Urban Intervention and Augmented Space: A Territory to be Considered within the Discipline of Architecture

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A Research Paper submitted to the University of Dublin,
In partial fulfilment of the requirements for the degree of
Master of Science Interactive Digital Media

I declare that the work described in this Research Paper is, except where otherwise stated, entirely my own work and has not been submitted for a degree at this or any other university.

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Acknowledgements

I would like to thank my supervisor Mícheál Mac an Airchinnigh for his guidance during my research for this paper.

I would also like the thank Brid Doyle, Pat Doyle and James O Donoghue for their continuous and generous support in all my endeavours

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Chapter 1

Introduction

The implementation, design and layout of the urban landscape is initially reliant on nominative designation, that is, it is first set out by the urban designer or the architect. But the potential nature of the spaces, inherent to the original and static arrangement of its infrastructure, is the result of the unfolding relationships of people, interaction, condition and movement. The impact of human inhabitation on physical space post production is often overlooked as a factor which affects the overall zeitgeist of a building.

Physical urban fabric is comprised of inert, inactive components, but through social interaction between city inhabitants, the built environment becomes an agent of movement and communication. Although physical structure may continue to remain solid and unchanging, the nature of spaces within a city is indebted to the manifesting activity of the collective. It is human operation and how we choose to use space which thus informs our feeling and perception over physical form.

Technology is now a prime catalyst of human activity, as urban space is now perpetually saturated with dynamic multimedia information technology. Through the data exchange occurring through location based and ubiquitous mobile computing, the distinction between physical space and data space is becoming increasingly questionable. Lev Manovich describes this condition as '*augmented space*' that is, to give a brief definition;

'*The physical space overlaid with dynamically changing information. This information is likely to be in multimedia form and it is often localized for each user'* (L, MANOVICH, 2006 p 219)

This research paper aims to explore the physical and non-physical organisation which emanates as a result of pervasive technology embedded within architectural space. The nature of spaces in this respect is now largely dependent on a pervasive use of technology throughout the urban landscape by a collective body of individuals. At any given time, one finds themselves within '*augmented space'*, a hybrid of data space and physical space, and within access to information technology which influences a predetermined idea of their surrounding physicality.

We are passively aware of multiple spaces, both cyber and physical, which influence our perception of the urban environment. Thus our conventional understanding of architecture and urban design as a primarily physical domain is challenged. As written by Malcolm McCullough, author of Digital Ground;

'*The built environment organises flows of people, resources and ideas. Social infrastructure has*

long involved architecture, but has also more recently included network computing. The latter tends to augment rather than replace the former; architecture has acquired a digital layer' (M, MCCULOUGH, 2004, p47)

As '*augmented space* becomes increasingly pivotal in the formation of social interaction within the urban landscape, it is important that its impact on the built environment be considered. Perhaps the conventional role of the architect as the prime instigator of space must also be questioned in relation to this.

Over recent years due to a large influx of new mainstream technologies, a growing body of research into media, communication and information technology has emerged. Human relation, interaction and use of space has been theorised comprehensively, yet it is surprising how little architects have involved themselves within this discussion, particularly with regards to ubiquitous technology. Anthony Dunne, the author of Hertzian Tales writes;

'Few architects have considered narrative space within the context of an electronic consumer-driven society and even fewer in way that specifically addresses experiences centred on electronic products' (A, DUNNE, p 76)

The impact on physical place with respect to this influx of technology has only just begun to be discussed. Even less so, the role of the architect with respect to spatial and cybernetic transformation and the hybrid space which results seems to have been largely under-theorized.

This paper aims to focus on the emerging technological elements which manipulate the urban landscape in order to construct a phenomenological discussion which expounds the impact of augmented reality on our perception of space. It attempts to identify a shift from the conventional understanding of architectural space as a physical entity towards *'augmented space*' as a result of pervasive and ubiquitous technology. As interactive technologies, indigenous to the urban realm, now allow the individual to manipulate, lay claim and personalise both physical and cyber territories, it is possible that within *'augmented space*' creative control of territory shifts from the nominative individual (such as the architect, planner or urban designer) towards the public.

Radical architectural practises such as *Archigram*, established in the 1980's, and contemporary architectural critics and academics such as Jonathan Hill and Jane Rendell abnegate the traditional notion of the architect as the prime instigator of space, and instead vouch for the formation of architectural space as a collective process. They would argue that although initially space is designated and laid out by a nominative designer, it is the use, re-use, destruction and decay of space by the *user* which informs atmosphere and the continuing identity of a space.

Urban intervention could be considered as a very literal example of this concept. In the expanded

and often impersonal urban landscape, individuals seek to find identity through street art and graffiti. Although this alters the initial intentions of the architect, creative interventions which aim to achieve personal relevance to inhabitants, transform static city surfaces. As its provocative nature stimulates response, stagnant built material thus becomes essentially dynamic and interactive over time. Urban intervention becomes representative of the identity of a city's inhabitants. In essence, I would like to propose that such art forms could be theorised as a predecessor of location based interactive technology, which is also based on response and rooted in physical place.

To a very large extent, interactive technology and socio-technical networks provoke and inform activity and interactivity within the urban realm. Interactive technology enables the city dweller to express identity and further engage with their city, yet it is primarily within *'augmented space'* that this occurs. As technology now provides us with expanded and diverse means of laying claim to both cyber and physical territory, ubiquitous computing could be thought of as a catalyst of change, accountable for a diversification and transformation of traditional notions of architecture.

I believe that augmented urban space and its inherent interactive technology thus opens up a debate as to who lays claims to the formation of space, the nominative designer or the collective public through their everyday actions. In this paper, I propose to challenge the traditional notion of the architect as the prime instigator of space, as creative control within the hybrid boundaries of *'augmented space'* is essentially in possession of the collective.

I shall use the hypothesis of an imaginary application which allows for urban intervention within both physical and cyber space to further investigate the concept of augmented space. Although this concept is at present a fictional entity, I shall use it to create phenomenological discussion concerning the concept of augmented space. I will delineate how such technologies not only transform traditional ideas of physical built form, but also encompass the potential to actualise and materialise the concept of augmented space.

Chapter 2

An Introduction to Architecture: An Historic and Autonomous Discipline

I will first establish what is generally understood as architecture and the conventional role of the architect. The discipline of architecture requires the knowledge and implementation of many trades and has been understood by a variety of definitions throughout history until the present day, as described by Tom Wiscomber in 'Emergent Models of Architectural Practice';

'Architectural practice has mutated and flowed between various identities for centuries, moving

toward and away from engineering, toward and away from construction, becoming sometimes more specialised, and sometimes more convergent' (WISCOMBER, 2006, p 59)

Renaissance architects were associated with primarily culture and art. They chose to distance themselves from sole construction and engineering. Their work reflected the ideals of the Renaissance itself with decorative elements, classical orders and strict proportion.

It was the Gothic architects who first began to involve themselves in all aspects of the building trade. Throughout this period architects began to approach the design of architecture beyond perfection and set proportion, during which time the incorporation of the scientific properties and function of materials also became fundamental considerations of practice. The architecture of the Gothic period became the art of merging all aspects concerning the design of physical space into a coherent and cohesive whole.

Similar to Gothic architects, modern architects can be associated with the science of building. Yet in contrast, they strived for efficiency. They abnegated decoration and non-functional elements focusing primarily on efficiency, performance, experimentation and the implementation of new materials. Modern architects generally collaborated with technical experts to investigate and test the potential of material properties such as transparency.

Postmodern architects could be associated with a conflicted or exclusive mode of design whereby layers of engineering, materials and processes remain striated and reducible to component parts. Postmodern architecture reflects an assembly of dematerialisation and atomic thinking rather than the coherent whole. (WISCOMBER, 2006, p59)

Considering all the aspects and trades which constitute architecture, overall the discipline could be said to be primarily concerned with the visual, conceptual, physical orientation, layout and design of space, most particularly in relation to human culture, behaviour and organisation. For example, Architecture has been described in contemporary times by Reinhardt and Jakovich in an article entitled 'Trivet Fields: The Materiality of Interaction in Architectural Space' is as follows;

'*Architectural design is the process of specifying articulations and variations in materials within these conditions for the purpose of satisfying and potentially influencing human behaviour and experience in the space. This implies that traditional architectural design anticipates, and arguably orchestrates, human interaction in and with the space, through materiality'*
(REINHARDT & JAKOVICH, 2009, p 217)

The practise of architecture is not solely the manipulation and design of static geometrical built material, but the design for human habitation. Fundamentally, with regards to traditional notions of architecture, the study of human interaction informs the assembly of individual

component parts to achieve a functional and cohesive whole. It is thus clear that human interaction plays a major role in the use and thus, the implementation of architectural space.

The articulation and design of physical space, in a sense is determined by the predicted actions, behaviour and use of a client, body or individual. The input and desire of the client is a major consideration in the work of an architect, however it is the architect that ultimately determines the result. The final design is unmitigated and attributed to the architect and thus it is implied that conventionally, the architect is the prime instigator and manipulator of space. As described in the 1940's by the renowned modern architect Le Corbusier in his book 'Towards a New Architecture',

'The Architect, by his arrangement of forms, realises an order which is a pure creation of his spirit' (LE CORBUSIER, 1923, p8)

Conventionally therefore, the design of space is set out by a nominative designator, the architect, urban designer or designated team. The architectural profession is generally perceived as an autonomous discipline. As described by Jonathan Hill in more recent times;

'The principle aim of the profession is to provide the products and practises of its members with an iconic status and a cultural value to suggest that only the work of architects deserves the title architecture' (HILL, 1998, p 32)

However, in truth, it is possible that these statements come about as a result of governing bodies and institutions which aim to strengthen and maintain the profession and to ensure its demand and continuity. In actuality, they may evade contemporary and critical discussions of space, particularly in relation to technology. Recent and innovative academic research which expounds contemporary notions of space would argue that instead, the city is the product of the collective. The architect is not the sole manipulator of space and, in truth; the urban landscape moulds itself more so through the inhabitation and activity of many.

