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## A Social Dimension for Digital Architectural Practice

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## A Social Dimension for Digital Architectural Practice

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# **A Social Dimension for Digital Architectural Practice**

by

**Chris Speed**

A thesis submitted to the University of Plymouth  
in partial fulfilment for the degree of

**Doctor of Philosophy**

School of Computing, Communications and Electronics  
Faculty of Technology

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**Chris Speed**

**A Social Dimension for Digital Architectural Practice**

**Abstract**

This thesis proceeds from an analysis of practice and critical commentary to claim that the opportunities presented to some architectural practices by the advent of ubiquitous digital technology have not been properly exploited. The missed opportunities, it claims, can be attributed largely to the retention of a model of time and spaces as discrete design parameters, which is inappropriate in the context of the widening awareness of social interconnectedness that digital technology has also facilitated. As a remedy, the thesis shows that some social considerations essential to good architecture - which could have been more fully integrated in practice and theory more than a decade ago - can now be usefully revisited through a systematic reflection on an emerging use of web technologies that support social navigation. The thesis argues through its text and a number of practical projects that the increasing confidence and sophistication of interdisciplinary studies in geography, most notably in human geography, combined with the technological opportunities of social navigation, provide a useful model of time and space as a unified design parameter. In so doing the thesis suggests new possibilities for architectural practices involving social interaction.

Through a literature review of the introduction and development of digital technologies to architectural practice, the thesis identifies the inappropriate persistence of a number of overarching concepts informing architectural practice. In a review of the emergence and growth of 'human geography' it elaborates on the concept of the social production of space, which it relates to an analysis of emerging social navigation technologies. In so doing the thesis prepares the way for an integration of socially aware architecture with the opportunities offered by social computing.

To substantiate its claim the thesis includes a number of practical public projects that have been specifically designed to extend and amplify certain concepts, along with a large-scale design project and systematic analysis which is intended to illustrate the theoretical claim and provide a model for further practical exploitation.

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## Author's Declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Graduate Committee.

This study was financed with the support of the School of Computing, Communications and Electronics and the Faculty of Technology, University of Plymouth.

Projects specifically related to the thesis are available in chapter 4.

Publications specifically related to the thesis are available in the appendices.

A DVD is also included that contains further documentation of projects described in chapter 4. Full details of publications, presentations and conferences are available online at <http://x2.i-dat.org/~cs>

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## Introduction and Overview

New computing technologies have transformed many relationships in society and one of these the way in which we consume, portray and produce space. During the 1980s, the transition from analogue devices to digital systems affected our lifestyles and professions in many ways. For architecture, the transition from the drawing board to the office computer was a significant change but, as the underlying coordinate system essentially remained the same, it wasn't as dramatic as, for example the moment when the same computers became part of a global network. As the concept of the internet as a public utility and cyberspace grew through literature and film, designers began to experiment with the computer-aided drawing tools, and wrote about how architecture could contribute to a digital society. Consequently creative work and texts began to emerge and formed a critical practice that can be described as digital architecture.

This thesis and the supporting research aims to provide models for the further development of digital architecture. In addition, it will extend a theoretical framework for the field through the integration of human geography's readings of space and the technologies offered by social navigation.

The central hypothesis behind the practise and research is that, despite digital architecture having become a field of research and an application with an image that has excited industrial and academic cultures alike, it has also, due to the rapid pace of its expansion, begun to reveal deficiencies which undermine its critical and sustainable development. It is the author's view that human geography's complex constitution of space - as the subject of social, economic, political, geographic and cultural attributes - offers a rich theoretical framework into which digital architecture can establish a fresh context which will enable it to engage fully with a networked society. In addition, with the technical qualities of contemporary social navigation computing techniques which offer distributed, reflexive and networked properties, digital architecture has the opportunity to recover itself and remain a valuable adjunct to mainstream architecture. It is within this theoretical context that the author demonstrates - by synthesising the critical concerns of both human geography and social computing into his own digital architectural design work - how a new strategy could succeed, and thus reveals new potentials for digital architecture.



In addition to the thesis, the research work aims to offer a number of practical and theoretical contributions to the field of digital architecture, which can be categorised by the following statements:

- a) a critical assessment of a particular aspect of digital architecture and the re-assertion of its value to mainstream architecture,
- b) the positive attributes of human geography theory as a useful theoretical framework for understanding the contemporary models of space,
- c) the technical and cultural properties of social navigation software that positions it as a powerful technology for binding spatially situated research with a wide range of human activities and needs,
- d) a large-scale industrial project that demonstrates the conceptual application of the use of social navigation technologies to construct a digital architecture, and an accompanying ethnographic study of the project that identifies the effectiveness of the technologies and theories,
- e) case studies of the author's projects that have contributed to the development of a methodology for what digital architecture can do when synthesising the complementary fields.

The thesis describes each element of its argument in sequence, leading towards the author's art and design work, and the large-scale project and ethnographic study, before a conclusion is reached. The different nature of the three core subjects - digital architecture, human geography and social navigation - means that each of the main chapters employs a different method of inquiry to demonstrate the value of each subject to the theoretical programme.

Proceeding from a particular reading and use of the literature and artefacts of digital architecture, the author constructs a critical narrative to support the idiosyncratic creative processes that are demonstrated through his practice. As a consequence of this the first chapter revisits a series of claims made by a specific collection of digital architects that made a significant contribution towards defining the discipline as an adjunct to mainstream architecture. The chapter suggests that not only have the claims yet to be fulfilled, but that apart from some notable exceptions, the social, technological and economic strategies for achieving them to date have been flawed. The author describes a brief history of digital architecture that preceded a series of books published by Academy Editions that documented the apparent rise and fall of a critical and practical method for digital architecture. Using these books as a barometer for the subject, the author identifies a range

of artists and architects who presented theoretical and practical strategies to support the critical development of architectures for digital space. The author reflects upon the work of these designers in order to categorise the types of practice, and through an analysis of graphic styles, theoretical propositions and the use of technologies, each category is explored in order to identify how they have developed over the past ten years. From this analysis the health of the field is discussed and a pattern of problems is identified which has prevented digital architecture from reaching its full potential. At this point, following the critical analysis of the condition of digital architecture, the research question and aim are articulated.

The second chapter charts how digital architecture has struggled to sustain itself as a research field after what appeared to be such a bright beginning. The chapter proposes that mainstream architecture's adoption of a split model of time and space led to the development of methodologies, and consequently technologies, that would inhibit its ability to express post-Cartesian ideas. The chapter traces the development of a split time-space model and how it became embedded within architectural method during the success of modernism, but failed to be modified once post-modernism threw doubt on the validity of science. This left digital architecture using Cartesian tools to engage with post-Cartesian theories. The chapter introduces human geography as a field that has overcome the split time-space model through the identification of social agency in the production of space. The work of human geographers is used to support the proposition that a social dimension offers digital architecture an opportunity to adapt its methodology and recover itself. The chapter closes with a reflection on how the internet has emerged as a social experience, in contrast to the early architectural visions of cyberspace in which networks were constituted through visual frameworks rather than social relations.

The third chapter studies architecture's relationship with social concepts and identifies how difficult it is for the field to relax its determination to materialise its design structures in a visual form. Through an understanding of the network as a social material, the technology of social navigation is introduced as a means of developing methods for constructing architectures within the internet. The chapter maps a history of social navigation, as it remained largely ignored throughout the initial growth of the internet. It looks at how social navigation has recently become a constructive strategy which supports social engagement and is remodelling digital economies for new forms of the web. Examples are used of technical approaches for achieving social navigation, which are then categorised through the developments of Human-Computer Interaction (HCI) research. Each technique

will be used to build the contemporary models that demonstrate this area's potential for providing digital architecture with a technical, methodological and theoretical framework for extending its enquiry.

Chapter four introduces a series of eleven practical works that represent 50 per cent of the doctoral work. Each piece is described through its objectives, which aim to address the research question, and how each piece uses theory and technology to offer strategic milestones towards a new digital architecture - one which is more robust than its predecessors. From the practical projects a method emerges that supports the application from arts practice into an applied design context which is described in chapter five. The supporting DVD should be used in conjunction with this chapter to understand the nature of the works and their development over the duration of the doctorate.

Chapter five details a large-scale industrial project that the author conceptually directed to provide a concrete example of how a methodology for social digital architectures is implemented. The design solution is presented along with its rationale and an accompanying ethnographic study. The programme for the study is carefully developed according to established methods and an analysis of its outcomes reveals further evidence of the potential for social digital architectures.

The sixth chapter is the conclusion of the thesis, and takes the salient points of the previous chapters - in particular the applied production work - to present a conceptual framework for digital architecture. Theoretical sensibilities are identified, and technical opportunities highlighted, which present the field with an opportunity to develop a strategy for a sustainable future that is successful in social, technological and economic terms.

### **Key Terms:**

Throughout the thesis the author has tried to use, where possible a vernacular language in which some key terms are technical, but perhaps the most conceptual and challenging, particularly in the way that it is used in this thesis, is the term Cartesian which has been explored by many authors from many disciplines including: philosophy, mathematics, human geography, cultural and historical studies.

In this thesis the term *Cartesian* refers to the epistemological model in which a mind-body dualism is used to support a 'truthful' analysis of experience. By everything in which he could find doubt, Descartes opened a conceptual gap between the physical and mental experience of the world. Throughout this thesis the term Cartesian is used to refer to this dualistic principle as a basis for enquiry. Most frequently it is used here to refer to a system of thought that flows from the view that time and space are separate dimensions.

*Digital architecture* is used to describe the critical practice that emerged within architecture, as computer-based drawing packages began to support the design process and the internet emerged as a public utility. This thesis focuses upon the activities of a selection of practitioners who were central to the formative development of the methods and theories that defined a generation of architects who chose to explore how architecture would transform through the use of digitally networked virtual environments.

*Human Geography* is used with specific reference to a branch of geography that focuses upon the study of social systems and processes that shape our interaction with the environment. It is used in preference to Cultural Geography because of its difference from the Physical Geography that dominated geographical research for most of the twentieth century.

*Social Navigation* is a theoretical and technical aspect of computer science within the field of Human Computer Interaction. The guiding principle behind social navigation systems can be understood as supporting a form of user navigation that is informed by the actions of one or more advice providers. Varying from actual people to different forms of software that has been written to filter and recommend choices of navigation to the user, social navigation systems are a key aspect of Web2.0 technologies for supporting social networking.

*Split time and space* is a term that is used to describe a model of experience that separates time from space. Originating from the Enlightenment's rational approach towards understanding human experience, the division of time and space was central to René Descartes' development of the drawing system that underpins contemporary digital drawing packages.

## **1.0 Digital Architecture; Identifying The Problem And Developing A Strategy For Recovery.**

*This chapter outlines some of the major deficiencies in the current field of digital architecture, and details how it is losing its potential as a research field to respond to a digitally networked society. Digital architecture has been enormously vibrant in establishing itself as a valuable extension to the mainstream field of architecture. Its 10-year lifespan has already provided many new images and ideas for the way in which architecture, both theoretically and practically, can embrace digital culture.*

*This chapter will argue that through a critical engagement with computer technologies, digital architecture has established itself with positive exposure, but due to the technology employed and the lack of a social agenda within aspects of the field it has fragmented and been unable to achieve its potential. The chapter describes the shift in focus from the idea of shelter that is used to underpin mainstream architecture's dialogue with actual space, to describe the attributes that digital architecture established as its own inquiry into designing for cyberspace. This chapter further describes how these inquiries manifest themselves as methodological and practical work, but how the technology used has led to a style of architecture that has failed to express the theoretical tensions within the field. This failure has resulted in a splintering of the field to compensate for the lack of social issues, and in doing so has dissipated the potential for digital technology to fulfil its early aims.*

*This chapter will highlight the lack of a social dimension within the field's early aims and objectives. It will suggest that the discipline should be paying greater attention to the social focus of its work, in terms of its range of audience, its use of technology and the growth of economical arenas. By addressing these concerns the author will suggest that a recovery is possible, and that this can ensure that the field has a future relevant to both architecture and computing.*

## **1.1 Architecture, Digital Architecture And The Dwelling**

*The section provides a background to the impact of computer aided design and through a brief history, identifies a series of responses to new opportunities as the technology developed and began to affect architectural practice. The section begins by making reference to the early technical and industrial developments as they affected architectural practice and in particular the use of collaborative systems that are characterised in the literature of Jabi, Maro, Saad and Wassim. A second area of impact was in the stimulation of innovative critical insights into both new media and architecture apparent in the cultural and theoretical responses characterised in the work of Benedikt, Coyne, Mitchell and Negroponte. The third area in which new insight and practice can be said to flow from computer aided design can be seen in those artists and designers who saw new possibilities for visual arts through the transformation of architecture as the cornerstone of art practice. These artists, and in some cases artist theorists who picked up on this possibility, drew eclectically in a body of response to digital architecture in an attempt to rationalise a new visual regime. This section elaborates on that history identifying key players (including Chu, Novak, Oosterhuis, Perrella, Spiller) in this enterprise which has most relevance to the practice based element of this thesis which is exemplified by the authors early work; Raindance.*

Digital architecture emerged as a response to the technologies that transformed the processes that architects used as they shifted from drawing board to PC in the 1980s. In parallel with this process, parts of western society underwent a number of crucial cultural shifts during the transition between analogue and digital technologies. Images were faxed rather than posted, money was extracted from walls using PIN numbers rather than after queuing in banks, and computer generated characters rather than actual people were watched for entertainment (Castells 1996:366). The public, as well as industry, struggled to make sense of what the new digital landscape really entailed. As these technologies began to be networked and the early forms of the internet emerged, architects began to ask questions about their own field's contribution to the digital society.

