expense of the 'bourgeois' and 'effeminate' practices of ornamentation, customisation and appropriation associated with the domestic/private sphere.

57. Jane Jacobs, The Death and Life of Great American Cities (New York: Random House, 1962).

The augmented datascape allows certain freedoms of possibility carried over from VR in the creation of custom, user generated virtual environments, and a potential to democratise the production of space in the same way that digital video, non-linear editing and online distribution democratised film-making. This is an exciting proposition, and important for architects as it undermines creative expression in the built environment, pushing architecture and creativity into the 'soft' occupation of space.

The electronomad, with an enhanced perceptory array of filters and controls, can reconfigure the augmented city to suit her needs. Programme is soft, even the qualities and perceptual boundaries of a space may be modulated through the HCI. She applies meaning to the built infrastructure; previously defined programmes are broken down into their constituent activities and requirements, and recombined as necessary to create hybrid and specific conditions, new clusters of activity. She controls and defines the space she inhabits, bringing together channels and feeds, including tools and spatial definitions, to create a customised and subjective occupation. She constructs and maintains her domestic augmented interface as the environment adapts to her patterns of use. This activity is supported by cloud architecture; buildings as infrastructure, providing warmth and shelter to cyborgs, and orientation, metadata, wireless connectivity and surveillance to computers. The built environment becomes a landscape to be read by machines, *Architecture Parlante* reinterpreted for the augmented age

Augmented reality allows a re-thinking of long-established fundamental architectural values. As the importance of the wall or façade shifts away from privacy, security and shelter, and toward the presentation of information, architects have also attempted to make buildings responsive and kinetic. Venturi famously championed the building as a communicative medium, using symbolism, screens and the billboard vernacular. The introduction of media facades is a more recent physical layering of information over structure but despite these attempts, the built environment displays a fixed message and is subsequently unable to compete with cheaper, more interactive and more useful mobile technology. In AR, walls are no longer

associated with privacy or security, but with the perception of space, control and display of information. Virtual 'walls' (although they are not necessarily flat rectangles), are created not as a barrier, but to present information. In this context, spatial dimensions matter less than viewing angle; space must be arranged for efficiency of communication within the limited 360°/180° field of view, and with the user at the centre of the universe. Venturi's mantra of "architecture as communication" is manifested literally as the city becomes the interface, a virtual datascape to be physically inhabited.

As we shift from the virtual/real dichotomy into augmented space, the physical manifestation of the city becomes only one of many parallel geolocated realities.
The augmented city is too vast and disparate to be understood as a whole. It contains an ever-accumulating amount of content, expanding infinitely, layer on layer.
The augmented city does not hover around or over the built environment, but resides as formless packets of discrete data in the cloud, outside of spatial dimensions. It cannot be seen with the naked eye; it must be viewed through a lens, a human-city interface. Viewed in AR, the augmented city is instantaneously streamed to the HCI. It can only be read subjectively, appearing spontaneously as it is requested, decoded, and presented. The augmented city is an intangible cloud of information, but observation imposes subjective order and structure on it.

Aggregation is the subjective recomposition of the augmented city. As aggregators on the web collect and display feeds that are of specific interest to the user, AR aggregators combine broadcasted feeds and channels that the user has subscribed to, creating a personalised and subjective reading of the city. Such world views are likely to aggregate feeds of friends and family, location-based tags from recent history, programmatic tools for task-based occupation, and environmental modifiers from one or many groups and belief circles; these may recreate past environments or inspire new movements in architecture, and may be selectively displayed or merged together.

Augmented space must be mediated. Computer mediated interactions become a greater part of our everyday

routine, the next step in the post-human evolution of the cybernetic organism. Our computers become integral to our understanding of the world, part of our extended nervous system. Moulding organically around our interests and idiosyncratic behaviours, the HCI becomes not a rigid shell, but a flexible skin, through which the augmented city can be decoded and understood. The aggregating interface is subjective, unique to the user, customized and familiar, the domestic presence in the augmented city. The way we consume space changes from authoritarian imposition of built structures to a dynamic and customised assemblage of feeds, reconfigured and combined to display a multi-authored expression of subjectivity, familiarity and identity. We may see aggregated space as domestic space, chosen and constructed to fit the exact interests and requirements of the user. It is the virtual 'interior', the cockpit through which the world is understood and modulated. This domestic occupation of the city will be a defining characteristic of the augmented space paradigm. Augmented domesticity is not a home in the contained sense that we traditionally view it, but a process of projecting the self on to the environment: domestic appropriation of the entire city.

The implications of augmented space and augmented reality are far-reaching and could dramatically change the way we construct and occupy space. The network is in the process of consuming the music and film industries, causing major changes in how these media are created, produced and distributed; Augmented Reality introduces the possibility that the production of space could also eventually become a de-centralised, democratised process, removed from the power of the intellectual elite. For architects to be able to contribute to the virtual production of space, we must understand that the modes of occupation within the built environment are shifting, increasingly influenced by technology and the network. The domestic programme, historically considered inferior to the public/work/male sphere, has become embedded in technology-mediated interaction; we may not realise the VR dream of uploading the soul, but we may yet upload the home, as a set of values and subjectivities.

Now, in the early stages of the augmented space paradigm, we are already starting to spontaneously augment

space with individually applied programmes, reading the city through subjective, mediating filters. Our occupation of space no longer matches its built form. We need to be progressive in the design of homes and public spaces, with the understanding that the built environment is just one among many layered realities. The old architecture answers to an obsolete model of domesticity and human being; we must find new physical and virtual architectures for the electronomad in the augmented city.

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BLOGS/FEEDS

The personal blogs of thinkers within the industry have been a useful resource in researching developments in augmented reality, and are therefore listed here.

Bruce Sterling, *Beyond the Beyond,* http://www.wired.com/beyond_the_beyond/

Tim Maly, *Quiet Babylon*, http://quietbabylon.com/

Robert Rice, *Curious Raven*, http://curiousraven.squarespace.com/

Zugara, *We are organized chaos*, http://www.weareorganizedchaos.com/

Tech Crunch, http://techcrunch.com/

The Augmented Times, http://artimes.rouli.net/

Games Alfresco, http://gamesalfresco.com/

IMAGE REFERENCES

Page 3. Keiichi Matsuda

Page 4. The heads up display of an F-15E Eagle aircraft. Source: Brad Fallin / Wikimedia Commons. http://commons.wikimedia.org/wiki/File:F-15E_LANTIRN_IR_HUD_image.jpg

Page 13. Keiichi Matsuda

Page 14. *A New England kitchen. A hundred years ago.* Source: Library of Congress Prints and Photographs Division Washington, D.C. USA

Page 19. Cover of a 1950s issue of *Popular Science*. Source: "No Pattern Required" blog. http://www.nopatternrequired.com/?p=150

Page 20. Home computers. Source: Paul Zimmerman. http://www.zimmtech.net/portfolio.htm

Page 29. Modded desktops. Source: Flickr (above) http://www.flickr.com/photos/30115255@N06/3377217423/sizes/o/, (below) http://www.flickr.com/photos/alfurd/3601445797/sizes/o/

Page 30. Man on phone with laptop at Heathrow airport. Source: DHD Multimedia Gallery

Page 37. Man sitting on street with laptop. Source: "Lazy Beggars" blog. http://lazybeggers.net23.net/en/laptop.html

Page 38. Keiichi Matsuda