Chapter 3

Architectural Space in a Technological Era

'Archigram' was an innovative collective of architects who first sought to question the relevance of architecture as the set, static and physical layout of space by a single designer or set of designers. Using strong, innovative and visual artworks, they provoked a debate about the role of human activity in informing the quality and perception of space. They also began to question the emergence of technology in relation to architecture, as quoted by Archigram member Warren Chalk,

'We are in pursuit of an idea, a new vernacular, something to stand alongside the space capsules, computers and throw-away packages of an atomic/electronic age' (SHEPARD, 2011, p17)

'Living City' was an exhibition set up by Archigram at the Institute of Contemporary Arts in London in 1963. The 1960's in London at that time epitomised the modernisation of the UK's cities. A major avant-garde art installation, 'Living City' sought to claim that our experience of urban space was more influenced by ambient, kinetic and immaterial activity than the physical articulation of static space. (SHEPARD, 2011, p 17) They suggested that the new materials of architecture were in fact human inhabitation and activity and that it was the elements of human activity which informed the quality of space rather than physical material. *(Fig. 1-2)*

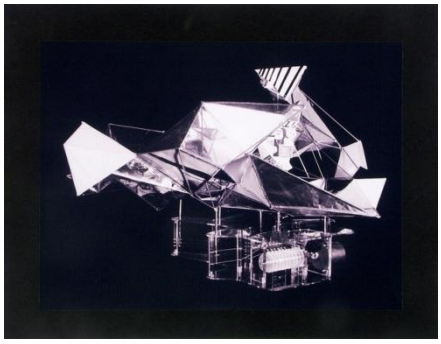

Fig.1: Speculative Proposal Model: The layered infrastructure of the city as a living organism. Exhibit at Living City Exhibition

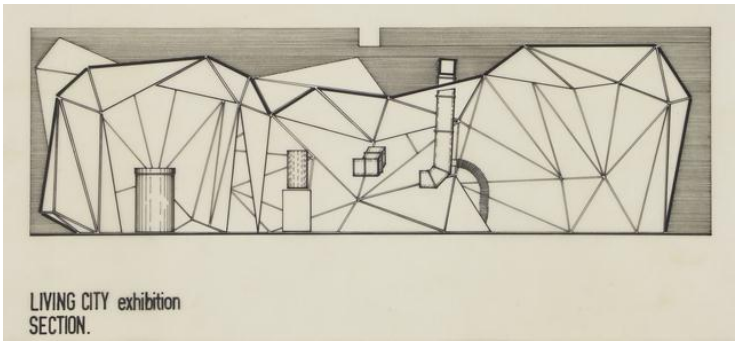

Fig.2: Section of Living City, Living City Exhibition

'Through image, text, sound, and light, this "assault "on the senses that physically enveloped visitors attempted to convey the essential property of the city as being in a state of continual becoming, and to enshrine physical and cultural pluralism as an indispensable quality of urbanism. "Living City" proposed an "existentialist" approach to design'
(SADLER, 2005, p 53)

Such an emerging and innovative concept is distant to earlier definitions of architecture as delineated in the previous chapter. Yet considering the recent influx of pervasive technology throughout the urban landscape, it is an important and pertinent question with regards to

contemporary notions of architecture. Malcolm McCullough, author of Digital Ground writes;

'Digital networks are no longer separate from architecture... pervasive computing has to be inscribed into the social and environmental complexity of the existing physical environment' (MCCULLOUGH, 2005, p xiii)

Archigram could not have predicted the major influx of technology and data-saturated space which would emerge in the coming decades. The extent to which these technologies are utilised and the impact they have on human interaction and activity within our cities in contemporary times would have been inconceivable in the 1960s. It is a discussion which is highly relevant in the coming age.

Mark Shepard, an artist, architect and researcher based in New York, whose work addresses new social spaces and signifying structures of contemporary network cultures, was the curator of an exhibition which elucidates the impact of technology on the urban landscape. It was presented in New York in 2009, along with a publication entitled *' The Sentient City: ubiquitous computing, architecture and the future of urban space'.* The exhibition and publication raise the following question;

'As the data clouds of the 21st century descend on the streets, sidewalks, and public spaces of contemporary cities, we might ask: to what extent are these informatic weather systems becoming as important as, possibly more important than the formal organisation of space and material in shaping our experience of the city?'(SHEPARD, 2011, p18)

This question echoes the contemporary discussions of architectural critics such as Jonathan Hill and Jane Rendell, who argue that it is human inhabitation and interactivity which most reshape and inform the urban landscape. The collective use of embedded technology becomes a prominent architectural question, as technology in a sense could be deliberated as a catalyst of human interaction and activity. As described by Marshal McLuhan, technology is an extension of our person, as it is a human creation result of an inherent desire to communicate and articulate to one another;

" ..our human senses, of which all media are extensions, are also fixed charges our personal energies, and that they also configure the awareness and experience of each one of us.."(MCLUHAN, 1964, p21)

Technology has the potential to heighten, exaggerate and increase correspondence. Thus, if one considers again that it is human interaction and activity which lie at the core of the implementation of space, then technology as an extension of human interaction, must therefore be a prime consideration in contemporary and emerging discussions of architecture. With the recent influx of pervasive technology throughout urban space, it is very likely that the definition

of architecture is another verge of change, as it undeniable that technology, as a catalyst of human activity, has become an integrated and indispensable element of the built environment. It is inevitable that digital infrastructure will have an impact on both the use and reshaping of physical space and thus emerging renditions of architecture. As Mark Shepard writes;

'To the extent that these technologies and how we use them influence how we experience the city and the choices we make there, they challenge the role traditionally played by architects in shaping the urban environment, a role which historically, with few notable exceptions, focused predominantly on the organisation of space and material in terms of form ' (SHEPARD, 2011, p10)

To elaborate on this concept further, an architectural program can be described as a set of functional requirements or uses ascribed to a set of spaces that, when taken together, make up a building. Each of these ascribed spaces is associated with a set of normative activities. Therefore, encoded in the architectural program, behaviour and activity are predetermined through material form.

At the scale of urban design, this concept comes in the form of urban planning which governs the use of public space. However, what is often evaded by this generic program is that, regardless of the initial designated and functional form, people will use and inhabit space to their own personal need which often contradicts or differs from the architect's original intention. Therefore;

'The architecture becomes a stage-set for a set of spatial practises that, in turn, enact the architecture' (SHEPARD, 2011, p24)

If it is more so the activity of the collective which informs the use and layout of space, then who may lay claim to the role of designer, the architect or those who use it? Their ideas contradict Le Corbusier's statement as previously outlined which promotes the autonomy of architecture and which implies that the architect is the sole creator of space. Again, as space is now consistently data-saturated and as technology may be described as a catalyst of human activity, this question is highly pertinent in contemporary discussions of architecture. A hierarchical and inaugurated approach to architecture is no longer applicable in the technological era, which presents extended and more complex cultural systems and networks. As expressed by Wilfred Wang in *'Quality Matters', New Irish Architecture 24, AAI Awards 2009,* ;

'Complex culture is the matrix of slow but deeply rooted development, and cannot survive the constant onslaughts of egotistic acts of de-contextualising self-expression' (WANG, 2009, p8)

For example, Jane Rendell in an essay entitled 'doing it, *(un)doing it, (over)doing it yourself'* argues that architects may lay claim to the initial layout of space but that through human inhabitation and consumption, the resulting change of layout, design and atmosphere of space is

the responsibility of the user. It is the consequent and unfolding activity within space which informs our feelings and perception of place.

'New temporalities, ones which go beyond the construction of a set of pre-designed drawings, can also be created through consumption. Through consumption, the traditional logic of need, which requires the architect to design for perceived use, can be upset' (RENDELL, 1998, p 232)

FAT architecture (Fashion Architecture Taste) is a contemporary award winning architectural practise with an international reputation. Similarly to Hill and Rendell they urge that the most meaningful qualities of architecture are those which come about from human occupation. They establish that such qualities are not represented or predicted by the architect. The architect as the sole manipulator of space is therefore based on a misleading definition of space. As discussed by FAT in an essay entitled 'Contaminating Contemplation';

'A prevailing myth would have it that space is the tool of the architect, that the architect is the manipulator of space. Admittedly, this myth has its basis in numerous conceits, not least the failure to offer a reasonable definition of space and the misplaced arrogance which excludes from this space that architects manipulate, all other determinates outside of the architectural space- the space of economics, geopolitics, bureaucracy' (FAT, 1998, p79)

To conclude therefore, it could be surmised that two prominent considerations about the practise of architecture arise with contemporary influxes of pervasive technology; the first, is what impact do social-technical arrangements have on the inhabitant's personalisation and alternation of designated 'architectural' space? And second, in this instance, does the architect or urban designer truly remain the nominative designator of physical space?