Following IBM's introduction of the first commercial computer aided design (CAD) system for General Motors in 1963, early computer based drawing tools, along with computer graphic technologies, improved dramatically through the 1970s, providing shading algorithms and interactivity through mouse control (Kalay 1999:20). During the 1980s, as systems began to be adopted by large US-based architectural practices such as

Skidmore Owings and Merrill (SOM), Perry Dean Rogers and Hellmuth, Obata + Kassabaum (HOK), the software began to focus upon developing standard practices within architecture. Running from large mainframe computers, software began to support drafting, plotting and management aspects that could be used specifically by architects (Engeli 2001:6). By the 1990s, the advent of desktop PCs allowed small businesses and academic centres to embrace drawing packages such as AutoCAD, as well as rendering applications such as 3D Studio MAX. During this time, research and development had extended design processes through interface and software techniques, including the development of vision systems to support virtual reality, and the development of generative systems using artificial intelligence that could assist the design of architectural spaces. The networking of computers for architectural drawing purposes was limited until the growth of the internet and the reliability of software was assured. As architectural practices became networked and online, offices became decentralised and designers could share work around the clock and around the globe, as well as being able to work simultaneously on single CAD documents across a network. By now, a potential for the internet to support CAD development and transform architectural practice was beginning to be identified. Wassim Jabi (Jabi 2003:171) identifies the realisation that networking can support a social dimension to design in William J. Mitchell's use of the term 'society of design', derived from Marvin Minsky's metaphor 'society of mind' which suggested how complex problems can be solved through distributed actions. Mitchell speculated how the architect of the future would have a breadth of digital and networked technologies to support communication with fellow designers, clients and contractors (Mitchell et al 1990:489).

As the products developed, so the theoretical and practical explorations began, and academic centres in America (Columbia, UCLA), Europe (Bartlett, ETH, TU Delft), and Australia (Sydney, RMIT) experimented with form, theory, aesthetics and interactive extensions to help define digital architectures. While new geometric potentials offered designers such as Greg Lynn, Lars Spuybroek, Kas Oosterhuis, and OceanD the opportunity to design new types of structures (although their practice largely contributed towards new design approaches for conventional building), books such as Michael Benedikt's *Cyberspace First Steps* (1991), Nicolas Negroponte's *Being Digital* (1995), Richard Coyne's *Designing Information Technology in the Postmodern Age* (1995) and William Mitchell's *City of Bits* (1996) all presented critical opportunities for architecture to ask serious questions about itself through its engagement with cyberspace and digital technology. Of the many books, these four represented a critical initiative within

architecture to sustain a relationship with digital technology to ensure that it could adapt and develop computer systems that embodied processes which would sustain an integrity to design.

Benedikt offered theoretical and practical concepts through which architecture could embrace cyberspace as an opportunity to explore its own development. Along with the four 'threads' of language, technology, architecture, and mathematics, he included computer scientists, cultural theorists and the digital architect Marcos Novak to present methodologies that articulated how architecture has a significant role to play in defining the critical development of cyberspace.

"The door to cyberspace is open, and I believe that poetically and scientifically minded architects can and will step through it in significant numbers. For cyberspace will require constant planning and organisation. The structures proliferating within it will require *design* and the people who design these structures will be called *cyberspace architects*." (Benedikt 1991:18)

Of the books and essays written to support the architectural development of cyberspace, Carl Tollander's contribution 'Collaborative Engines for Multiparticipant Cyberspaces', presented an important theoretical framework for a collaborative model for digital architecture. Tollander asserted that 'collaborative engines' "can provide an arena where - distributed, decentralized influences can operate in concert to produce and maintain shared spaces" (Benedikt 1991:330). The following year, William Mitchell was also involved in the co-authoring of a paper along with Jerzy Wojtowicz and James Davidson entitled *Design as Digital Correspondence* (Wojtowicz et al 1992). The paper described an educational project that made use of an electronic bulletin board to support a solution to an architectural design brief by students who were in two different places around the world. Making use of the bulletin board to post drawings, and email and telephone to communicate, the authors demonstrated a further potential for architecture to be developed through the use of networked digital media.

Negroponte's speculation on the digital lifestyle further encouraged us to consider a different experience of architectural space as digital systems emerged and became all pervasive. This is an experience in which architecture no longer remains simply in physical space, but will be progressively complemented by the virtual, until actual space itself will be irrelevant (Negroponte 1995:7). Through a critical analysis of computer systems and software design and their historical ties to rationalism, Coyne used postmodern studies to



expose the contradictions of logical methods for design, and used metaphor to allow insight into how designers can use more pragmatic processes in the use and understanding of digital technology. Directed toward the planning and architectural communities, Mitchell's *City of Bits* is a highly accessible text in which he makes clear how the internet will transform existing practices both for the users and developers of urban space. Mitchell's *Soft Cities* is consistent with Benedikt's, Negroponte's and Coyne's need for a critical sensitivity in the use of digital media, and encouraged architecture to use the advent of cyberspace as an opportunity to reconsider its programmes, methods and potentials.

By the mid 90s, networked CAD systems began to gather momentum as Computer Supported Cooperative Work (CSCW) began to affect the development of architecture systems (Maro, Gero and Saad 1993; Caneparo 1994; Schmitt and Rodden 1996; Wassim 1996). In 1995, Mitchell published the paper *CAD as a Social Process* which described the importance of CAD to become networked: "it's a person-to-person, social process - not just one of solving technical problems and producing documentation. That's what practical design is mostly about. And traditional CAD hardly helps with the all-important social aspect of it at all." (Mitchell 1995:8).

Educational institutions across the world began developing specific architectural projects and software to exercise these emerging principles (Saad and Maher 1995; Kvan et al 1997), and the term Virtual Design Studio became synonymous with collaborative design environments that used digital networks to supported the design process. Notably WebOutliner (Jabi 1999), Phase(x) and fake.space (Engeli and Mueller 1999), GW-Notebook (Morozumi 1999), Archville (Peri 2000) and ACCOLADE (Stellingwerff and Verbeke 2001) all demonstrated collaborative attributes to support social relationships for design. Varying in their use of technologies, from VRML to bespoke applications programmed in C++, the systems consolidated collaboration and the importance of social frameworks within CAD and digital architecture.

By the year 2000, social systems had become a sustained part of CAD conferences such as CAADRIA (in Asia), eCAADe (in Europe), and ACADIA (in North America), as collaborative design had become a central part of CAD and digital architecture. However, during the time it had taken for the development of social systems within digital architecture to take shape, a specific range of artists and architects had responded to the early proposition of cyberspace by designing and developing practices that represented an

'image' for the field which was largely without a social dimension. Less concerned with mainstream architectures processes, designers such as Marcos Novak and Karl Chu provided the illustrative and theoretical content for a series of highly visual books that demonstrated how architects were responding to cyberspace. The Architects in Cyberspace series, published by Academy Editions, London, became a vivid handbook which documented how designers were responding to the development of architectural drawing applications and the growth of the internet between 1995 and 2002. Offering dramatic images for a wide range of publications, many of the architects and designers featured in these books deeply affected the perception of digital architecture's mission by students and elements of the design community. Concentrating upon how to resolve the view that time and space are separate dimensions, and the immersive and dematerial potentials of cyberspace, the developments of this 'cyberromanticism' (Coyne 1999:68) ultimately was not used to sustain practices that defined an aspect of digital architectural activity. This thesis traces the roots and development of the high profile architects and designers who were heralded as Architects in Cyberspace, and identifies the scope of any social dimension to their theories or practice, and how such a creative response is able to support new opportunities in art and architectural practice and theory. It draws down a new human dimension consistent with theoretical and critical reactions that compels not least a revisitation to the concept of dwelling.

In the first edition of Architects in Cyberspace, key questions were asked such as: What constitutes a city? How far do our bodies reach? Who can see me? Can I live in a virtual reality? Who can I talk to? What are the rules of a new space? These questions were explored and stimulated by the science fiction writers such as William Gibson and Neal Stephenson, who provided literary starting points for imagining what a virtual architecture might be like. Through Architects in Cyberspace, designers and academics used the critique of the fundamental tenets of architecture - such as 'dwelling' that modernism had dismantled - to define their practice. Dwelling becomes a key architectural term which allows us to understand the context in which digital architecture emerged. Its critical, postmodern programme was due to the differences that digital systems offered to the industry of constructing buildings.

Dwelling, prior to the Enlightenment, can be understood as having more than just a functional imperative. In addition, it was closely linked with worship and expressions of power, as though an attachment to a space was connected with the religious and political structures to which its subjects should be subservient. The embracing of technologies and

the movement to modernism “free[d] people from the limitation imposed on them by family or clan or by their village community, offering them unheard-of options and often material improvements as well” (Heynen 1999:15). In doing so, there was an ensuing loss of particular certainties such as the sense of ‘being’ that Heidegger sees as being intrinsically tied to the concept of ‘dwelling’. Through the mapping and subsequently the commodification of space, Heidegger suggests that the Enlightenment separated us from an intrinsic connection to land and, in doing so, we lost our sense of ‘dwelling’ (Heidegger 1971:155).

By tracing the term ‘building’ back to the German phrase ‘buan’, which is related to “I am”, Heidegger concludes that building and dwelling are closely bound to the concept of being. For Heidegger dwelling does not stem from building, but the reverse; building comes from the need for shelter and a sense of being in the environment.

“The nature of building is letting dwell. Building accomplishes its nature in the raising of locations by the joining of their spaces. Only if we are capable of dwelling, only then can we build.” (Heidegger 1971:155).

However, as Modernism concentrated upon the machine and the development of the city for a space for living, an insurmountable distance was created between the metropolis and a place to dwell. Subsequently, as dwelling receded, building took on a new aggressive form in which modern homes such as bungalows and apartments constituted new living environments and the attraction of the city led to migrant populations and homelessness.

“Under modern conditions the world has become impossible to live in; modern consciousness is that of “the homeless mind,” and foreigners and migrants provide a model for the experience of every individual in a modern, mobile, and unstable society.” (Heynen 1999:17).

Modern architectural values then questioned the nature of dwelling as something that could not be qualified simply through structure and attachment to a place, since the human continuity with ‘nature’ and space can no longer be taken as a given. The machine age brought with it the romantic counter-culture in which technology was considered as intrinsically opposed to nature, and altered architecture’s provision for shelter through materials that distinguished themselves from organic matter, rendering us ‘homeless’ (Heynen 1999:14). Examples of this include Le Corbusier’s concrete Marseille apartment block on stilts, suggesting a rejection of the soil beneath it. Buckminster Fuller’s post-war Dymaxion house meanwhile, made use of aircraft manufacturing technologies which

replaced hand-made, wooden dwellings. Architecture's role in reconciling our relationship with the world remains in discussion and provides the differences in theoretical and practical approaches to designing forms and structures.

More recently, in an effort to overcome the tension between modernity and dwelling, contemporary architects have written about the complexity of the architectural process at a conceptual level, involving narratives from literature and the arts as well as critical theory and politics, in an effort to overcome the tension between modernity and dwelling. Post-modern architecture can be understood as an attempt to reconcile the dilemma as it rejects science and invests in cultural imagery as a resource for representing the value of the vernacular and exposing our lack of faith in modernism. Mimesis and the use of apparently naturally inspired systems becomes a framework for strategies involving the form, materials, plan and experience of a building. Of the most significant architects of recent decades, Rem Koolhaas and Daniel Libeskind have incorporated complex historical and contextual references into their work. These architects would argue that they have extended the service of providing dwelling by addressing the complex nature of our relationship with time, space and place. However many of these solutions are still bound up in the modern process of making buildings and struggle to escape the dilemma of 'homelessness'.