Chapter 4

Augmented Space as a Socio-Technical and Fundamental Layer of the Urban Realm

As defined by Keller Easterling in *'The Action is the Form'* digital infrastructure and communication technology is;

'The binding medium or current between objects of positive consequence, shape and law, yet it is also the point of contact and access, the spatial outcropping of underlying laws and logics' (EASTERLING, 2011, p154)

Digital infrastructure and communication technology could be described as an underlying substrate, which arranges and organises the ebb and flow of people within physical space. It is a function of invisible processes and communication in contrast physical architectural space which is conventionally understood as unmoving, formal and physical organisation of geometry,

'The discipline of architecture still maintains its primary currency in singular durable objects that can be framed and represented' (EASTERLING, 2011, p154)

It is generally understood that objects which are not dynamic or expressing movement are inactive. However, the philosopher Gilbert Ryle suggests that disposition always possesses sequential and potential action. (EASTERLING, 2011, p 155) Easterling surmises that this concept exists similarly in architecture with regards to infrastructure in that;

'Infrastructure, whether composed of digital building or urban components is dispositional. It is made up of action just as much as it is made of concrete, bits, cables or CPUs. It does not constitute an event, but must rather be observed over time as potentiality, capacity, ability or tendency' (EASTERLING, 2011, p 155)

Active, infrastructural and emerging technological models must possess an underlying physical organisation of geometry and social groups. The use and interaction of digital infrastructure thus informs movement or disposition within physical space. This raises the interesting question, in this technological age, that what may constitute as architectural space is thus not always the static organisation of geometrical space, but also the unfolding relationships and movements which occur inherent to its use. This concept correlates very closely to the ideas outlined by both Jane Rendell and Wilfred Wang.

It also reflects the ideas of Archigram in the 1960's more closely now than it did then. As previously discussed, the nature of architectural space is largely dependent on the activity of those who inhabit it and the activity of internal digital infrastructures. In contrast to the 1960's, broad regions of contemporary urban space are now becoming embedded and distributed with technological systems and infrastructure. For example, in 1990 there were 5 million mobile phone users in the United States, which in 2007 increased to 225 million. (VARNELIS, FRIEDBERG, 2007)

Laura Forlano, in a dissertation entitled, 'When Code meets Place: Collaboration and Innovation at Wi-Fi Hotspots', writes that,

'We are at a turning point. A digital information layer is rapidly expanding throughout the physical spaces of our homes, offices, cities and towns' (FORLANO, 2011, p 8)

Described by Lev Manovich as '*augmented space'*, this digital layer consists of an extensive

range of mobile and wireless technologies, wireless networks, Wi-Fi hotspots, cellular networks, Bluetooth headsets and so on. These systems collect, store and process information activated by the movement and interaction of the people who occupy it. Physical space is being filled with electronic information, which has spilled out from original, static place on the desktop. The concept of virtual reality, whereby cyberspace is experienced through a situated and set monitor is now being replaced by the augmented experience of real life, extended through the use of pervasive technology;

'*The previous icon of the computer era – a VR user travelling in virtual space- has been replaced by a new image: a person checking her email or making a phone call using her PDA/cell phone combo while at the airport, on the street, in the car, or any other actually existing space'* (MANOVICH, 2006, p 221)

Anthony Dunne, author of Hertzian Tales, writes that through our use of transportable, ubiquitous devices we enter a conceptual space which is between the mind and the physical world. He surmises in a chapter entitled Physcosocial Narratives that;

'Electronic objects generate a conceptual space where interactivity can challenge and enlarge the scheme through which we interpret our experiences of everyday electronic objects and the social spaces they mediate' (DUNNE, 2005, p 86)

Technology and socio-technical networks further skew the definition between notions of pure physical architectural space and its embedded activity. To re-iterate, the underlying geometry and organisation of physical matter is enlivened with dynamic and digital infrastructure, informing the movement within and disposition of physical space. Such technologies and socio-technical networks could thus be understood to transcend the boundaries and parameters of the physical by extending opportunity within augmented space. Allesandro Aurigi editor of '*Augmented Urban Spaces: Articulating the Physical and Electronic City*' writes that;

'Relationships are extended and multiplied, and urban spaces get literally 'augmented' by this, as more becomes possible' (AURIGI, 2008, p 6)

In essence, ubiquitous technologies are thus responsible for the creation of a new phenomenon known as 'augmented space', the hybrid territory of cyber and physical. Lev Manovich writes of three examples of technological applications which dynamically deliver data to, or extract data from, physical space, all of which are currently in wide use and which create '*augmented space*'. The three which he describes are as follows; video surveillance, mobile/wireless media, computer video display (MANOVICH, 2006, p221) He suggests that these three technologies;

'Make physical space into data space: extracting data from it (surveillance) or augmenting it (cell space, computer displays)' (MANOVICH, 2006, p221)

Manovich defines 'augmented space' as the overlaying of dynamic data onto physical space, whereby there is an exchange of data by both parties. The paradigm of desktop computing, conventionally understood as the use of situational technology, is now shifting towards socio-technical, mobile and location based computing. Thus the augmentation of human senses comes to mean the augmentation of the space through which one passes.

To further elaborate on the concept of 'augmented space', augmentation with regards to data-saturated space consists of an opposing concept to virtual reality whereby the user is experiencing a simulation of real life. It also incorporates the idea of augmented reality whereby information is added directly related to the user's immediate physical space. It is not entirely viable to consider the immersion of virtual reality and the heightened sense of augmented reality as opposing entities with regards to augmented space, as the experience of both real space and cyber space depends on the scale of use and also the perception of the user.

Manovich writes that varying forms of technologies distinguish the experience of virtual reality from augmented space. For example, the experience of watching a movie on full screen or in the cinema is different from interactive technology on the small screen of a mobile device. As you are more likely to be consciously aware of your presence within physical space using a mobile device, the overall phenomenological experience is not overwhelming. Manovich surmises that;

'Whether we should understand a particular situation in terms of immersion or augmentation depends on how we understand the idea of addition: we may add new information to our experience- or we may add an altogether different experience.' (MANOVICH, 2006, p225)

This possibly suggests that interactive mobile technologies in a sense increase our options within augmented space. We chose how we would like to interact both within physical and cyberspace. It introduces a new approach and relationship for the user to their physical, urban realm as it naturally generates questions about our perception of architectural space. Augmented space and the integration of digital networks within architectural space can result in new and emerging modes of communication, collaboration and innovation. These questions are now highly pertinent as our cities are presently comprised of data-saturated physical spaces which are being mapped and manipulated by consistent, invisible and technological layers. Keller Easterling describes physical urban infrastructure as being;

'Not reliant on movement but rather on unfolding relationships inherent to its arrangement. Designing infrastructure is designing action'. (EASTERLING, 2011, p155)

Naturally, the tangible qualities of physical properties which make up our cities are important entities with regards to human orientation and understanding of space. Yet it is undeniable that the virtual, the invisible exchange of data, digital bits and information, now equally inform the

nature of our occupation, our assimilation and our sense of place within the urban realm. Therefore, at the intersection of this socio-technical infrastructure there must lie the conceptual reframing of organisation, interaction, policy, movement and exchange of space, as it is these very conditions which inform our perception about place and the city we inhabit. Augmented space, the hybrid of our consciousness within both physical and cyber territories, thus presents itself as a new and emerging concept to be considered as inescapable and fundamental to the urban realm.

Chapter 5

The Influence of Socio-Technical Arrangements on Architectural Space

In order to continue and validate this phenomenological discussion, it is necessary to observe pragmatic and visible applications of what has previously been discussed.

Location-based services (LBS), a relatively recent emergence of technology, can provide an insight into new ways in which information may be shared, distributed and accessed within urban environments. It a medium through which augmented space materialises, as it offers an example of how such technologies reveal human activity as an instigator of space, rather than the urban designer or architect. In this way, LBS has the potential to delineate how human perception of the built urban environment is transforming.

LBS offers another perspective, even dimension, of our experience of space as it delivers information specific to location and time. (SHEPARD, 2011, p25) A typical example of such a technology would include a GPS (Global Positioning System) navigation system available to a user or network of users via mobile phones and other portable devices.

'GPS, wireless location services, surveillance technologies, and other augmented space technologies all define data space – if not in practise, than at least in theory, as a continuous field that completely extends over , and fills in, all of physical space. Every point in space has a GPS co-ordinate that can be obtained using a GPS receiver' (MANOVICH, 2006, p228)

GPS navigation enables the user to find themselves within unfamiliar territories and they also allow the ordinary user to associate media and information with specific physical locations. What is most interesting about such technologies is that with Apple's introduction of the iPhone 3G in 2008 and the numerous equivalent PDA smartphone technologies which later followed, there now exists applications which;

'*Explore the ability of GPS enabled technologies to correlate place, time and identity in ways that*

empower users to not just read information, but also to write it'
(SHEPARD, 2011, p 25)

For example, the traditional use of maps, whereby the map informs the structure of our movement, has now been subverted if you consider that writable GPS technologies now enable the public to inform the map itself.

Physical space becomes augmented space, annotated by city inhabitants, which alters our perception of place within cities. Conventionally it is physical landmarks which determine awareness of place and orientation within the urban landscape. Now however, people are increasingly dependent on the clarity and availability of wireless networks in locating and familiarising themselves within urban space. Location based online facilities such as Google Maps are now largely written by the collective public as everybody has the choice and potential to annotate this particular example of hybrid space.

An example of work which explains this concept is a project entitled 'Amsterdam Real-time' (2002) by WAAG society in association with Esther Polak.*(Fig. 3-4)* (http://realtime.waag.org/) Inhabitants' movements throughout the city of Amsterdam were traced using GPS enabled devices and their individual locations were transmitted in real time to an animated map. The result was a direct representation of the ebb and flow of people within the city's streets. The map of the city thus became a representation of a network of nodes and pathways, the social movement of many, which changed over time rather than a static representation of the layout of its streets. (SHEPARD, 2011, p 26) It represents the influence of the collective public on space through technology, rather than physical layout designed and enforced by a single individual.