At the end of the 20th century a new form of 'homelessness' was identified through the use of the internet, but its interpretation was more constructive. Stephen Perrella describes the 'loss of being' as a central part of the cyberspace experience, one in which there is an 'omnitemporal logocentricism' (Perrella 1995:30) or an 'anywhere, anytime' through which we find ourselves further dislocated from a sense of place. These writings were part of the beginnings of a new movement in architecture, in which dislocation and 'homelessness' were embraced as powerful attributes of a new type of space, rather than symptoms of an old one in crisis. Digital architecture represented an opportunity in which a reconciliation between dwelling and modern technology wasn't necessary, because there were ground rules for a new type of space in which architects could regain the power to provide meaningful spaces. Cyberspace provided the re-establishment of a 'metaphysical, even theological dimension' (Larner and Hunter 1995:25) to space because it was constituted by a person to person communication. It constructed an 'instantaneous dynamic consciousness' (Larner and Hunter 1995:27) with the potential to develop new aesthetic forms, away from the lineage of art and industry, and across the borders of countries and continents. The implications of the development of the borderless environment of the

internet was one that offered an exciting element of lack of control and an element of decentralisation. Reliant upon its development by a rich mix of users, the boundaries and territories could not follow the planning models of any one individual's authoritarian dreams. For Sadie Plant the "continual flux and change" that is offered by a highly socialised development offered an antidote to the consequences of Modernity in which "the sciences, arts, and humanities lose their definition and discipline: law and order fall into decay; social bonds slip beyond repair" (Plant 1995:36). Roy Ascott's conceptualisation of this organic model of the network of the internet led him to the term *cyberception* which "involves a convergence of cognitive and perceptual processes" that become "locked socially and philosophically" through the web to support a new model for seeing both virtual concepts and spaces as well as a close attachment to actual natural systems (Ascott 1995:38). In the context of architecture he laments the lack of biological and social systems that are evident in classical and modern design, and sees both the actual and the digital city as a "space to share, collaborate and participate in the processes of cultural evolution" (Ascott 1995:40).

The interpretation of how this new landscape of cyberspace may appear was debated by writers in terms of how the distance between dwelling and building could be overcome through the different ground rules presented by working in a digital space. For many technical ambassadors of virtual reality systems, however, cyberspace presented an opportunity not to extend the inquiry into what a digital 'dwelling' may be but to "produce virtual photo-realism in real time" (Chaplin 1995:33). Critiquing an article by John Walker of Autodesk (creators of AutoCAD, 3d Studio Max) who suggested that his company's technology supported the development of "a three-dimensional simulacrum of the world, and that allows interaction in the ways that mimic interaction with real world objects", (Walker 1990:444) Jonathan Stoppi argues that mimicry of actual architecture offers little opportunity to extend architecture's enquiry into 'shelter' (Stoppi 1992:25). He argues that digital architecture's potential lay in supporting the actual with businesses using digital space to complement their actual places. There would be virtual headquarters for example, featuring meeting rooms, libraries and shopping centres. These hybrid spaces would offer economic benefits and support better international communications. The 'Cybrid' (Anders 2001:60) concept for digital architecture is where many architectural contributors to *Architects in Cyberspace* identified a critical position that would have the greatest impact upon architecture itself. Sarah Chaplin describes a point in time when the "enabling technology gathers momentum, designers of virtual soft and hardware [will be] happy to allow the differences between cyberspace and reality to be gradually eroded, until the

experience of both will become practically interchangeable, thus perfecting a mutual simulation.” (Chaplin 1995:33).

The architectural form that cyberspace would take became the key point for many texts of the period. Digital Architects became determined to demonstrate visual and interactive potentials distinct from those of technicians who developed virtual ‘mirrors’ of actual space. Marcos Novak recognised a ‘post-Cartesian’ opportunity offered by interacting with digital systems as time and space became interwoven. Setting a scene for his own aspirations for more geometrically challenging interpretations of architecture in cyberspace, Novak described the historical use of time and space as being features of particular disciplines: “architecture was the art of space... and music was the art of time” (Novak 1995:44). He expressed a disappointment with modernism’s inability to keep up with mathematical developments through the 20th century. Novak identified the underlying Euclidean mathematics, which informed structures of the International Movement, to be evidence of a lack of critical development for architecture, and demonstrated a lack of engagement from a world which was moving toward quantum and relational models for understanding space.

“Descriptively, analytically, synthetically, the rigidity of the canonical, orthographic descriptions of architecture fail to capture what is salient to space as we currently conceive it. Plan, section, elevation, axonometric, perspective, traces of pigment held by the tooth of vellum, ruler and compass, were perhaps appropriate to the cycles and epicycles of Ptolemaic, Copernican, and Galilean universe, or even the ellipses of a Keplerian universe, but are completely impotent in arresting the trajectories of subatomic particles, or the shapes of gravity waves of colliding black holes.”

(Novak 1995:44)

Genetic engines and higher dimensional maths that integrate transformation and time were the technologies for Novak’s propositions for non-Euclidean architecture in cyberspace. Karl Chu extends these through theoretical visions of how the internet itself may evolve through self organising systems to manifest structures that we can only begin to imagine as our “conception of territory, of dwelling, of identity, of the phenomenology of existence and being will no longer be the same” (Chu 1995:69). By using the emergent processes involved in computer models such as Cellular Automata<sup>1</sup>, Chu dispelled the dominant teleological conception of ‘process’ that he sees as central to the Enlightenment and which

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<sup>1</sup> Cellular Automata is a computer science technique used to simulate biological cell activity. Mathematical rules are applied to cells within a grid, and over time depending upon the relationship with their neighbour each cell will update itself and thus affect its own neighbours.

remained part of modernism into the 20th century. Through the 'morphogenetic' nature of CA behaviour, Chu introduces the term Modal Constructivism. This offers an organic model for the emergent architectural systems that will begin to appear in the context of the internet. For Chu, cyberspace offered a distributed and decentralised framework in which "traditional conceptions of territory, of dwelling, of identity, of the phenomenology of existence and being will no longer be the same" (Chu 1995:69). John Frazer identified the etymological root of cyber-space as a critical opportunity to endorse the use of genetic and complex systems for architecture (Frazer 1995:77). Cybernetics and architecture were linked through many activities of architects in the 1960s. Frazer suggests that the 'products' of such thinking which were in 'the relationship of forms' were manifested in architecture and the arts by people such as Buckminster Fuller, John Cage and Marshall McLuhan. For Frazer, digital architecture now has the computational power to focus not on 'products' but 'processes' that can accelerate evolution and grow relationships between forms and users.

The non-material nature of such a new space ultimately becomes non-visual and highly social as Dunne and Raby consider not just the visual representation of an internet, but the electromagnetic fields that support its networks. Cautious to identify themselves as pioneers of an 'abstract digital space' they concern themselves with interfaces to actual people or places through digital systems. Their research project, *Fields and Thresholds*, situates an opportunity for digital architecture in creating 'translucent' connections with people and places. Concerned with the assumption made by technologists that society can deal with transparency in technologies such as the telephone, the designers plot out a framework of practice that blurs telematic and physical space to support "the more subtle complexities of our social skills into the world of telecommunications." (Dunne and Raby 1995:64). Their highly sensitive proposals are notably different to that of many other published 'cyber architects', and there is a deep vein of industrial design embedded within the objects and situations that they focus upon. All of the contexts are very physical, and focus upon reconciling the gaps formed by 'modern' technology between the relationships of people and spaces, rather than in speculating about new systems or future worlds. Dunne and Raby's sensitivity to technology and its implementation is evidence of a concern for digital architecture not to become a hyperbolic path for technologists to indulge in post-modern futures, but to offer a means of understanding the nature of cyberspace before it becomes colonised and represented using predefined techniques.

Reflecting on the core texts of the early period of the field, it's possible to identify a series of popular themes that can be interpreted as 'aims' for its investigation. It's notable that many of the themes are interconnected and rely upon each other to constitute methodological directions for realising the ideas.

1. Surface and image, new forms of architectural dwelling.

Interwoven between many of the writers' practice and texts is recognition for digital architecture to provide an opportunity to revisit the role of architecture when it is taken outside of Heidegger's dilemma of dwelling.

2. Post-Cartesian forms and structures.

The mathematical openness of the canvas that is cyberspace offers a new medium through which architectural styles, aesthetics, geometries and physics can be developed beyond the Euclidean and Cartesian Coordinate based systems that prevail in mainstream architecture.

3. Genetic and biological computing models offer an integrated framework beyond split time and space.

The control of time and space as interconnected subjects in digital media offers rich potential for complex biological systems to be developed in an architectural method.

4. Augmented digital architectures will support our experiences in actual space.

Social, economic and technological circumstances in the physical world will benefit from the design and use of cyberspace not as virtual and separate environment, but as an additional layer for investigation and design within actual space.

5. Cyberspace as offering 'new' properties that offer different challenges for architectural method.

The interconnected and ecologically constituted space that transgresses borders, cultures and genders offers a context for architectural practices to emerge that are not tied to typical vernacular constraints (cultural, political, geographic).

*This section described briefly the development of CAD technologies including collaborative design systems, and focussed upon the theoretical and practical aspects of the work of architects and designers who were published in a series of books entitled Architects in Cyberspace. This section has identified five core themes that represent the activity of architects and theoreticians that were heralded as digital architects. These*



*research questions originated during the middle of the 1990s and establish the direction that we could expect practical work to begin operating within. The following section will describe methodological attributes of work from more recent years in order to identify whether the field was able to sustain its initial enquiries and even provide solutions to them.*

## **1.2 The Form Of Digital Architecture As A Practice**

*This section describes how digital architecture has manifested itself over the past ten years and the dominant visual language that has become synonymous with it. It suggests that although it has filled a cultural void in the media, it has nevertheless led to a mannerism within the field that has failed to address many of the aims that were expressed in the five core themes. It also looks at the pressures of publishing and the media which have exacerbated the repetition of digital architecture's style and distracted it from engaging with the core questions.*

As internet technologies stabilised and more people got online, an accumulation of architects and writers interested in how architecture would respond to cyberspace began to come together. As contacts were established, particular images and image makers came to the fore in creating a style for how architecture might look in digital space. Inevitably, due to the power of the imagery associated with built architectures, this preoccupation with form laid the groundwork for a critical problem for the direction of the field. In presenting itself through images, there was a danger of the discipline being understood as the mere reinvention of the drawing board in the context of a networked society. Consequently the images that were so exciting in demonstrating the mathematical properties of computing space, and which could lead to the distributed social network of the internet, appeared to have become weights that tied architecture to its analogue heritage of designing space with a drawing board.

Many of the books that have documented the development of digital architecture have had to call upon a limited resource of images and texts. This is simply because the field is so young. However, in this rush to herald the new digital movement, many of the images have become more than just emblematic, they have generated a mannerism; an unofficial formula for qualification to be involved within the field. Marcos Novak and Karl Chu were

among the first digital architects to be published, and their work soon established a dominant aesthetic. Their images operated in such a provocative manner on the page that they defined an influential language for the field which continues to be expressed today. Dark, masculine shapes with sharp and sometimes fluid lines, making use of differing levels of opacity between objects, which collectively generated a massive complexity, the images were strikingly different to anything seen before in traditional architecture. They contravened rules for objects that could be built, they were weightless and out of scale, and their materials couldn't be easily identified other than as RGB values. Reminiscent of the covers of mathematics text books, the forms appeared to have a geometric order about them, but one that involved a higher level of calculus than the reader could readily comprehend. At the time of their presentation the works were accompanied with critical texts that, although loaded with new phrases to explain themselves, contained imagery which was tied to a process of inquiry into the field of digital structure and form. Later however, the ingredients of these images became the signatures of designers who wished to be associated with the aspirations of the movement, but who could contribute little to its critical development.

To understand the aesthetic and the critical differences across the field of digital architecture it is important to explore the five categories that were identified in section one. The following analyses use specific architects, artists and designers to describe theory and practice within the categories. The use of images that immediately follows this chapter complements this by identifying the graphic language that emerged through the discipline. Readers are encouraged to refer to the images for support.

### **1. Surface and image, new forms of architectural shelter.**

*Sculpture City* was an architectural project based in Rotterdam that culminated in an exhibition and publication of works and texts that challenged how an urban space would engage with virtual technologies. Interested in the interplay between the material nature of both actual environments and a variety of technologies that constructed architectures, the documentation of the exhibition demonstrates some starting points for digital architecture to express its aims. Stephen Perrella presented the philosophically complex text to frame his hypersurface work. Interested in the split between subject and object, he finds digital systems and in particular interactive digital presentations as a space in which the schism between mind and body is reconciled.

Preceded by his own historical interpretation of Heidegger's loss of 'being' through modernism as an end to metaphysics, Perrella unfolds a crisis for architecture because of its complicity in using Cartesian technologies. He identifies an opportunity within the textures and not the grids, and his fascination with cinema special effects and high impact street advertising that wrap around buildings demonstrate his aspirations for an approach to architecture that is beyond being steered by representation but somehow an ongoing manipulation between representation and experience. In decoding his text he also presents his own work, and that of his architectural design project studio AEM, as merely attempting to deal with this practice, as though by dismantling the tools he renders himself unable to operate. Early works from 1995 involved the layering of objects with unusual texture maps (note) in twisted, folding environments (Figure 1.1). Perrella references the application of textures in the movie *Terminator 2* through special effects to describe how the designers "geometricized [the] air, the relationship between bodies and buildings." (Perrella 1995:30). Through his reflections upon the post production of the architecture and bodies in the film's spaces he suggests that "if bodies are giving off information, and buildings are no longer objects, then there's got to be some sort of clinched interaction; interactivity." (Perrella 1995:30). These interpretations lead to an understanding of what Perrella's images are and how they begin as sketches in response to the use of surface in cinema and in highly mediated public spaces such as Times Square.