Fig. 3&4 Amsterdam Real-Time

The ways in which either entity regulates may be different, conflicting and even unpredictable at times, as represented visually by 'Amsterdam Real-time'. Thus, the nexus between physical and digital space is both challenging and fascinating. LBS technologies used in conjunction with experimental and artistic projects are thus representative of the activity and interactivity of the

collective public. Amsterdam Real-time is a direct representation of this city's inhabitants, as an impression of their physical movement and habitual patterns becomes embedded within hybrid, augmented space.

In a sense LBS could be described as a subversion of the traditional use of maps, whereby the map becomes a consistent and changing representation of movement in real-time through the use of GPS technology rather than that which informs static physical space. In a sense it reinforces the concept of augmented space as an entity which allows the individual to lay claim to space over the architect, to ground the inhabitant within the urban environment and achieve a sense of identity.

A reliance on intelligent maps to read urban space and everyday use of technology has an undeniable impact on the habitual pattern and use of our cities. Lessig argues in 'Code' that software may regulate human behaviour in a similar manner to physical architecture. (FORLANO, 2001, p 4) The use of such technologies within architectural space further complicates this analysis. Wi-Fi networks, a technology bound geographically to a physical location within space could be considered as another example. By its nature Wi-Fi encourages people to gather within close proximity to another and within a set space wherever the service is available. Forlano also surmises that;

'In contrast to notions of networked, virtual organisations... mobile and wireless technologies enable an ad-hoc community or peer to peer form of organizing that is deeply embedded in physical space' (FORLANO, 2011, p9)

It is the disposition of many which informs the use and perception of physical space in this instance. Free Wi-Fi removes hierarchical boundaries as anybody may lay claim to equal cyberspace with the urban environment. Again, this reinforces the idea of augmented space as an agent in promoting space as the territory of the collective public.

It also calls to mind the concept of Gilbert Ryle whereby inert non-human objects possess agency. (EASTERLING, 2011, p154 -155) It is possible that technology enables static physical space to possess sequential action and potential of change and this change is dependent on the actions of the collective public.

This concept contends with the traditional and conventional definition of architecture, whereby architecture is the design and layout of physical and static geometrical space by a single nominated designer or team for the accommodation and use of the public body. Rather it correlates with the ideas of Archigram whereby human activity is a new material of architecture and it is technology which acts as a catalyst for this ambient and kinetic interaction.

It is clear that new modes of communication and collaboration are emerging at the intersection of

technology and physical space. The integration of digital networks and technologies within location-specific, urban territory contends with traditional ideas of architectural space, as not only does this conceptual reframing of forms transform social organisation within the urban realm, it also allows the public to manipulate cyber territory embedded in place.

Chapter 6

The Impact of Interactivity on the Materiality of Architecture

As discussed in the previous chapter, while conventionally architecture may define space, it can also be described as the combination of interrelated and interacting elements. These elements are comprised of the physical, as they are also equally comprised of human interactivity, the new material of architecture as surmised by innovative thinkers such as Archigram, Hill and Rendell.

Reinhard and Jakovich, the creators of a project entitled '*Trivet Fields' (Fig. 5-7)* instigate a critical discussion which expounds the relationship between human interaction, technology and physical material. The project consists as follows;

'Trivet Fields is a responsive, spatially adaptable installation constructed from interlocking modules that host a field of sensors and audio-illuminate displays, acting on a sensate memory system that builds on the interactions from visitors over time'
(REINHARDT & JAKOVICH, 2009, p 221)

Trivet Fields is a project which attempts to reconstruct the basic conceptual framework of architecture to incorporate, in particular, interactive technologies. It is a conceptual art installation which encapsulates emerging ideas of technology and architecture, transforming conventional ways of thinking about physical space. It reflects what Alessandro Aurigi writes in an essay entitled 'Augmented Spaces', that;

'A blurred distinction seems to exist between space and information, as elements of space increasingly are powerful conveyors of information, whilst information- materialising into them- becomes more and more spatially related' (AURIGI, 2008, p 5)

Fig. 5: Trivet Fields: A configuration using 35 modules

Fig. 6: Trivet Fields: A Modular Sensate Installation

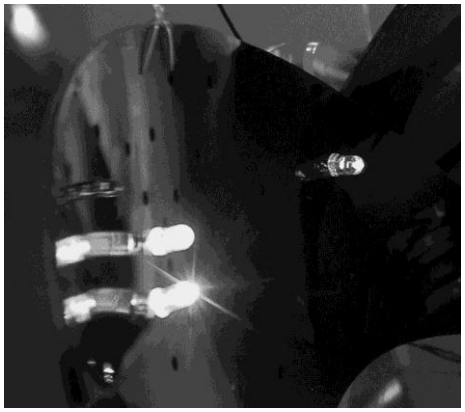

Fig.7: Trivet modules host a series of simple motion sensors, mini speakers and LEDS

The project and the analysis which followed expound the effect of interaction technology on physical, spatial materiality by introducing interactive art computing to architectural practise. As a result the project revealed critical and valuable questions about the relevance of conventional ideas of physical place in respect to emerging pervasive technologies.

Conventionally, it could be said that it is the combination of visual, formal, acoustic and tactile elements of built material which comprise the materiality of architectural space. As previously discussed, traditionally architecture is understood to be the design of static geometrical spaces, set out to accommodate and satisfy human need. Human interactivity is thus a vital consideration in the design process of buildings, yet the marks left by the inhabitant post construction are generally overlooked as inherent elements of the structure. Emerging discussions suggest that human interactivity and socio-technical infrastructure should be considered as new materials of architecture and are also largely responsible for the implementation of space.

Similar to the ideas as discussed above, Trivet Fields seeks to introduce interactive technology as a new dimension to conventional definitions of architecture and architectural practise. Similar to Forlano, the designers behind Trivet Fields, Reinhardt and Jakovich, acknowledge the complexities which computing introduces to physical space;

'Contemporary computation allows the deconstruction of the action-response cycle into infinite permutations of interactions over time in space' (REINDHARDT & JAKOVICH, 2009, p 217)

Human interaction through the extension of technology becomes a series of multi-dimensional responses by numerous users which increases in complexity through time. Computational structures, combined with the innumerable possible actions of users and following reactions of built material, can thus result in infinite combinations, articulations or experiences of space. Again, as previously discussed, through interaction and technology, physical space becomes an

agent of potential and movement, distancing itself from the conventional idea of architectural space as a static entity. Architectural space, formally considered to be solely instigated by the architect, becomes a product of the collective body, as the several variations and possibilities of built form and appearance become the product of many.

In contrast to Forlano's ideas, in focusing on interactivity and its direct impact on the materiality of architecture, the project opens a visible and pragmatic explanation as to how technology has a potential to transform traditional notions of physical space.

'The infinite variation of such computational structures in combination with the articulations of matter as interface (light, form, material) forms what was previously an unfathomable palette of interactive 'materials' for contemporary spatial and interactive design'
(REINDHARDT & JAKOVICH, 2009, p 217)

It is deduced by Reinhardt and Jakovich that through an expanded understanding and alternative perception of built material, architectural practise may then develop a vocabulary of space which comprises indeterminate and interrelated dimensions of interactivity combined. Rather than conceived as a material system following a set structure, an influx of interactive technology may re-negotiate architecture to be in a transient state.

'Matter or material, then, must be conceived both in terms of its capacity to express as well as its capacity to instigate expression' (REINDHARDT & JAKOVICH, 2009, p 224)

Again, this project points towards an emerging platform of cross-disciplinary explorations of architecture, whereby interactive technology is a new and emerging important consideration of architectural space. Most interestingly, interactive technologies such as this raise questions about public impact on physical space, as they direct the control of the architect towards the user instead. Both Trivet Fields and Amsterdam Realtime are projects which expound the notion of human activity and use of technology as having an impact on the definition of architectural space, individual sense of place and sense of identity within the urban environment. Thus, as interactive technologies, indigenous to the urban realm, now allow the individual to manipulate, lay claim and annotate both physical and cyber territories, it is possible that within *'augmented space*' creative control of territory shifts from the nominative architect towards the user. It supports the argument underlined in the previous chapter that the interactivity of the collective through use of technology embedded within architectural space enables the user to leave a mark, perhaps even express individuality within the urban realm.

Chapter 7

Augmented Space as an Instigator of Sense of Place

As previously discussed, inert urban material and infrastructure possess agency set out by human activity imminent to urban organisation. Socio-technical networks, mobile and ubiquitous devices act as catalysts in this process. As data information thus shapes morphology and organisation in both human and non-human systems, it is reasonable to consider how such technologies may impact our experience of space. How is it possible that within augmented space, the individual may achieve a heightened acquaintance with their city, perhaps a sense of control and belonging within space?

Easterling points towards the ideas of George Batson, who linked information flow in organisations to dispositions of productivity, stability, violence and collapse. In competitive or destructive states within urban organisations, the flow of information collapses, whereas in more balanced arrangements the flow of information is more easily exchanged. (EASTERLING, 2011, p157)

Ones sense of the immediate urban environment is directly influenced by communication, the interactive exchange of information, and thus it can be deduced that socio-technical networks and interactive network play a significant role in establishing sense of place.

For example, traditionally neighbourhoods are distinguished by a central and public location which encourages gathering through its social amenities such as a market or town square. These centres are used as a landmark to meet friends and peers. Ubiquitous, pervasive, interactive and social technologies now enable the inhabitant to iterate their plans, to designate a meeting place and negotiate a meeting time spontaneously. As the public become increasingly involved in an intermittent architectural space brought about through activity and interactive technology, the traditional physical landmark becomes less important in establishing a sense of familiarity or orientation within the urban landscape. The prospect of non-human organisations possessing temperament over and above the human agency inherent to physical space, also might suggests that a symbiotic relationship exists between either entities.

The examples quoted below and set out by Easterling demonstrate how active forms or directions for activity have an underlying geometry which shapes the disposition of organisation and interactivity of individuals and groups. Thus in the contemporary urban realm, this underlying physical substrate of geometry is consistently interlinked with communication and the exchanged flow of data. The examples outlined by Easterling are as follows;

'An underground mafia organised as a hub and spoke organisation fosters secrecy because of limited contact to administrative decisions. A television or radio organisation of mass media similarly has a hub and spoke organisation very different from contemporary networks of computation. A skyscraper organises sequential movement not unlike serial computing. A mat building with, multiple points of entry is something like its parallel computing counterpart. A telecom locates its underground fibre optic cable in relation to only one segment if the population and it operates as a monopoly' (EASTERLING, 2011, p 158)

Whereas the philosopher Gilbert Ryle surmises that disposition is an inherent property of the static and physical, the potential and behaviour of the individual and their use of socio-technical networks within groups is also a prominent question of the contemporary urban realm. Socio-technical networks and social interactivity may act as the nexus between people and place. Often it is our involvement within social groups which inform our sense of belonging, identity and territory within a city. It could be said that today, every city inhabitant is a member of a *hybrid* community with regards to augmented space. Hybrid communities are described in an essay entitled '*Social Place Identity in Hybrid Communities'* by Navarrete, Huerta and Horan;

'In hybrid communities, members hold physical and virtual relationships simultaneously and their interaction takes place through multiple forms of communication: face-to-face, traditional means (e.g. telephone and fax) and Web based tools (e.g. email, chat rooms, bulletin boards)' (NAVARRETE, HUERTA, HORAN, 2008, p127)

It is undeniable that, presently, socio-technical networks and mobile technologies play a considerable role in establishing a sense of belonging and understanding of place. Heesang Lee writes in an essay entitled 'Mobile Networks, Urban Places and Emotional Spaces';

'Whether people exist in public spaces or private spaces is not determined by whether the people are physically in public or private spaces but is dependent on whether their mobile phones are on or off' (LEE, 2008, p42)

The study published in 2008 entitled '*Social Place and Identity in Hybrid Communities*' by Celene Navarrette, Esperanza Huerta and Thomas A. Horan, found that from a social identity theory, a dual form of interaction between socio-technical networks and place, facilitates personal representation of place-based identities through online settings. Although much has been theorised about the effect of cyberspace on individual identity, one point of view is that it allows multiple identities through its anonymity. Alternatively, this particular study argued that online social networks within cyberspace are a means to express several characteristics of the self. Group interaction online is generally anchored to a physical place offline. Thus hybrid identities, facilitated through the use of the internet relates also to place.

'Offline identities are invoked in online settings providing the identification required for

generating the trust and commitment necessary for the sustainability of the virtual community' (NAVARRETE, HUERTA, HORAN, 2008, p134)

The study explored how, primarily, an enduring role and association of physical place is first accessed before enacting an identity within cyberspace. Hybrid communities can thus facilitate the creation and maintenance of a mutual identity, both virtual and physical. Within augmented space, through the use of technologies such as radio, mobile devices, Wi-Fi, Bluetooth etc., the intersection of the physical and the cybernetic, people can further determine a sense of self and identity of place.

Public spaces act as social catalysts as they are places where citizens and communities meet to create and maintain relationships and social connections. Public spaces also, have the important function of grounding the individual, providing sense of place and space to exhibit individual expression. Marcus Foth and Paul Sanders write that such spaces are;

'Paramount in establishing the identity and culture of a city and a sense of cohesion and belonging' (FOTH & SANDERS, 2008, p73)

Interactive technologies and wireless networks allow urban inhabitants to connect with each other, to negotiate and organise social gatherings. In this way, as briefly described above, physical place is becoming increasingly important due to an increasing number of social links provided by interactive networks. This effect has been previously coined as 'glocalisation'. (FOTH & SANDERS, 2008, p73)

The concept of 'glocalisation' reinforces both the existence of a contemporary symbiotic relationship between place and interactive network technologies and thus acknowledges augmented space as a new and important territory of public space.

Social connections develop and are maintained in both virtual and physical public spaces and the inhabitants of the urban landscape traverse these worlds seamlessly. As these technological bridges are used for the same purpose of connection, the distinction between virtual and physical space becomes increasingly blurred. As previously discussed, with regards to our orientation and understanding of being within space, the tangible quality of physical material is equally as important as the invisible exchange of data, digital bits and information. Thus physical and cyber space become continually interwoven through the use of technology. Forth and Sanders surmise in this situation that;

'Thus, it is time to depart from simple binary oppositions and compartmentalised dichotomies such as 'physical place' vs 'cyberspace' or 'online' vs 'offline' and embrace the complex hybrid nature of urban spaces.'
(FOTH & SANDERS, 2008, p73)

It is clear that bodies of individuals, the collective, through the use of these technologies within physical urban space evade the nominative control of the architect since through human action space takes on a life of its own. Interactive and pervasive technologies introduce the individual to an un-predetermined use of space and so, open out an opportunity to establish a sense of place and identity. Therefore, perhaps rather than inhibit our personal claim to our individual territories and sense of self within the urban environment, augmented space can be utilised to extend and expand personal expression and individuality.

Also, rather than a clear separation between the traditional concept of physical space and the kinetic energies of human inhabitation, these theories support the existence of a new and emerging interstitial territory which lies in the intersection of static and kinetic elements. This idea unearths another dimension to be considered within architectural practise. A ubiquitous space, used and manipulated by the collective, now floods existing physical territories and in turn, contends with hierarchical boundaries. This interstitial territory, known as augmented space, allows each individual an equal connection to their city through the use of technology. As most urban space could now be considered as augmented, the individual as part of the collective public now has more opportunity to express identity, achieve a sense of place and freely leave their mark within the urban landscape. In this sense, could technological influx therefore create a new territory to contend with the conventional role of the architect as a nominative designator, as particular socio-technical networks and pervasive technologies now allow the public to literally write their city?

Chapter 8

Urban Intervention as a New Element of Architecture

Jonathan Hill writes in The Illegal Architect;

'Home always belongs to someone. It is supposedly a stable vessel for the personal identity of its occupants, a container for, and mirror of the self'
(HILL, The Illegal Architect, 1998, p14)

An exponential increase in the population of cities has occurred in recent decades and is continuing to grow. Currently, more than half the population of the world live within an urban area and it is predicted that seven out of 10 people will live in a city by 2050. (WORLD HEALTH ORGANISATION, 2012)

To a greater extent, the city calls for utilitarian and regulatory controls, ultimately resulting in

an increasingly impersonal landscape. Yet, the urban landscape is home, as cited by Hill, and cities should reflect a sense of identity and the culture if its inhabitants.

Scott Burham, author of an essay entitled 'The VJ of Everyday' argues that in reaction to increasing urban population, city inhabitants seek new and unique ways to express the relationship that exists between the self and the city, as increasing density impacts on them both physically and mentally. Burham writes;

'The expanding urbanisation at the heart of contemporary life has transformed the identity of home as part of the landscape; to the realisation that home is the landscape. This facet gives rise to an increased level of engagement with the aesthetics of public space, objects and surfaces of the city' (BURHAM, 2007, p182)

These expressions often materialise in the form of urban intervention, more commonly known as urban art or graffiti. Often, the term 'graffiti' is considered as derogatory, yet when considered in an alternative manner, urban art may transpire to be an art of urban dialogue. Graffiti, if viewed as a relationship of personal contributions and connections transcribed across the impersonal urban fabric, can be read not as vandalism, but as a form of anonymous expression and as a reaction to the present urban situation.

The concept of creative intervention which remixes the urban visual to connect the individual to their city, correlates with the ideas of Hill and Rendell, whereby the original function and appearance of the built environment set out by the architect is transformed by the public. These acts of expression generate personal relevance and introduce an alternative form of communication into a previously impersonal landscape. It supports Easterling's theories also, whereby static city spaces transform into agents of movement and communication.

'As the visual remix transforms the static visuals of the city into a continuum of expression, the city ceases to be a fixed terrain of commercial narratives and becomes a dynamic landscape, where expression is organic and on-going storytelling is possible' (BURHAM, 2008, p183)

The ethos behind the work of respected and renowned urban interventionists and artists is generally to challenge one-sided visual communication that floods urban surface. Often urban art is a reaction against capitalist, commercial messages through encouraging a common and open urban dialogue. Banksy an urban graffiti artist based in Bristol is famous for such work.