By the late 1990s, his theoretical framework couples the Heideggerian dilemma of not knowing 'place' with a Deleuzian model in which "everything is connected prior to divisions, thus subject and matter are fundamentally linked" (Perrella 1998:13). He suggests that digital technology - through its complicit use of image in surface and texture throughout our daily lives - is eroding the separation that has kept "subjectivity and materiality apart" (Perrella 1998:13). This is a complicated proposition makes it hard for him to fulfil in digital form because of the implicit connection that the viewer is expected to have with the work, and that is undermined through looking at an image on a page.

"A hypersurface is the informed topology of an interstitial terrain between the real and the unreal (or any other binary opposition) which then flows transversally into a stream of associations."  
(Perrella 1998:15).

Along with more sketches that allude to a complex interactive state between texture and form (Figure 1.2), Perrella also applies the ideas to a proposal for a structural study of a small dwelling that attempts to deal with the sense of non 'shelter' in a form that envelops



the user in media images. The Möbius House Study remains a clever narrative for describing the paradox of loss of connection to 'place' with a new attachment to 'media'. The images, however, tended toward a masculine play with chrome meshes (Figure 1.3) that struggled to articulate the complexity of his thesis. With the publication of *Hypersurface Architecture 2* in 1999, Perrella concentrated upon his ideas through a textual analysis of other designers' work, as though the crisis of representation in a non-interactive space (the page) rendered him incapable of making images that would only serve to undermine his thesis. The work of others is divided into two types; firstly, studies around a car advert through which evidence of a hypersurface culture is identified and then critiqued, and secondly, architectural designers who use digital technology in their development of surfaces. The former are based on the television commercial 'Cool world' for Mazda cars produced by Charlie Watson (Figure 1.4). Special effects again support the work as a symptom of hypersurface culture and, through an interview with the commercial artist, Perrella claimed that "all the theory relevant to hypersurfaces was considered in purely commercial terms: the selling of a car." (Perrella 1999:39). The latter works feature Oosterhuis, Decoi, Burry, Capaz and Lalvani. They offered structural plays toward new surfaces for built spaces and included a range of metallic meshes and fluid forms which consolidated *Hypersurface Architecture* as a theoretical framework for supporting the building of actual structures in the physical world (Figure 1.5). This return to the built suggests a closure for the investigation of hypersurface as a digital field. Its description in the editorial preface as the "refining of digital construction and manufacturing" (Toy 1999:4) reinforces the impression that the early experimental illustrations of a theory didn't have enough momentum to escape the gravity of mainstream architecture, in order to establish a digital practice.

In 2001, Perrella responded to further discussions upon hypersurface through the *VOID* book (Lowenstein 2001:26) and, after 10 years of practice, there was a limited sense of success in using digital technologies to resolve the Heideggerian dilemmas that fuelled his initial inquiries;

"to accept the division between media and material is already to participate in a dualistic and dichotomizing activity. One can be assured that such an approach will always uphold such divisions. That is because dichotomies begin with our assumptions about things in the world. When I do architecture, I try not to make such distinctions although it is very hard not to, because the deep history of dividing things almost always assures that when you engage with the world it is already locked into tightly controlled categories. Finding a way to unlock that systemic but at the same time remaining productive in the world of everyday design of architecture commands all

of my time at the moment.” (Lowenstein, 2001:26).

## 2. Post-Cartesian forms and structures.

Marcos Novak’s images date from the early 1990s, and plot a history of involvement in digital systems from even further back. It is the early works such as *Dancing with the Virtual Dervish: Worlds in Progress*, *New Blood*, and *4D Paris N* that appear to contain many of the aesthetic ingredients that would become widely published in later forms of digital architecture. In order to understand the path that the field has taken since 1995 (when *Architects in Cyberspace* was published), and Novak’s images began to excite architects and academics alike, it is valuable to trace a series of publications and understand the theoretical tensions that shifted alongside the practical works.

In the *Sculpture City* workshop, Novak sets out a visionary rhetoric that mirrors his ‘play’ between the virtual and the real. Novak uses the term ‘excess’ as a means of describing what else Architecture provides in addition to shelter, for example historical and aesthetic concerns. This narrative is largely unsupported by textual references, but uses powerful rhetoric that seeks to convince the reader of a future in which digital architecture will transform our experience of the actual.

“...our windows to the outdoors will have corresponding windows to the digital nature we are constructing, and we will be able to sit at the sill and gaze, or nostalgically read an anachronistic book. The virtual worlds, too, will have windows to the world: and all manner of reality will be able to be threaded and woven through them once that are properly aligned.” (Novak 1995a:26)

At best, the words describe his play with dimensions and geometries that fold and collapse on each other through the use of the mathematical software Mathematica (Figure 1.6). Using this software to translate three-dimensional spaces into four-dimensional geometries, Novak’s liquid architecture melts and transforms as a user experiences it according to the rules of maths. The confusion and uncertainty in his texts at this point in time is also vividly present in his powerful and complex imagery. By 1998, Novak’s images were being used throughout *Architects in Cyberspace 2*, and his work appeared across a wide range of journals and books, creating an iconic style which became a primary reference point for the field (Toy 1999:4). Structurally complex, sharp and fragmented the forms are generated according to a thesis that proposes that the surface of the two-dimensional computer screen displaying his higher level geometries is a

'hypersurface' (Figure 1.7). Due to the complex nature of the maths involved in developing four-dimensional structures generated in the space of the computer, the screen takes on a new role in translating complex space-time algorithms into shapes that we can see. "He believes that the screen itself is a hypersurface in that the virtual spaces are depicted through the continuously changing 'matrix of physical pixels'. The hypersurface of the screen is the interface between the real and the virtual." (Imperiale 2000:76). Through this we can understand the dynamic role of production and presentation as a metaphor for the crisis that Novak sees in depicting virtuality. If it is a more complex subject – one that is beyond "Euclidean/Cartesian/Newtonian experience" - then representations of it must embody an impossibility in actually 'seeing it'. "The question of the conceivable and the presentable is already a question of incommensurable screens" (Novak 1998b:86).

It would seem that in the mass distribution of the imagery through two-dimensional media misinterpretation occurred of what Novak's architectures were. Generated as time-based relational structures they were becoming consumed as images of forms of architecture. In the second edition of *Architects in Cyberspace* (1998), he is highly defensive of those that are engaged in producing "transarchitectures" and critical of those that speculate upon the qualities of virtuality through the decoding of images and texts, rather than being involved in their production. Articulating the distinction through the terms; "virtual-as-construct" and "virtual-as-ideal" (Novak 1998:22) he emphasises the need to be close to the mathematics of producing digital architecture as well as the philosophical texts that give it credence.

"The virtual-as-construct enabled by the technologies of cyberspace or neurobiology is not to be confused with the virtual-as-ideal that exists as a hermeneutical figure, relativised and beyond all scrutiny. Just as the recognition of the embodied mind renders obsolete the Cartesian mind-body division, the virtual-as-construct enacts an embodied virtuality that is engaged in the world as we are constructing it, in all its problematic but rich specificity. The virtual-as-ideal, on the other hand, stops short of engaging the underlying matrix of physics and materiality that makes both mind and cyberspace possible; the virtual-as-ideal limits itself to making isolated conventional forms in conventional space, dressing them in rhetorical conceit, and leaving the world unchanged." (Novak 1998:22)

Novak's assertion that the use of the programming and spatial tools that constitute digital architectures and environments is critical for the interpretation of the imagery intimates an emerging crisis with the representation of digital architectures. Further evidence of this emerges at the same time and although not critical of Novak, Toy describes how "many other architects, however, are only touching on the possibilities hiding behind the graphics

of the computer; content to dress virtual images of their buildings in digital lipstick in the hope of seducing clients, they perceive the computer as a glorified airbrush.” (Toy 1998:7). By 1999, Novak’s contribution to Hyper Surface 2 is text only, as his concerns about representation are further explored and he introduces an interest in music as a palette to explore ‘*n*-dimensional’ sound (Novak 1999:76). Entitled ‘archimusic’ the decision to ‘drop’ visuals and invest in complex sound pieces that are derived from ‘higher dimensional’ mathematics to be played in galleries and through other physical spaces suggests a disillusionment with the misinterpretation of his imagery.

In the Venice Biennale 2000, Novak brought together the visual with the audio through an interactive piece of work that the public controlled through interaction with rapid prototyped object derived from the four-dimensional spaces that were projected (Figure 1.8). Through physical interface with the sculptural forms, the public experienced the space-time complexity of moving through and listening to higher dimensional spaces as the “virtual environments and spatialised sound, [were] all algorithmically cross-correlated” (Novak 2002:69). Beyond this attempt at synthesising image with experience, Novak has concentrated upon manifesting the physical ‘by-products’ of the virtual environments through rapid prototyping and stereolithography, and has been working toward the use of skin and bone cultures that can be grown to construct ‘artificial skeletons’ as ‘quasi-living architectures’ that demonstrate the ‘alien’ relationship that we have with systems outside of the familiar Cartesian (Figure 1.9).

### **3. Genetic and biological computing models offer an integrated framework beyond split time and space.**

In the Genes of Architecture (Oosterhuis 1995:18), Kas Oosterhuis presented a narrative for understanding how architecture and our built environment is becoming more complex and responsive as it takes on board data and communicates back to other systems. His clearest example was of the Citroen XM car that uses on-board computers to understand the road, compared to a Renault Twingo that requires the driver to process these conditions.

“The computer decides how the hydro-pneumatic system reacts... And at the same time trivialising the dominant role of the driver enzyme. That is the way Darwinian nature works: a higher developed intelligent organism will absorb specific function in a more complex whole. And this is exactly what is happening here: the engineered synthetic bodies are evolving into more complex and responsive systems.”

Oosterhuis' interpretation of intelligent systems in design informed his practice and the production processes employed to manifest Digital Architectural forms derived from data sets. These forms went on to offer structural shapes for large scale building projects such as the Saltwater Pavilion and the FreshH<sub>2</sub>O eXPO (with Lars Spuybroek and NOX Architects). Oosterhuis and Spuybroek's forms were derived systematically through a dialogue with materials and information from a site; "the architecture charges the body because its geometry is such that points become vectors. The source of the action in architecture that has become transported and moved – its geometry has become a prosthetic vehicle by contamination – is exactly in-between body and environment." (Spuybroek 1998:51). The resulting forms are highly fluid and gestural, and they translated efficiently into Bezier curves in a digital space (Figure 1.10). As one of the few projects that attempted to materialise non-Euclidean space in a large scale physical form, the Saltwater Pavilion obviously no longer becomes digital. Although experience of the space included flowing water to complicate the user-experience the project became an unusual environment, but one that remained bounded by the constraints of actual space (Imperiale 2000:74) and less so the 'liquid' aspirations of its designers (Figure 1.11).

In search of forms that are less linear in their derivation from natural systems, two articles in *Architects for Cyberspace* set out modes of practice to develop genetic systems for the growth of Digital Architectural aesthetics. Frazer, Rastogi and Graham documented an 'evolving virtual environment' that grew according to the genetic information that each structure inherited from its ancestors in a growth cycle (Frazer et al 1995:80). Using a genetic algorithm to help the models 'learn' as future generations of the model are grown, the application built elegant folding forms. In order to give architectural integrity to the projects the team placed the system on the internet to allow a 'collaborative evolution', as virtual visitors manipulated genetic or environmental information (Figure 1.12). Visually 'organic' in their language, Frazer developed the work for use in designing fluid forms for the built architecture of American architect Frank Gehry.

Karl Chu who can equally be bracketed as a designer in pursuit of non Cartesian approaches architecture using cellular automata and genetic algorithms to inform the growth of his structures. The forms are highly referential to organic forms such as shells and complex plant structures and fold and curve in upon themselves according to the evolution of their mathematical roots, (Figure 1.13). The complexity of the internet and the



mathematical potential of its networks offer Chu an 'epigenetic landscape' (Chu 1995:69) that offers enormous theoretical properties for an evolutionary architecture.

"This domain will be the arena of complex adaptive system at the global level of the mechanosphere, accommodating a collective co-evolution of models that converge towards the virtual anatomy of hyper-structures." (Chu 1995:69).

Chu's work has progressed along a specific trajectory of complex systems and an evolutionary approach to developing digital "genetic architectures" (Imperiale 2000:73). He sees the genetic model of space as potentially superior to one which mimics actual space, as this merely perpetuates the use of traditional architectural languages, and offers escapism into "hallucinogenic" landscapes (Chu 1998:72). By *Architects in Cyberspace 2*, the forms were more dramatic but followed the same aesthetic vein; curvaceous forms that are rich in colour (Figure 1.14). Concentrating within his specific research enquiry, Chu's later texts expand upon his interpretation of cyberspace as the context for his works, and in doing so he explores the new conditions that architecture must operate within. Chu also presses the discipline's dominance of space over time. Interpreted as a 'bio-mechanical' organism, Chu recognises the internet as developing "temporal dynamics of its own" (Chu 1998:73). Unlike all previous forms of architecture that have privileged space over time, the internet can be seen to grow and transform organically within its own time bases, and these new time bases offer Chu a context to explore dynamic evolving architectures.

#### **4. Augmented digital architectures will support our experiences in actual space.**

In the first *Architects in Cyberspace*, Sarah Chaplin raised a deep concern over the early fascination for cyberspace to become a virtual mirror of actual space, and expressed a fear over the direction of architecture being led by technological drivers. Concerned with how we wrestle between virtuality and actuality, Chaplin references two interpretations of how cyberspace as an environmental context for architectural activity can be understood; "virtual reality" and "real virtuality", as described by Sanford Kwinter (1992:188). Using Kwinter's assertion that our visions of actuality are far more fluid and inventive because of the deep connections between our dreams and our bodies, Chaplin foresees a role for architecture in straddling the threshold between virtual and actual space.

"lingering on the threshold is not to be characterised as a temporary position from which to assess either reality or cyberspace, but becomes a long term meeting point, where two worlds may

themselves coincide and interact, where hybrid realities can emerge, and where architectural dreams may be satisfied in and out of reality.” (Chaplin 1995:35)

Identifying the overlap between the traditionally divided spaces represented a sophisticated break for some practitioners. Whether work in an augmented reality remains as digital architecture depends upon the methodologies applied, but for a series of key developers through the 1990s this layered space was where some architects could operate.

Peter Anders established a theoretical model to explain the types of architecture that operated across actual and virtual spaces. The spatial metaphors used for communication and the browsing of catalogues can be understood to have close connections with actuality, while less relative and more abstract data may remain virtual and separate. Described as ‘cybrid spaces’, Anders constructed a methodology for architecture to begin adapting and designing buildings to relinquish some actual space to hard disk space; libraries that could be online instead of on shelves, and adapt existing formulas for actual environments to take account for visualising virtual spaces; meeting rooms with presentation technology to ‘see’ visitors in cyberspace (Figure 1.15).

“Cybrids are the interactive union of physical and electronic spaces and objects. Incorporating the concept into our definitions of space results in three different types of spatial entities; only the second two are examples of cybrids. The first, not a cybrid, shows a complete separation between the physical and electronic environments – a typical example would be an office with a computer network. The second is a partial cybrid entity – an example being an office with a teleconferencing facility. The last would be a complete overlap, i.e. the entity would exist almost entirely in both physical and cyberspaces. A typical example would be a building security or operating system that could be accessed both physically and electronically.” (Anders 2001:61).

Although only a concept, ‘cybrids’ describe a context for mainstream architecture to begin integrating cyberspace into its design process. Dunne and Raby position themselves as critics of an indulgence into new architectures for cyberspace. They are far more interested in interfaces with cyberspace which are physically and socially emotive. Describing the folding forms and dynamic fluidity of early work as architectural dreaming in cyberspace, they choose to separate themselves from a digital architecture that, by the early part of this century, they described as a “visual pornography” (Dunne and Raby 2001:92). Sensitive to the public consumption of digital space, their practical projects remind us that while the consumer thinks of cyberspace as “a rather banal, an information space, useful but devoid of sensory pleasure” (Dunne and Raby 2001:92) the public are actually involved in it through the use of mobile phones, radios and baby monitoring devices.

Electromagnetic space is a rich context for a non-visual cyberspace that doesn't generally affect architecture, but one in which buildings and walls tend to affect its audience. The "car radio for exploring the tuneable city" (Figure 1.16) allows the user to listen to illegal frequencies that are otherwise screened out through domestic radios. Tuneable to baby monitors in houses, wireless bugs, messages transmitted by satellites and even the radio signals given off by natural phenomena such as lighting, the proposed project locates cyberspace as something that is all around and permeating our bodies. Novak cites the electromagnetic spectrum in the first *Architects for Cyberspace*, as an opportunity for architecture to "set aside" the outdated tools (Novak 1995:45) that the 15th century theorist Alberti defined as establishing the conceptual structure of a building. For Alberti, architecture was about the construction of an "architectural composition [that] fit together and achieve a sense of completion and that this sense of completion produces the harmony between parts" (Ingraham 1998:58). Dunne and Raby's work offers a new 'site' for the architect in which integrity akin to Alberti's metaphors for architecture as body (Ingraham 1998:58) are inappropriate because of the highly distributed and pervasive nature of electromagnetic fields. A site in which the human is central as both transmitter and receiver to substantiate their form of architecture. The 'nipple chair' (Figure 1.17) is an architectural device that allows users to detect when they are sitting within an electromagnetic field. As the chair picks up radio waves two nipples located in its seat vibrate into the back of the user. Forced to have their feet off the ground in order not to earth the chair, the user looks as though they are sitting on somebody, which compounds the blurred sense of boundaries that we have when we consider the 'everywhere' nature of the electromagnetic spectrum.

Although not visual, Dunne and Raby's work operates as a good model for a range of architects who use digital systems within their exploration of space, and identify themselves with a model of cyberspace which for them is more complex and "grounded in reality rather than fiction" (Dunne and Raby 2002:89)

##### **5. Cyberspace as offering 'new' properties that offer different challenges for architectural method.**

Sadie Plant's text in the first *Architects in Cyberspace* sought to grasp the complexity of the internet and its repercussions for understanding how it would constitute different structures for communities and intersocial relationships. 'No Plans' evoked a real sense of the frontier that would be developed in a lawless and organic manner by a huge spectrum

of users, all of whom could be identified as architects. Describing it as 'anarchitecture', Plant relishes in the anti-authoritarian and even anti-architectural opportunity that the internet offered. Not to be misinterpreted as a desire to see the end of civilised democracy, on the contrary, Plant finds the subversive and deviant activities as rich and compelling as the spaces of order and management so as to elude to the diversity and breadth of creativity that people in society demonstrate as they adapt their own houses and spaces.

"Retrospectively, all spaces, their builders, and inhabitants, functioned as cybernetic systems in multiple layers of cybernetic space. And regardless of how they have defined themselves, architecture and its professionals were merely turning these spaces on." (Plant 1995:37)

Plant's socialisation of architectural practice diminishes the agenda that many of the most published Digital Architects should operate as developers of primary styles for the discipline, and that it should be open to a breadth of individuals to explore its aesthetics and functions. In exploring aesthetics for such a complex, decentralised system such as cyberspace Larner and Hunter also prepare us for an openness in its aesthetic development. "The aesthetic is unlikely to emerge from the art-world, or the insight of individual genius: its adoption will rest on consensus rather than the autonomy of any one element. By the same token this aesthetic will probably not reflect the values of any particular cultural group or political ideology, but should allow for an equality of input by those that are disenfranchised." (Larner and Hunter 1995:25). Referencing Sean Cubitt's observation that it is the developers of the software applications, and not artists, who are leading the aesthetic form of digital media (Sean Cubitt Video Positive Exhibition Catalogue 1995), Larner and Hunter demand a "post-technology aesthetic" to nurture non-visual experiences of cyberspace.

These non-traditional architectural design frameworks for the field suggest approaches to cyberspace that should be critically aware of their own aesthetics, understand historical context and environment well, and attempt to decentralise their practice. 'Hybrid Housing', a 1995 work by Nina Pope (Figure 1.18) from the same era, is one example of an approach to digital architecture that brings some of these qualities, although her work has subsequently not been treated as digital architecture (van Mourik Broekman 1995:IX). Interested in the assumptions that classical gardens are 'natural' and 'serene', when in fact they have been constructed and have transformed according to the whims of each successive head gardener through the use of local labour, Pope's 'Hybrid Housing' used digital systems to re-orientate vistas across the grounds of Ickworth House in Suffolk from the perspective of the cottages occupied by the labourers. Offering no new forms of

aesthetic language to digital architecture, the work is classified as sculpture, but it is useful to cite its highly architectural relevance. Also not absorbed into digital architecture publishing is the work of Jane Prophet, a British digital artist who has worked with landscapes and computer imaging since 1995. Technosphere (Figure 1.19) was a three-dimensional digital landscape populated by creatures designed by web users. Although not strictly architectural her interests in digital landscapes led to the work Decoy in 2001 which involved reconstructing artificial landscape features over photographs from the gardens and grounds of country estates designed by Humphry Repton and Capability Brown (Figure 1.20). Like Pope, the reflexive visual dialogue with the environment supports a digital architecture that understands the virtuality of non-real and actual contexts.

The work of architects Neil Spiller and Shaun Murray investigated cyberspace as being complex in constitution and reliant upon distributed data. Spiller edited many architectural publications that embraced the involvement with digital culture. Avidly dedicated to pursuing new aesthetics and processes for architecture his own work, as it developed over the past 10 years, offers a useful approach to understanding how digital architecture may have changed its aims. Highly illustrative, and using only black ink (Figure 1.21), Spiller's work connects the architect to a process of design that modernism rejected in favour of technologically mediated systems that ignore the "romantic notion of drawing" (Spiller 2000:22). Spiller uses drawing to represent "an approach and a feeling" in the same way that building an actual structure on a site might, but without the constraints of actual environments. In this way it is a virtual architecture. His own work uses references to Gothic architecture to provide a language for the form of his digital architecture. His investment in the Gothic styles provides him with a metaphor for how he understands the two types of future spaces that architects will have to engage with; cyberspace and nanospace. Spiller considers that these environments are best understood in the same way as Gothic cathedrals are "an attempt at creating an image of heaven on earth" (Spiller 2000:20), and by using the Gothic he purposefully unlocks himself from using the *de facto* technology of cyberspace - computers - to represent his ideas. This highly aware decision to make analogue images of structures and spaces has excluded his work from the wide range of publications that have revelled in the new and hi-tech imagery surrounding digital architecture (Figure 1.22). However, his writings and his editorial role are extremely valuable as his theoretical and historical perspective encourages a translation of the 'hype' surrounding cyberspace into the beginnings of methods for architects. In *Digital Dreams*, published in 1998, Spiller qualifies cyberspace and nanospace alongside biological,

spiritual and ecstatic spaces and describes the importance of understanding our interpretation of them before we engage with or visualise them.

“Have you ever believed in something that has turned out to be a lie? We are now in the midst of the greatest lie that has been told by man to man. It concerns the stealing of our inviolate sense of reality, the mixing of substance with absence, and the fracturing of our sense of being; but, as with all good lies, we like it. Our history is full of stories and myths whose narratives are dependent on mystical, magical environments. These surreal environments and dreams are now becoming crystal and clear and interactive. They are easily communicated and duplicated. This lie is the conspiracy of cyberspace.” (Spiller 1998a:41)

In this context the drawings, that are continually updated as though they were a website, operate as illustrations for intellectual strategies for “bridges” between actual and virtual spaces, bodies, belief systems and stories. Although kept at the periphery of digital architecture the work retains an integrity for a branch of the field.

Murray, a student of Spiller’s from the Bartlett School of Architecture, is introduced in the 1998 edition of *Architects in Cyberspace*, where he indicates a methodological response to the complex model of virtual architecture and environment, but one that elicits an aesthetic. Like Spiller the architectural drawing represents more than mere representation, and for Murray the relationship between drawing and the environment supports the production of a “spatial unit, which is termed an ecotype” (Figure 1.23). Murray’s images are best understood to be systems for understanding a complicity with an environment in which the “user - reader - space” are interconnected and respond to each other, unlike traditional architectural drawing that operates outside of the nature of an environment and imposes form on to blank paper that will later be turned into buildings.

“Coherence in Architecture and their parts are still treated, for all intents and purposes, as machinery through diagrams and datascares. In relation to design and architecture the user doesn’t need to understand everything and break things down; it is all connected on an ‘invisible web’ where everything would be connected to everything else through a reader. This moves the debate away from a mechanistic vie of architecture and towards architecture in a holistic view.” (Murray 2005:76).

The drawings, although complicated and difficult to decode, suggest a highly reflexive understanding of environments, and which indicate that Murray uses a contemporary model of space based on Human Geographic principles (see Chapter 2). Focussed upon ecological and not social contexts, the work adopts the assumption that “you can never

direct a living system; you can only disturb it.” (Murray 2005:9). Through studying various ‘natural’ sites across Europe, he develops ‘eniatypes’, drawings that “comprise of ecotype, notational, instructional and aesthetic strands” as propositions for architectural interventions (Figure 1.24). The aesthetic qualities of the work by 2006 retain hand-drawn qualities that involve a digital manipulation of images and models. They are maps rather than vistas of virtual spaces and indicate a shift away from the representation of cyberspace with horizon lines or as structures floating in space.