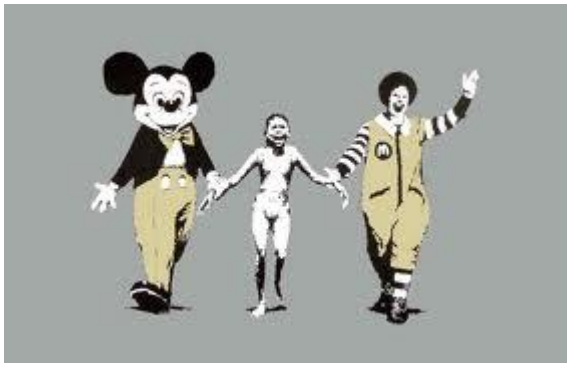

Fig. 8: Anti-Capitalist piece juxtaposing McDonalds and Vietnam

Fig. 9: Banksy's Designated Graffiti Area

His work both attacks advertising, as does it allocate space for open urban dialogue. *(Fig 8-9)*

Equally, urban interventionists also seek to argue against urban conformity and the social structures which impose regulation on inhabitants' movements and functions within the urban landscape. Ultimately they aim to transform the impersonal to personal. Roadsworth, an artist based in Montreal, uses regulatory and utilitarian objects of the city as his canvas in order to rework the visual topography of the city and induce a deeper sense of place and identity for the urban dweller. He writes;

'There's this banality and predictability to city life, and that's enhanced by urban planning and the way our movement is directed. I wanted to play with that' (BURHAM, 2007, p 185)

Both Roadsworth and Banksy are classic examples of how urban art can enable the city dweller to further engage and connect with place. Everyday banal material surfaces of the urban landscape thus exhibit elements of surprise and amusement. Their work expresses anti-establishment ideas as does it also abnegate the nominative role of architects and the imposed regulations of urban planning. In promoting individual expression literally on the surface of built material, they correlate to the ideas of Hill and Rendell whereby architectural space is cultivated by the inhabitant through its use, destruction and decay.

Fig. 10 & 11: Roadsworth: Playful interventions of utilitarian and impersonal road markings

What is also interesting to surmise about urban intervention is that it could also be considered as a form of interactivity. An intervention entitled 'The Bubble Project', *(Fig. 12-13)* instigated by an artist named Ji Lee in New York in 2005, is an example of a project which could be considered as interactive. Ji Lee encouraged the public to print and post thousands of speech bubbles onto physical urban fabric in response to public posters and advertisements. The intention of the project was to offer the urban population an opportunity to engage with each other through the visual infrastructure of the city, and evoke an anonymous expression of ideas. The bubble project spread to cities internationally and its website exhibits global renditions of urban 'bubble' dialogue.

Fig. 12 & 13: Annonymous and Provocative responses to the Bubble Project

An on-going project in the present day, it is described by Lee on the website;

'The Bubble Project instantly transforms these annoying corporate monologues into open public dialogues. They encourage anyone to fill them in with any expression, free from censorship. More Bubbles mean more freed spaces, more sharing of personal thoughts, more reactions to current events, and most importantly, more imagination and fun' (LEE, 2005-)

The Bubble Project is an example where inert and static urban surfaces are transformed into a dynamic and active dialogue, correlating closely to interactivity one also experiences through the interface of a mobile device or monitor. Through both mediums, the inhabitant may embody multiple identities with the choice of remaining anonymous or equally they may openly express their ideas concerning their immediate environment. Similar to location based interactive technologies, the concept is embedded in place as does it allow bodies of individual to annotate their city.

The ethos and intention of physical urban intervention such as graffiti art is an expression of identity and individual claim to urban territory. It is a medium which encapsulates urban living and invigorates a deeper connection with urban place. In turn through its action and consequent

reaction, it parallels in this sense with interactive socio-technical networks, which are also inherent to contemporary urban life. Interactive technology thus contests with traditional notions of architecture, and introduces new ways of interacting with space.

Within the data-saturated and increasingly populated urban realm, both urban intervention and location based interactive technology open out opportunity for the inhabitant to express individuality and achieve a sense of place. In contending with the utilitarian ideals of urban planning, and introducing the opportunity to write and manipulate space, they contend with the architect as a nominative designator and transfer creative control to the collective public.

In this sense, social networks- virtual or physical play a vital role in modern urban transformation and the claim of territory by the collective. Rather, they have the potential to instigate individual sense of place as opposed to authority. Urban intervention exposes the potential of individual expression within the urban realm and it also reveals how interactive location based media offers an expansive means to allow for this. Critically considering the layering of dynamic data over physical space, one realises it may be an abstract concept already deeply connected to the aesthetic and conceptual practise of architects and artists. .

'It is crucial to see this as a conceptual rather than just a technological issue- and therefore something that in part has already been a part of architectural and artistic paradigms' (MANOVICH, 2006, p 226)

This issue reveals itself to be both a conceptual and technological issue. However, the use of urban fabric as a canvas and also, socio-technical data which is in constant change and iteration could be thought of as an emerging dynamic layer of architectural space. As the architect's job is the manipulation and design of space on both a physical and conceptual level, the issue of pervasive technology and individual expression within space, should be thought of as a new architectural layer in the coming era.

Lev Manovich refers to the work of an artist named Robert Venturi to further explore this concept. Electronic displays are often superimposed on building surfaces, exhibit dynamic and changing imagery, information and dialogue. In this sense they can be likened to several works of urban art.

As the author of '*Learning from Las Vegas*' which is often referred to as the founding of post-modern aesthetic, Venturi surmises that display, for example, is not an optional addition to the physical surfaces of the built environment but the very centre of architecture in the information age.

'The graphic sign in space has become the architecture of this landscape' (VENTURI, 1977, p13)

Venturi argues that we extract architectural elements from vernacular and commercial culture. Rather than refine architectural space to minimalist space he suggests that it is vital that we embrace complexity, contradiction, heterogeneity and iconography as part of the built environment. (MANOVICH, 2006, p 232) Again, these ideas echo Hill and Rendell whereby it is the human qualities and activities which enliven and define the atmosphere and feeling of space. This concept also correlates strongly to the expressive impact of urban intervention and graffiti art on the impersonal and utilitarian landscape.

This concept, according to Venturi, is deeply set within the urban environment and the incorporation of technology within architectural space is an advancement of what has existed for many years already. In the 1990's, similar to Archigram in the 1960's, Venturi articulated a new vision, whereby architecture became more so communication for the Information Age, rather than space for the Industrial Age. (MANOVICH, 2006, p 232) He pointed towards a concept whereby architecture is an 'information surface' and that architecture should be thought of as;

'An iconographic representation emitting electronic imagery from its surfaces day and night' (MANOVICH, 2006, p 232)

Venturi argued that, traditionally, architecture has always in fact, been a form of communication since many styles of architecture throughout the ages incorporated ornament, iconography and narratives. It is also undeniable that the design of space itself and use of material speaks of the era within which a building was built. Thus architecture has always possessed an inherent narrative and has spoken of the society in which it was erected.

'A medieval cathedral…communicated Christian narratives…through the images covering its surface... Modernist architecture…communicated its own narratives through new spaces constructed of from simple geometric forms' (MANOVICH, 2006, p 233)

Architecture may reflect the culture and society from which it arises, yet ultimately final decisions on form have always fallen under the responsibility of the architect. In contrast, today as information changes continuously under the control of the collective rather than the nominative, information surfaces and the architecture of today instead becomes;

'A potential space of contestation and dialog, which functions as the material manifestation of the often invisible public sphere' (MANOVICH, 2006, p 232)

Architecture, when perceived as an 'information surface', transcribes itself more so an inevitable advancement of previously existing concepts of architecture rather than an entirely new territory. What is of most interest, however, is that a dynamic information surface could be thought of as an abstraction of urban art and graffiti. It also echoes the concept of augmented space, where data-saturated contemporary space becomes interactive, embedded in place and is

full of disposition and dialogue. Manovich expresses that;

'A problem of our own time is how to combine the new functioning of a surface as an electronic display with the new kinds of spaces and forms being imagined by contemporary architects'
(MANOVICH, 2006, p 234)

Manovich raises a concern that today, architects are presented with the challenge of dealing with dynamically changing information which is often obscure and difficult to manage. I believe that in this instance, physical electronic displays and the literal implementation of technology within material urban fabric should not a cause of concern. Instead, architects should shift their focus towards data saturated space and accept it as a new consideration of architecture. Augmented space, if considered as a new material of architecture in this sense, not only resolves these issues but opens out extended interdisciplinary and creative opportunities for the built environment.

Chapter 9

In [TERRA] vention: A Smartphone Application for Augmented Space

One's sense of the immediate urban environment is directly influenced by communication -the interactive exchange of information- and thus, it can be deduced that socio-technical and interactive networks play a significant role in establishing sense of place.

'Interactivity empowers the observer to engage and influence the work of art, it destabilises this control by allowing her to lose herself through the work.'
(KHAN, 2011, p 160)

Having proposed augmented space as a new dimension to be considered in the practise of architecture, it would be interesting to imagine how the concept could be applied in reality. I will therefore propose an augmented reality application which encapsulates the concepts underlined in the previous chapters for use on mobile handheld devices such as a smartphone or tablet PC.

In [TERRA]vention is the proposed name for a location-based mobile application which allows the user to 'write' on the urban fabric within augmented space. The name is derived from the Latin 'terra' meaning ground and the combination of both action and interaction. In [TERRA]vention is an idea which promotes and materialises augmented space. It is a mobile and presently conceptual application which allows the ethos and activity of urban intervention to be translated into augmented space, to promote a new territory of architectural space. Considering the technology available today, it is not difficult to imagine an application for use on a mobile

device, which could allow city inhabitants to upload personal interventions to urban fabric within augmented space and to literally write their city.

Essentially In[TERRA]vention would allow the user to create a personal digital image or expression in text and upload it to a physical location is space using a hand held mobile device, thus creating urban graffiti accessible through augmented space. *(Fig 14 -16)*

Fig 14 - 16: In [TERRA] action, a conceptual app at present which could allow urban intervention and graffiti within augmented space using AR technology and QR tags.