*This section has described through the use of illustrations and concepts the aesthetic and theoretical development of digital architecture over the past ten years. While there are many approaches that overlap with each other, the five areas of study identified in section 1.1 remain coherent. However much of the initial activity has now dissipated and the field has lost its momentum as publishers have began to look at other areas of architectural activity. The next section will identify some of the core tensions that have resulted in the slowing of the field and question its capability to continue along the same trajectory.*

### **1.3 A Critical Review Of Digital Architecture**

*This section reflects upon the apparent stasis that the field of digital architecture appears to have reached since its portrayal through the Academy Editions series Architects in Cyberspace. It identifies a series of characteristics that have emerged through the use of particular technologies and the non-social focus of many of the theoretical investigations. It will be suggested that these characteristics have contributed toward the field not reaching its potential. The section argues that the technology that digital architecture adopted but did not invent, inhibited the field from developing a self critical framework regarding its technologies. It also reflects upon the academic texts, popular lifestyle magazine presence and television work where digital architecture has been published, and discusses how effective these spaces of consumption have been in regard to its cultural status. It suggests that the production of an aesthetic orthodoxy inhibited the nurturing of a social agenda that has resulted in the field splintering and being incapable of fulfilling its aim.*

“Architects dream in cyberspace, escaping the constraints of matter and gravity. They dream of folds and dynamic form, or constant fluidity. A visual pornography of space denied, as yet, to biological material until it too can vaporise and contort. Our stable fleshy bodies remain on the

outside looking on to windows filled with representations of forms and spaces we can never touch.” (Dunne and Raby 2001:92)

By 2002, *Architectural Design*, which published *Architects in Cyberspace*, appears to have shifted its framework for collating digital architecture under a bracket that dealt specifically with online space. Perhaps this was due to the widespread reach of the internet. It was no longer a speculative concept, but another medium for entertainment, shopping and communication (Spiller 2002:5). *Architects in Cyberspace* had discussed complex ideas for how architecture could find a role to play in the experience of digital space. At best though, it appears to have left us with a house style for architectural drawing, techniques for adapting actual buildings and a propensity for generating escapist dreams.

Maggie Toy’s warning that the special effects offered by computer graphics would begin to determine what digital architecture could achieve (Toy 1998:7) does not appear to have been heeded. Much of the imagery that defined the field has been repeated, and not reinvented. Dunne and Raby’s distinction of their own work not being related to the ‘visual pornography’ (Dunne and Raby 2001:92) that is dreamt up by other practitioners appears as a specific criticism for a field that has failed to escape the inertia of the aesthetics that attracted so much attention in the mid-1990s. From the range of examples included in the previous section there is a clear palette of shapes, forms and textures that became consistency used by many leading practitioners. From shiny, harsh and spiky to smooth, rounded and flowing imagery, a mannerism has formed within the field that has led to a disassociation with computer generated forms of digital architecture associated with a number of the key protagonists. Novak was concentrating upon sound, Stephen Perrella returned to mainstream architecture, Frazer works with Gehry in realising actual structures, and Dunne and Raby have associated themselves with the emerging new field of ‘interactive architecture’.

The consequence of core theorists moving away from screen-based works during the proliferation of these ‘styles’ has since rendered the research impotent as younger designers have copied styles without method. Digitally produced architectural images found a niche in providing images of the future in a way that excited audiences, and whose production was relatively undemanding compared with say, a slow-to-render animation. Lifestyle and design magazines such as *Wallpaper\** and newspapers such as *Die Zeit* (Figure 1.25) began to commission young graduates from the Bartlett who demonstrated that they could design and manifest architectural solutions for the magazine’s audience.



Rarely engaging with any of the theoretical discussions that were part of the brief history of using the technology, the works were spectacular demonstrations of virtual spaces for people to dream about owning. These visions of spaces closely referred to the Modernist tradition for designing futures, and such over-ripe imagery may be seen as an immature demonstration of architecture's least critical activities. Through magazines, and eventually television, the students who were emerging from educational environments became cultural currency as their control over the aesthetic manner of digital technology was exploited. Before long, digital architecture became synonymous with developing computer-generated backdrops and television commercials for the likes of *Match of the Day*, MTV and Nike (GLP Figure 1.26 and 1.27). Packages such as 3D Studio Max and Maya are used to render 3D imagery, and video compositing software used such as Adobe After Effects to integrate them. Small architectural offices such as Softroom and General Lighting and Power - although exceptionally talented in the use of the technology provided for them - are not primarily interested in critiquing the software or its application. They use it not in a provisional role, but at the limits of what it is designed for.

“Obviously those who create animations of architecture are limited by the newness of the medium and the fact that much software is designed for industries other than architecture. The appropriation of software has caused many practitioners to press all the buttons simultaneously, or layer a million filters on top of one another for pure unadulterated affect. Such software is conceived to depict surfaces or graphics that have little to do with the modalities of architectural production.” (Spiller 2001:84)

Neil Spiller introduces the 2002 publication of *Reflexive Architecture* as the missing *Architects in Cyberspace Three*. Based on the ‘clamour’ for actual architecture within the field, and the limited interpretation of digital systems by many architects, he decided to launch a new title as a means of encompassing what can be understood to be the evolution of the field (Spiller 2002:5). Highly aesthetic and featuring contributions from staff and students who have studied at the Bartlett (where Spiller is a professor) as well some of the original contributors (Novak, Dunne and Raby), the publication concentrates upon qualifying the integrity of a field that has been misunderstood. “The Reflexive lifts the soporific cover on what is fast becoming convention in the treatment of the digital – those all-too alluring and pervasively smooth computer-generated forms.” (Castle 2002:4)

Interactive architecture, the umbrella under which Dunne and Raby have begun to feature, appears to be the current architectural framework within which digital design is bracketed. Different from the speculative *Architects in Cyberspace* publications, Interactive

Architecture is a title and range of projects that have already been built and installed as architecture. Replacing the fantastic images of cyberspace, images of functioning works by Haque, United Realities and Decoi anchor architecture's control of digital systems, an area which was becoming abstract and perhaps self indulgent.

“Since the Industrial Revolution and the rise of science fiction, the popular impulse has often been to regard technology as a socially derisive and potentially malign force. In the 1990's, this was further exaggerated by the spectre of cyberspace with its promise of the domination of the virtual over the physical. It engendered visions of a horrific netherworld responded to by even the most subconscious of neuro twitches. This issue of AD turns these angst-ridden visions on their head. Here, spatial design skills and adept application of digital technologies are pooled to aid interaction.” (Castle 2005:4).

Castle's description of digital architecture through the 1990s seems to diminish many of the theoretical sensitivities that were explored by Spiller, Novak, Perrella, Chaplin and Chu. Finding solace in the application of interactive architecture is an avoidance of the critical questions for architecture that were explored through the subject of shelter when dealing with post-Cartesian systems. Interactive architecture should not be understood to be an evolution of digital architecture. Its use of mechanics and engineering systems to move, light and allow interaction in the actual world returns architecture's palette of tools to a post-modern relationship with space that foregoes any attempt to theorise or practice a relationship for architecture in a digital space. Lucy Bullivant's opportunity for interactive architecture - “treating digital media as physical matter” (Bullivant 2005:5) - not only places gravity into the digital by returning it to a form easily handled by familiar techniques, but also renders it passive again as though it is a dumb material. Despite this, interactive architecture evidently offers architects some attractive attributes that digital architecture didn't address. In further qualifying the difference between the two fields, Castle infers a complex social context that is acknowledged by interactive architecture: “Web and remote technologies may be the props of the contemporary world, but it is the underlying social forces of individualism and an unrelenting work culture that most often distance us from each other, rather than the gadgetry in our hands.” (Castle 2005:4).

While *Architects in Cyberspace* and *Hypersurface Architecture* concentrated upon the conceptual tensions of space, time and shelter in the internet, interactive architecture also focussed on social dimensions. Bullivant presents the space for Interactive Architecture as being located within the “threshold between the virtual and the physical” (Bullivant 2005:5). Reminiscent of Dunne and Raby, and Chaplin, she establishes a ‘sociospatial’

context in which interactive architecture is the bridge. The social priority embedded in interactive architecture is noticeable throughout works that use mobile, pervasive, locative, electromagnetic systems, many of which have physically animated, malleable and structural properties making them architectural features and installations.

The 'social' as priority has had a limited presence in the digital architecture that was speculated, or that materialised through *Architects in Cyberspace*. With regard to the practices that were defined at the end of section two, only two of them featured a social agenda. Section five, "*Cyberspace as offering 'new' properties that offer different challenges for architectural method*" was initiated by Larner and Hunter, and Plant. However they are theorists who do not pursue practical work that embodies social attributes. Spiller and Murray embrace the complexity of history and environments but people tend to become part of data sets to inform their research into architectural representation and drawing. Secondly, there is section four "*Augmented digital architectures will support our experiences in actual space*". This indicates interactive architecture's potential, with Chaplin's assertion that the 'threshold' between real and virtual is where digital architecture will best operate. However while the 'threshold' is a site where digital architecture can operate, using physical and interactive interfaces, there remains the opportunity for digital architecture to recover its theoretical origins by embracing a social agenda on the screen.

The geometric, mathematical, genetic, structure and form based enquiries of digital architecture has developed largely without any inclusion of social characteristics. The stylistic mannerism of the graphics that emerged toward the end of the 1990s contributed to a split in the field between practice based work that disassociated itself with the screen based forms and structures, and a theoretical strand that has pursued many of the original ideas through the revised theme of '*Reflexive Architecture*'. Both remain vividly energetic at fulfilling particular research interests within digital architecture. One is interested in physical materialisations, and the other the theoretical aspects of digital architecture. The neglect of a social agenda, however, and the emerging dominance of the geometric and mathematical elements of the field, can be associated with the tools that designers used to materialise their theories. Although digital architects used drawing packages such as AutoCad and rendering applications such as 3D Studio Max, their primary toolset wasn't programmed to include social properties. Designed for mainstream architecture and graphic visualisation, the Autodesk suite of applications has dominated the field and features all of the Cartesian properties for planning the construction of new buildings. It

even permits complex warping and bending of forms to produce 'hypersurfaces' - but none of these are socially dynamic. The proliferation of graphic 'lipstick' and 'pornography' produced by young designers who were employed by media industries was produced entirely using the 'off the shelf' suite of applications that were not designed to extend the practical objectives of digital architecture's theoretical aims. As software developed through the 90s, a new technology was heralded within 3D modelling that claimed to use a calculus-based system to create curved forms; NURBS (Non-Uniform Rational Bézier Spline). NURBS became part of 3D Studio Max, Alias and Maya modelling applications and offered a means of making fluid curves that the Cartesian X, Y and Z coordinate system of traditional packages inhibited. Implemented together in software packages it became very easy for designers to create fluid forms, the skins and surfaces of which readjusted as points in space were altered (Imperiale 2000:39). "The use of NURBS-based computer animation programs such as Alias or Maya has had a liberating effect on the design process, allowing architects to work on topological surfaces with increasing levels of complexity. The Deleuzian focus on smooth spaces, seriality and dynamic processes seems to have found its perfect foil in these programs. One should be cautious, however, in making reductive statements that would equate good design with complex form, or for that matter in denouncing sinuously curved architecture as merely a stylistic choice." (Imperiale 2000:98). The NURBS technology provided a useful tool for allowing Cartesian coordinate based applications to render complex forms quickly, but this does not fulfil the theoretical aspirations for a post-Cartesian approach to form and structure. It simply compounded the perception of digital architecture as producing dynamic, slick and futuristic forms.

While the momentum behind modelling extends the distance between the designers and social factors, contemporary computing software is highly network-based, with data correlation a principal part of its use. The merging of one dataset with another to generate new forms of information is a significant field within computer science. Information visualisation uses computer graphics to present vast forms of data in ways that allow users to interpret them quickly in order to build assumptions and aid reasoning. The breadth of datasets that are mined and visualised is highly varied and includes many forms of social, cognitive and biological data. Although often too specific for buildings, the neglect of digital architectural systems to begin correlating social data with modelling and design appears a serious omission. While contemporary architecture packages have extended their use beyond that of simply offering drawing and rendering modes by linking to technical and materials databases, there is a surprising lack of people in any of them. From



materials, costs and schedules, software such as *Archi-CAD* allows the designers to design buildings to meet specific deadlines and budgets. Packages such *Virtual Environment*, developed by IES, even allow the import and construction of 3D models to test for environmental conditions. By locating a building specifically in a global location the software generates visual reports that describe how well the building will perform according to carbon emissions, natural and artificial lighting, thermal loss and ventilation, environmental pollution and building regulatory compliance. However, the only mention of people in these design and planning tools remains evacuation modelling, which simulates the likely behaviour of individuals caught in a fire.

The technologies for new forms of software to integrate social data into digital architecture are already available through the use of networked databases. The process through which the architecture can be contested and transformed will become the focus of this doctoral research.

### **1.3.1 Research Question and Aim**

This thesis and the author's associated art and design practice first seek to identify the elements lacking in digital architecture as it is presented through popular, highly graphic publications that contribute to its academic image, primarily its failure to include a social dimension. Secondly, the presented work aims to propose elements that can be incorporated into digital architecture in order to provide it with a theoretical platform to comprehend a social dimension, as well as a methodology with which to enable the social dimension to become part of the field's practice.