The huge success and popular uptake of smartphones in recent years has led to extensive research and development of Augmented Reality (AR), particularly within the gaming industry. Pervasive Augmented Reality games are a special type of location-aware pervasive game, which use AR to enhance the real world of the players by virtual objects. (BROLL et al. 2006, p1) The technology used for location-aware AR games is similar to those required to realise a project such as the In[TERRA]vention application, as AR allows computer generated imagery to exactly overlay physical objects in real time. Unlike Virtual Reality (VR), where the user is completely immersed in a virtual environment, AR allows the user to interact with virtual images using real objects in a seamless way. (ZHOU, BEEN-LIRN DUH & BILLINGHURST,2008, p1)

ISMAR (International Symposium on Mixed and Augmented Reality) have deduced a number of factors required for effective augmented reality based on 10 years of research. The basic technical requirements, which would also apply in the implementation of In[TERRA]vention, would be as follows;

1. Graphic rendering software/hardware to overlay virtual content in the real world
2. Tracking techniques so that the users position can be located

3. Tracking calibration tools to adjust graphics in relation to user position
4. Display hardware for merging virtual images with the real world
5. Hardware for running AR simulation code an supporting input/output devices
6. Interaction techniques specifying how the user can manipulate AR content

(ZHOU, BEEN-LIRN DUH & BILLINGHURST,2008, p2)

Anders Henrysson and Mark Ollia describe in a paper entitled UMAR- Ubiquitous Mobile Augmented Reality how augmented reality can be implemented using a Personal Digital Assistant (PDA) i.e. Smartphone;

'The AR-PDA setup consists of a PDA with a camera. The PDA is connected to an AR-server using WLAN and sends a video stream to the server for tracking and rendering. The augmented video stream is returned to the PDA for display after processing on the server' (HENRYSSON & OLLIA, 2004, p 41)

Ubiquitous Mobile Augmented Reality (UMAR) (HENRYSSON & OLLIA, 2004) has the potential to realise augmented space through a handheld device such as a tablet PC or smartphone. UMAR is primarily location based, whereby the user's geographical location and orientation is tracked. Their experience of the physical world is augmented through computer generated visual information which is relevant to their present context. Smartphones which can use existing Wi-Fi and can also connect to data enabled networks such as General Packet Radio Service (GPRS) and Universal Mobile Telecommunications System UTMS, feature cameras with built in GPS. Smartphones also have a competent capability of rendering and producing high quality multimedia graphics such as video and animation, all of which make UMAR, and thus the in[TERRA]vention application possible.

Smartphones, which contain built in cameras, can be used for optical tracking where the orientation and translation of the camera may be recorded using GPS. With regards to augmented reality, optical tracking may be marker-based or maker-less. An example of a marker is a Quick Response (QR) code tag. These tags can be used to store a pre-defined location and orientation negating the need for GPS. Where a marker is used, the system can calculate the cameras orientation, translation and location based on a co-ordinate system whereby the origin is the centre of the marker.

Marker based optical tracking gives accurate results, as each QR tag is identifiable through a unique pattern, which then can be translated to an identification number assigned to a graphic. The In[TERRA]vention application would enable the user to generate unique, personal QR tags, print them out, and place them on a particular location on physical urban fabric. The user can then assign text, imagery and expression to any physical location via the QR tag.

The user's digital artwork, becoming a digital urban intervention in a sense, can then be re-

accessed by another person through its individual QR code in its physical location. Equally, connectivity to GPS could allow the user to annotate their intervention on live maps to allow them to be located and viewed by other urban inhabitants. By tracking this marker, a passer-by could regenerate the image through augmented reality on the camera screen of their smartphone or mobile device. The application In [TERRA] action thus would allow an experience which is neither completely in the physical realm nor completely within cyber space. Ultimately the action must be carried out within augmented space to achieve the full experience.

Henrysson and Ollia write that marker-based optical tracking gives accurate results but is limited in that it is dependent on the visibility of the marker. However, rather than use marker-less optical tracking which is also a possibility, this app consciously choses to make a physical mark in space through the use of QR tags placed on built material, bridging the cyber and physical

Thus, In[TERRA]vention represents augmented space, ultimately a hybrid territory existing in both physical and cyber space. It encourages city inhabitants to interact with the urban landscape in a tangible and hands-on fashion which is ultimately experienced and shared through the use of technology. Thus, In[TERRA]vention could thus function as a catalyst for urban exchange and dialogue, anchoring socio-technical networks to physical place. The effect and interactive creativity thus parallels with physical art and urban intervention, as the impersonal, utilitarian landscape becomes literally embedded with personal energy.

Chapter 10

Conclusion: Autonomous Identity towards Interdisciplinary Unity

Throughout each epoch, concepts within the discipline of architecture have continually shifted. However, save for a few innovative exceptions such as Archigram, architecture has always been predominantly associated with the design of built material and form whereby the architect is the primary and nominative designator of space.

In an essay entitled 'Toward the Sentient City' (2011) Mark Shepard asks us to look beyond materiality in architecture and shift the locus of practice from the architectural 'hardware' of urban space to the immaterial architecture of 'software' infrastructures (SHEPARD, 2011, p20). We are encouraged to acknowledge their ability to inform, perform and enact new urban organisations and experiences.

Similarly, architectural academics and researchers such as Hill and Rendell and innovative practice such as FAT, believe that it is primarily the user which informs the atmosphere of space

through their activity.

The fluxing, interactive electronic displays indigenous to the contemporary urban realm may appear to contrast greatly to the traditional and static narrative of previous architectural styles. But when we consider the theories of Venturi, it becomes apparent that expression has always been an integral element of architecture. Narratives have existed as physical elements of built material throughout time, and equally the technology and material form of a building speaks of the era in which it was built.

Presently, socio-technical networks and narrative speak of this generation. Socio-technical infrastructure is pervasive to physical space today through ubiquitous computing, and with regards to architecture, technology is no longer an electronic screen paradigm. The incorporation of diverse elements within built fabric enables the static physical material to become an agent of movement.

'*Augmented space*', a nexus of cyber and physical space, is emerging through the collective use of interactive technology. The urban landscape is now a hybrid entity, fragmented between bodies, machine and built material. Augmented space is a medium which accommodates for an increased interaction between urban inhabitants. Thus it is not illogical to consider augmented space as an emerging element to be considered inherent to architectural space, in that it encapsulates the generation and society in which it exists.

The new definition of architectural space is thus a transient and kinetic entity. It is through the use of pervasive interaction technology, socio-technical infrastructure and the input of the public that this occurs. To consider the architectural discipline as autonomous and the architect as the prime instigator of space, is to deny the concept of augmented space, since the hybrid territory of augmented space implies that the use of socio-technical networks by the collective ultimately informs urban space.

The emerging architect of augmented space should prioritise open-ended exchange of expertise and technologies to accommodate embedded technologies and changing perspectives on space. In a sense, identity politics whereby the architect continues a role as the primary agent of spatial experience and design, poses a threat to the architectural profession. In times of dynamic technological change and pervasive computing embedded in physical space, there is a considerable risk in the sole association of architecture with material form. Mark Shepard surmises;

'For architects to address new and emerging kinds of space, they (and their clients) will need to see them as valuable – as spaces open to the architectural imagination- even when that are not as heavily invested in material form appropriate to building as we know it'
(SHEPARD, 2011, p 37)

In remaining autonomous the architectural discipline runs the risk of becoming side-lined in emerging technological innovations, pivotal changes, and discussions of design with regards to technology and the urban landscape. Alternatively, the architect could seriously consider the concept of augmented space, the intersection of networked information systems and the socio-spatial practises of daily life. Augmented space must become prominent in emerging architectural discussions, as it may also become a manifesto for individual expression and enhanced sense of belonging within the urban realm.

In a sense, urban intervention attempts to reconstruct our approach to the urban environment through the often anonymous personalisation and claim of space. Graffiti art is essentially interactive as it is a direct response to social situations and an attempt to claim urban territory through artistic expression. Often graffiti art can result in continuous, anonymous and controversial debate, instigating open dialogue and discussion which is physically present on urban fabric. Thus through enabling individual expression it visually transforms the urban landscape.

Urban intervention reflects art installations such as Trivet Fields and Amsterdam Real-time, which aim to expound the impact of human interactivity on architectural space and the urban landscape. Both art forms illuminate architecture and physical fabric as a territory indebted to the interactivity of the collective rather than primarily the nominative designator. They also demonstrate how inert, fixed and physical urban fabric becomes an agent of movement and communication through social interaction.

'In [TERRA] vention', is my proposal for a smartphone application which introduces the ethos behind urban intervention into augmented space. It potentially avoids the regulatory control imposed by authority within cities, as its impact is concealed from physical space within cyber space. Yet the collective may persist in carrying out personal and location based interventions within their city. This application, while encouraging open urban dialogue embedded in place, could open out new territory within the urban landscape in which the user may exhibit unrestricted creativity. It could thus transfer much creative control from the nominative designator or architect towards collective bodies of individuals.

Although presently conceptual, In [TERRA]vention, represents the potential of UMAR and similar technologies in materialising augmented space and realising it as an emerging territory to be considered within the discipline of architecture. Through my research I have discovered that the technologies used by the gaming industry for augmented reality gaming have the potential to create applications such as In[TERRA]vention, and thus allow concepts such as augmented space to be further explored. Although I have briefly outlined the technologies required to implement such a concept, an in-depth knowledge of augmented reality and mobile computing is necessary for further study.