This research question and the work's aims are investigated through the following chapters, which identify how digital architecture positioned itself without a social agenda through its adoption of a split model for time and space. It discusses the way in which human geography, through an identification of social agency in the production of space, has demonstrated how a combined approach supports many new models for understanding experience. It introduces social navigation as a contemporary form of social computing that offers methodological techniques for supporting the construction of digital communities, and it reflects upon the author's own art and design practice through which a methodology was developed. Finally, the author's methods are applied to a large-scale design project, and are evaluated through a substantial ethnographic study.



*This section has described how the use of 'off the shelf' software and the proliferation of a limited range of imagery has led to an orthodoxy within digital architectural practice. This stylistic emphasis that was published through print and television inhibited the emergence of a social agenda due to the focus of the applications used by many of the designers. As a consequence of this, the formerly cohesive field has ruptured. There has been a renewed interest of social application in the contemporary field of 'interactive architecture', leaving the smaller division of Reflexive Architecture to concentrate upon a limited range of theories and practice for digital architecture. The fallout has left many of the original aims of digital architecture unfulfilled. The proceeding chapters describe how digital architecture found itself in the position where it was using systems that would inhibit its own development, how critical the social agenda is within architecture, and will finally offer a creative and theoretical solution to recover the field.*

*This chapter introduced digital architecture as an exciting response to the technological and cultural advent of the internet and how collaborative systems had represented a positive integration of a social dimension. Section one described the alternative focus of a series of books that represented the field of digital architecture, which concentrated upon the shifting role of shelter in architecture, from modernism in which 'dwelling' and 'being' were lost, to cyberspace in which 'homelessness' becomes an opportunity to re-explore architectures deliverables. Digital architects recognised the opportunity to develop new forms of architecture without the burdens of 'actual space' or the history of the discipline. The section reflected upon the wide range of speculative visions for architecture in cyberspace that adopted an equally broad range of technologies to realise them. The author identified five fields of activity that defined these inquiries; 1. surface and image, 2. post-cartesian forms and structures, 3. genetic and biological computing models, 4. augmented digital architecture and 5. cyberspace offering new methods. Section two used the five fields to analyse the theoretical and technical strategies of a selection of key architects and designers. It traced individuals over a period of the development of their work, and identified how practice had responded to theories. In many cases it was found that the intensity of the projects that had launched the field of research, had waned and even ended as technologies failed to match the ideas, or that a mannerism was beginning to emerge that was less critical of its own style. Section three deals with the current state of the discipline, as the mannerism has affected the subjects ability to present work or theories without being associated with the banal development of graphics for television and print. Described as a 'visual pornography' the section highlights the failings of the*

*practice that results in both the renaming of a key text to avoid association, and the development of the new bracket interactive architecture which distances itself from many of the original 'architects in cyberspace'. The section reflects upon the use of particular technologies and the subsequent proliferation of graphic styles that become synonymous with the field of digital architecture, leaving many of the theories unexplored and the ideas unrealised. The final section identifies the concept of the 'social' as the subject that interactive architecture has used to develop a new inquiry, and suggest that its limited presence in digital architecture may indicate why the field has struggled to sustain itself.*



Illustrations

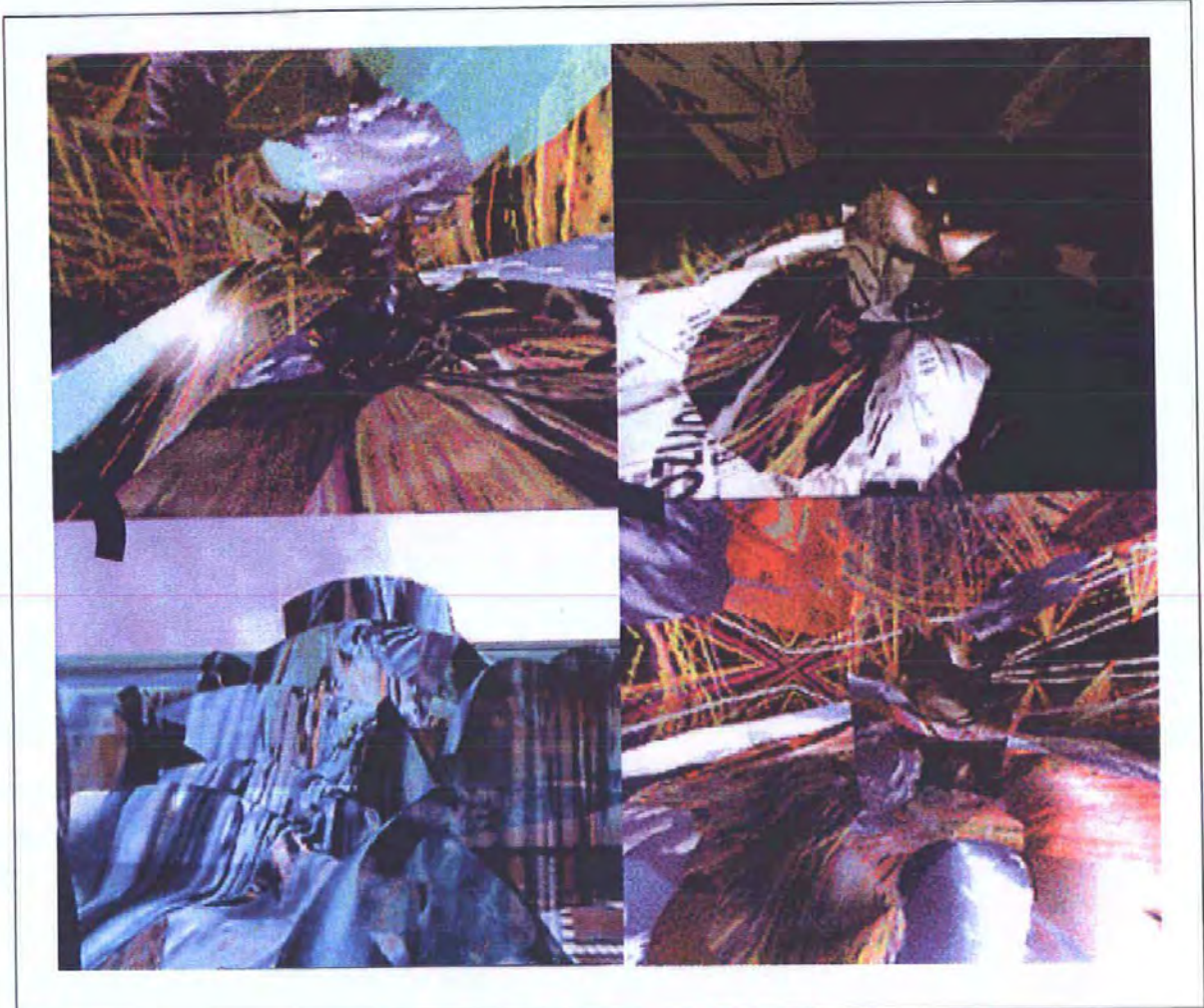


Figure 1.1. Stephen Perrella, Hypersurfaces.



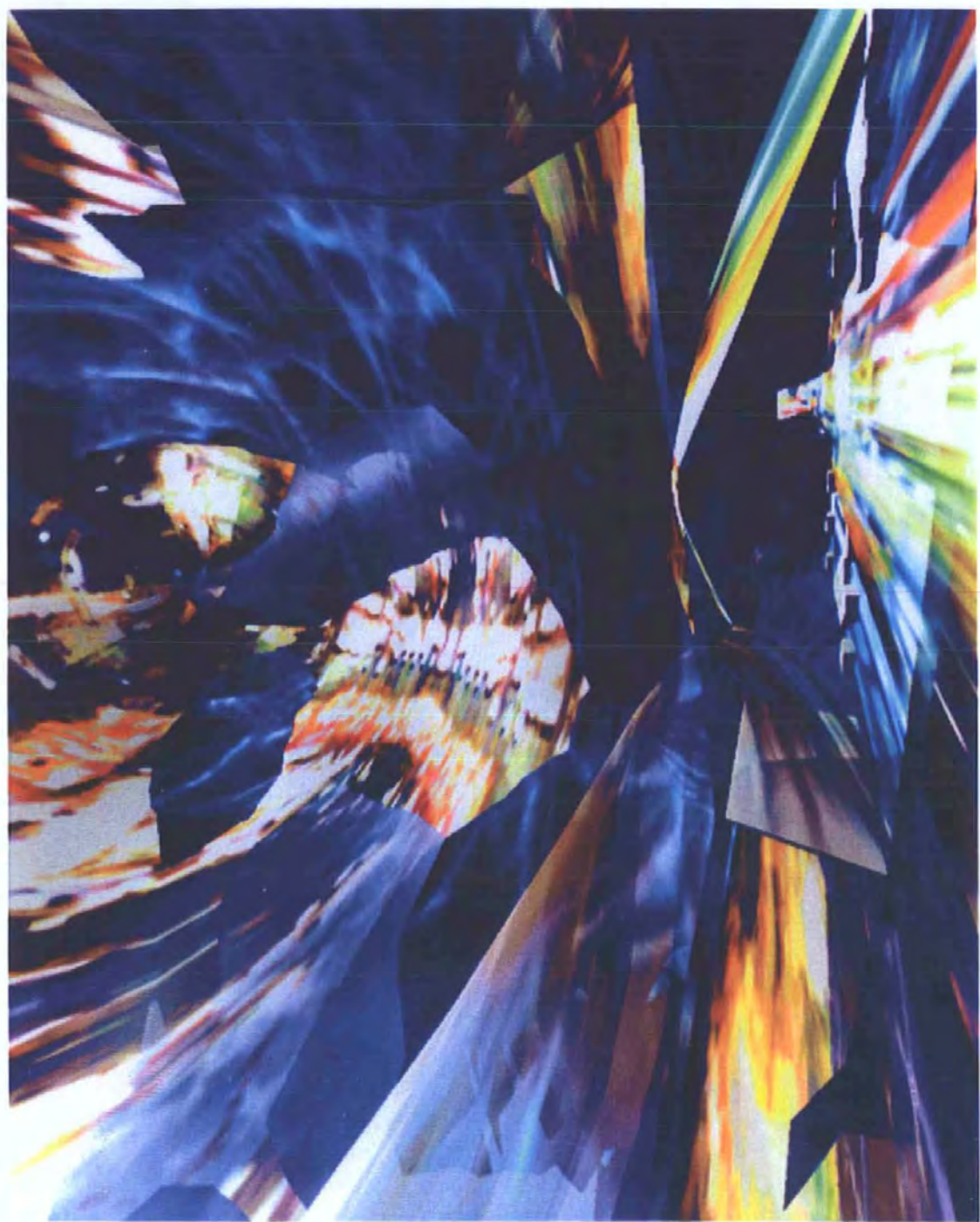


Figure 1.2. Stephen Perrella, The Haptic Horizon.

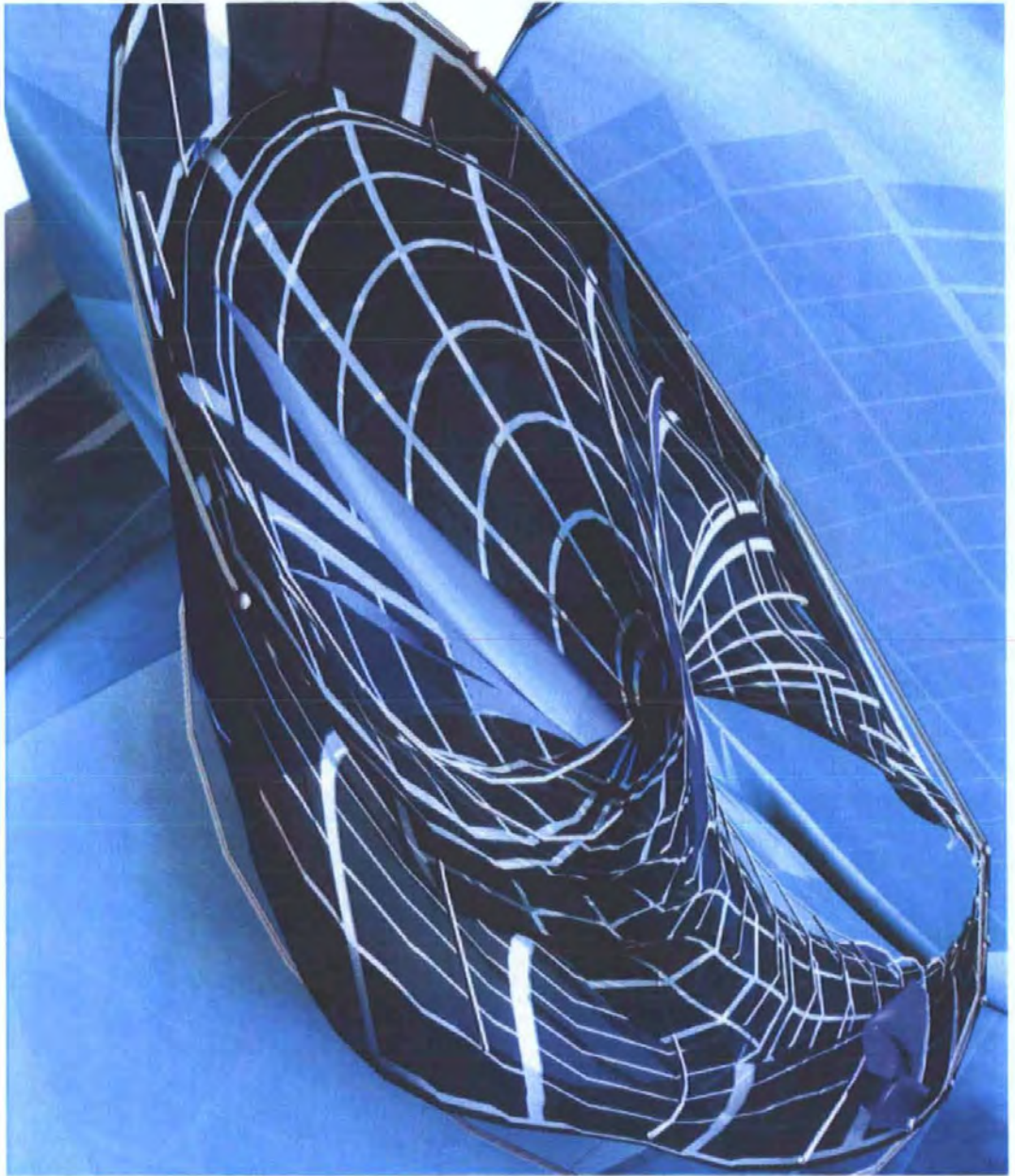


Figure 1.3. Stephen Perrella with Rebecca Carpenter, Möbius House Study.