Therefore, a cultural question is thus revealed which extends beyond the current ability and definition of an architect, as it requires the participation of several disciplines. As interactivity requires participation and response, it supports the idea of an increased involvement in space. If interactive technologies are emerging as a core instigator of space within new definitions of architecture, it is my opinion that the same approach be implemented in the architectural profession. Malcolm McCullough writes that;

'The need to connect architecture and interaction design comes from overlapping subject matters and escalating social consequences. The two disciplines converge on the design of operable inhabitable systems' (MCCULLOUGH, 2004, p154)

It is therefore essential that new models of practice be based on dynamic organisations in which cyber and physical entities can operate both independently and collectively at the same time. In other words, the profession should remove itself from an autonomous identity towards an interdisciplinary unity, especially considering the recent influxes of technology which exemplify and extend human behaviour and its impact on physical space.

Through shedding its disciplinary anxieties, iconographic image and involving itself within an interdisciplinary mode of practice, architecture will progress towards a new and emerging concept of space. As technology continues to permeate and pervade the urban landscape in the coming era, we should consider the statement as written by Antonio Sant 'Elia, that;

'Every Generation must build its own city'
(SANT'ELIA, 1914, p38)

Bibliography

Academic Publications

BROLL WOLFGANG, OHLENBURG JAN, LINDT IRMA, HERBST IRIS, BRAUN ANNE-KATHRIN (2006) *Meeting Technology Challenges of Pervasive Augmented Reality Games,* Collaborative Virtual and Augmented Envrionments Dept, Fraunhofer FIT, Sankt Augustin, Germany. Available at: URL http://dl.acm.org/citation.cfm?id=1230097 [Accessed 26/02/13]

FORLANO, LAURA (2011) *When Code Meets Place: Collaboration and Innovation at WiFi Hotspots*, ProQuest, UMI Dissertation Publishing

HENRYSSON ANDERS & OLLIA MARK (2004) *UMAR- Ubiquitous Mobile Augmented Reality,* MUM' 04 Proceedings of the 3rd International Conference on Mobile and Ubiquitous Multimedia, p 41-45, ACM, New York, NY, USA

ZHOU FENG, BEEN-LIRN DUH HENRY, BILLINGHURST MARK,(2008) *Trends in Augmented Reality Tracking, Interaction and Display : A Review of 10 Years of ISMAR*, Nanyang Technological University, Singapore, National University Singapore, University of Cantebury, New Zealand, Available at URL: http://ir.canterbury.ac.nz/bitstream/10092/2345/1/12613246_2008-Trend-inAugmentedRealityTrackingInteractionandDisplayAReviewofTenYearsofISMAR.pdf [Accessed 26/02/1`3]

Books

AURIGI, A, & DE CINDIO, F et al. (2008) *Augmented Urban Spaces,* Hampshire: Ashgate Publishing

BURHAM SCOTT (2007) In: Marcus Alan, Neumann Dietrich (eds.) Visualising the City, 2007, Routledge, London and New York

DUNNE, ANTHONY (2005) *Hertzian Tales: Electronic Products, Aesthetic Experience, and Critical Design,* MIT Press, Cambridge, Massachusetts, London, England

EASTERLING, K (2011) '*The Action is the Form'* In: Mark Shepard (ed.) The Sentient City, Ubiquitous Computing, Architecture and the Future of Space. The Architectural League of New York, London: The MIT Press.

FAT (1996) *'Contaminating Contemplation',* In: Jonathan Hill (ed.) Occupying Architecture, Between the Architect and the User, London: Routledge

FOTH MARCUS, SANDERS PAUL (2008) *Impacts of Social Computing on the Architecture of Public Spaces* In: Aurigi, A, De Cindio, F (eds.) *Augmented Urban Spaces,* Hampshire: Ashgate Publishing

HILL, JONATHAN (1998) *The Illegal Architect, Black Dog Publishing Limited*

HILL, JONATHAN (ed) et al. (1998) *Occupying Architecture, Between the Architect and the User*, London: Routledge

KHAN, OMAR (2011) '*Interaction Anxieties'* In: Mark Shepard (ed.) The Sentient City, Ubiquitous Computing, Architecture and the Future of Space. The Architectural League of New York, London: The MIT Press.

LEE HEESANG, (2008) *'Mobile Networks, Urban Places and Emotional Spaces'* In: Aurigi, A, De Cindio, F (eds.) (2008) *Augmented Urban Spaces,* Hampshire: Ashgate Publishing

MCLUHAN, M (1964) *Understanding Media, the Extensions of Man.* London: Ark Paperbacks.

MCCULLOUGH, M (2004) *Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing.* London: The MIT Press.

NAVARRETE CELENE & HUERTA ESPERANZA & HORAN A THOMAS (2008) *Social Place Identity in Hybrid Communities* In: Aurigi, A, De Cindio, F (eds.) *Augmented Urban Spaces,* Hampshire: Ashgate Publishing

RENDELL, JANE (1996) *'doing it, (un) doing it, (over) doing it yourself',* In: Jonathan Hill (ed.) Occupying Architecture, Between the Architect and the User, London: Routledge

SADLER, S (2005) *Archigram, Architecture without Architecture, The MIT Press,* London, England.

SHEPARD, MARK et al. (2011) *'Toward the Sentient City'. The Sentient City, Ubiquitous Computing, Architecture and the Future of Space.* The Architectural League of New York, London: The MIT Press.

W, WANG (*2009) 'Quality Matters', New Irish Architecture 24, AAI Awards 2009*, Architectural Association of Ireland and Gandon Editions, 2009

Books (Online)

LE CORBUSIER (1923) *Towards a New Architecture,* PDF Available from URL http://www.colorado.edu/envd/courses/envd4114-001/Spring%2006/Theory/Corbusier.pdf [Accessed: 18/02/13]

VENTURI ROBERT (1977) *Learning from Las Vegas* The MIT Press, Cambridge, Massachusetts, and London England. PDF Available from URL http://designtheory.fiu.edu/readings/venturi_LFLV.pdf [Accessed: 19/02/13]

SANT'ELIA ANTONIO (1914) *Manifesto of Futurist Architecture* PDF Available from URL http://davidrifkind.org/fiu/library_files/santelia.futurist.architecture.pdf [Accessed 25/02/13]

Blog

K VARNELIS & A FRIEDBERD '*Place: Networked Place'* [Online] 2007 Available from: http://networkedpublics.org/book/place

Journals (Online)

MANOVICH, LEV (2006) *The Poetics of Augmented Space, Visual Communication 2006; 5; 219, SAGE PUBLICATIONS* Available from URL http://vcj.sagepub.com/content/5/2/219.full.pdf+html [Accessed : 18/02/13] [Accessed : 19/02/13]

REINHARDT DAGMAR, JAKOVICH JOANNE, *'Trivet Fields: The Materiality of Interaction in Architectural Space,* Leonardo, Volume 42, Number 3, June 2009, p216-224, The MIT Press Available from URL http://muse.jhu.edu/journals/len/summary/v042/42.3.reinhardt.html [Accessed 12/21/12 14:08]

WISCIMBER, TOM (2006) *Emergent Models of Architectural Practice,* Perspecta, Vol. 38 p 57-68, The MIT Press. Available from URL http://www.jstor.org/stable/40482417 [Accessed 21/12/2012 09:21]

Websites

LEE, JI (2005) *The Bubble Project* [Online] Available from: http://www.thebubbleproject.com [Accessed 19/02/13]

WORLD HEALTH ORGANISATION, Global Health Observatory [Online] Available from: http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/index.html [Accessed: 19/02/13]

Images

FIGURE 1, *Speculative Proposal Model, Living City* n.d. Available from: http://archigram.westminster.ac.uk/project.php?id=40 [Accessed: 26/02/13]

FIGURE 2, *Section of Living City,* n.d. Available from: http://archigram.westminster.ac.uk/project.php?id=3 [Accessed 26/02/13]

FIGURE 3, *Amsterdam Realtime* n.d Available from: http://realtime.waag.org/ [Accessed 26/02/13]

FIGURE 4, *Amsterdam Realtime* n.d Available from: http://realtime.waag.org/ [Accessed 26/02/13]

FIGURE 5, *Trivet Fields*, n.d, Available from: http://muse.jhu.edu/journals/leonardo/v042/42.3.reinhardt_img01.html [Accessed 26/02/13]

FIGURE 6, Trivet Fields, n.d. Available from: http://muse.jhu.edu/journals/leonardo/v042/42.3.reinhardt_fig04.html [Accessed 26/02/13]

FIGURE 7, Trivet Fields, n.d. Available from: http://muse.jhu.edu/journals/leonardo/v042/42.3.reinhardt_fig02.html [Accessed 26/02/13]

FIGURE 8. Banksy Anti-Capitalist Piece, Available from: http://t0.gstatic.com/images?q=tbn:ANd9GcT3rBRrHjh9S9YRo87-IZYQbQws49DX0Id0IFpwoLWZ1yPgH9NSag [Accessed 26/02/13]

FIGURE 9, Designated Graffiti Area, Available from: http://www.flickriver.com/photos/tags/cell%3Alac%3D3009/interesting/ [Accessed 26/02/13]

FIGURE 10&11, Roadworth Interventions, Available from: http://www.streetartutopia.com/?p=379 [Accessed 26/02/13]

FIGURE 12, The Bubble Project, Bus Stop Available from: http://www.flickr.com/groups/bubble_project/pool/with/2706363871/#photo_2706363871 [Accessed 26/02/13]

FIGURE 13, The Bubble Project, Apple, Available from: http://grandtextauto.org/2005/10/ [Accessed 26/02/13]

FIGURE 14 – 16, Doyle, Lorraine, Febuary 2013, in[TERRA]action.