Figure 1.4. Stephen Perrella, Mazda Protégé television advert by Charlie Watson.

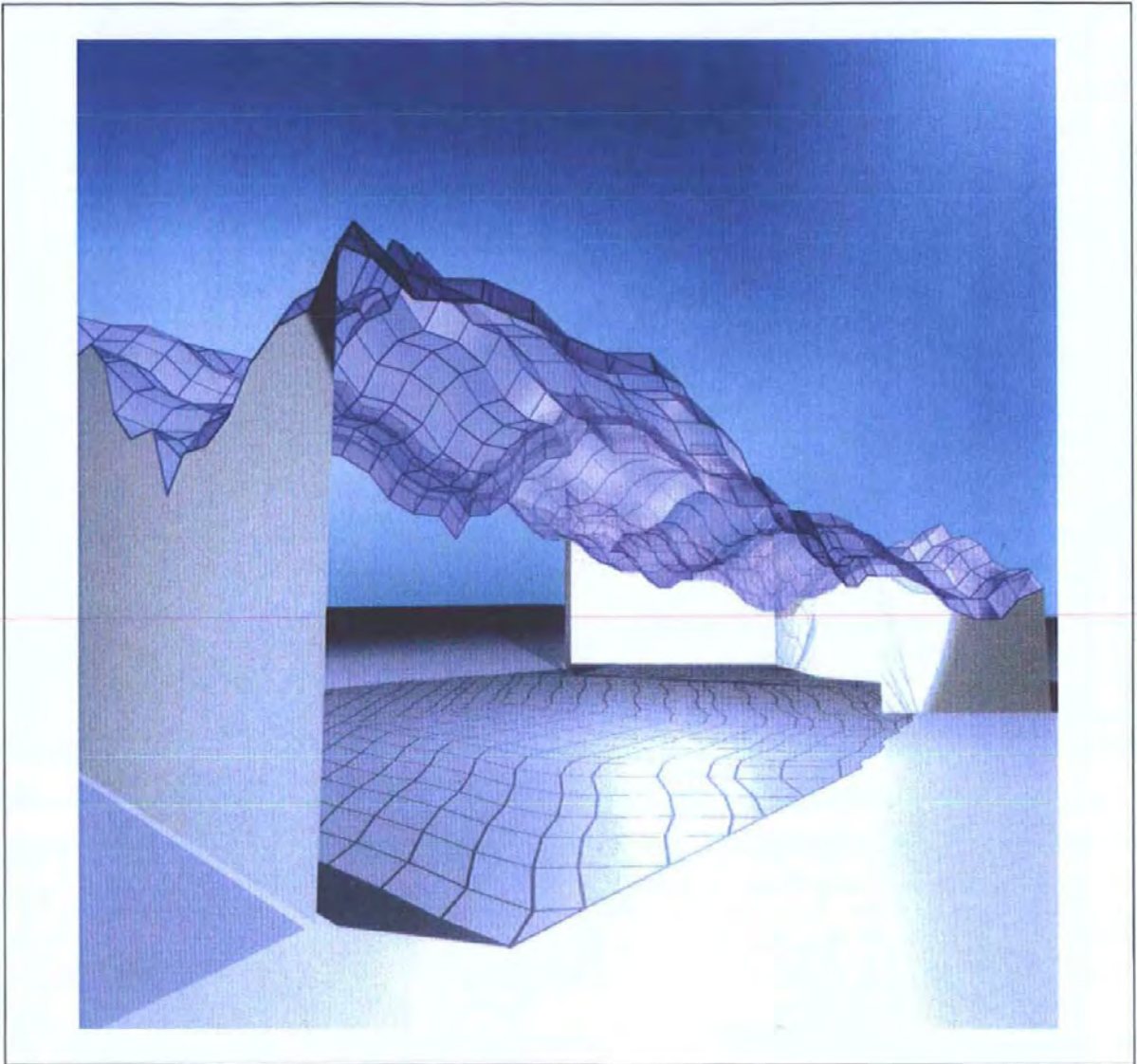


Figure 1.5. Haresh Lalvani, Hypersurface



Figure 1.6. Marcos Novak, Data-driven forms.



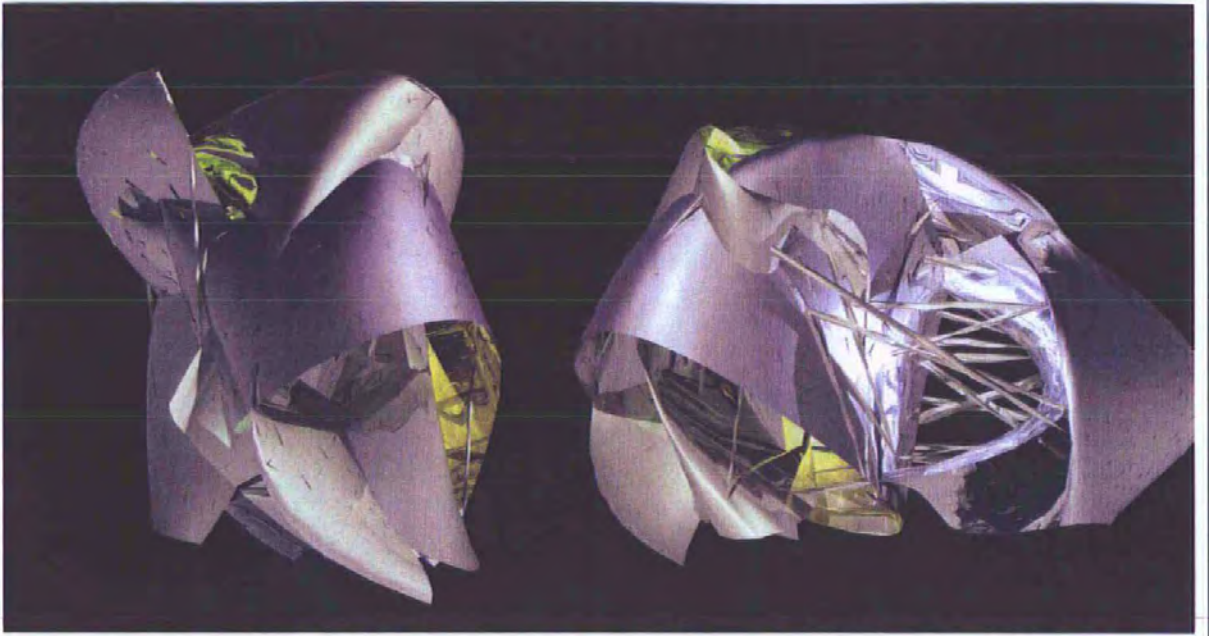


Figure 1.7. Marcos Novak, Data-driven forms.

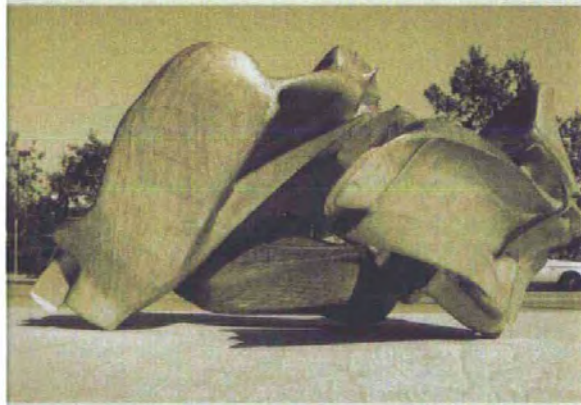


Figure 1.8. Marcos Novak, V4D\_TransAura.



Figure 1.9. Marcos Novak, AlloBioExo.



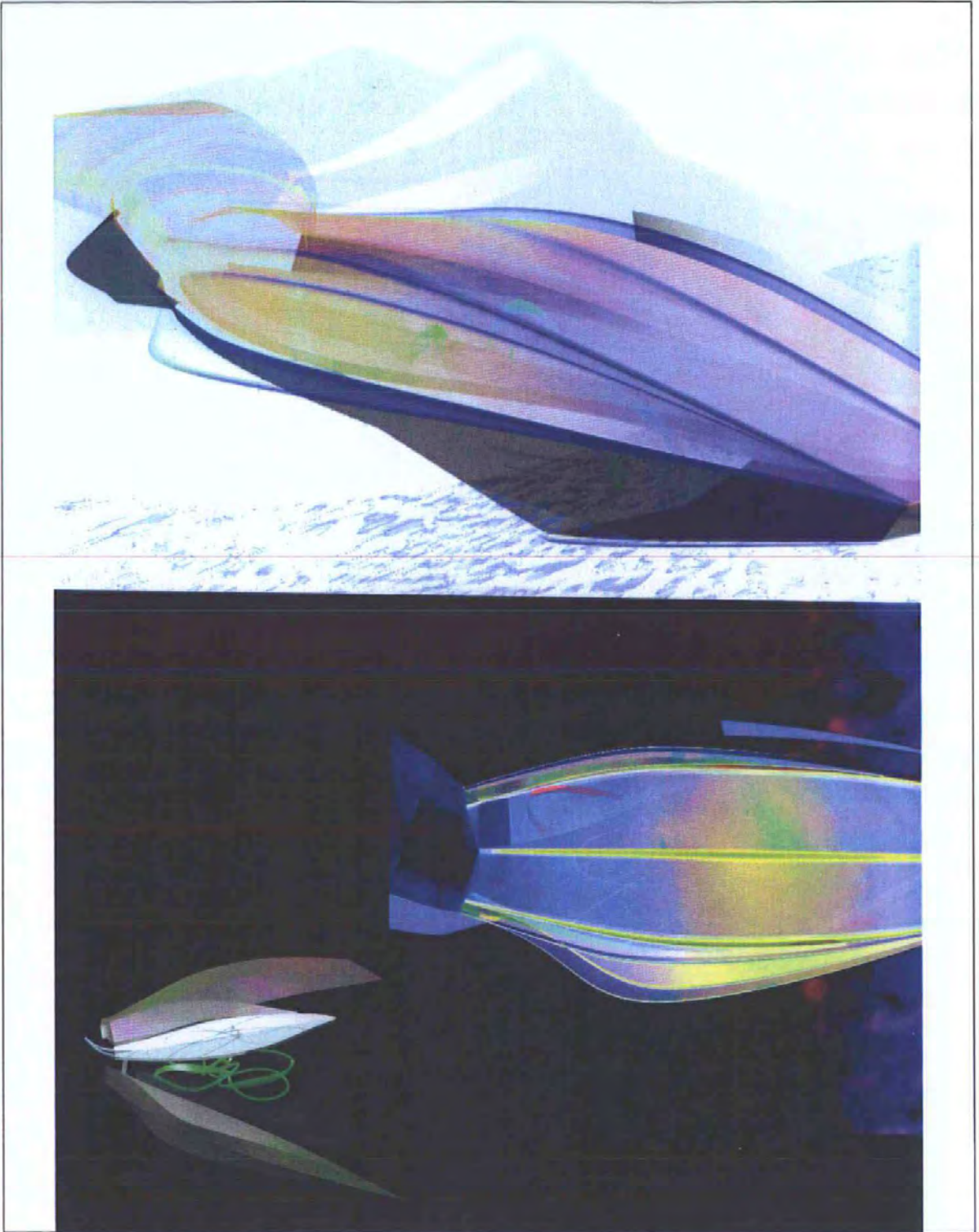


Figure 1.10. Kas Oosterhuis and Lars Spuybroek, Salt Water Pavilion.

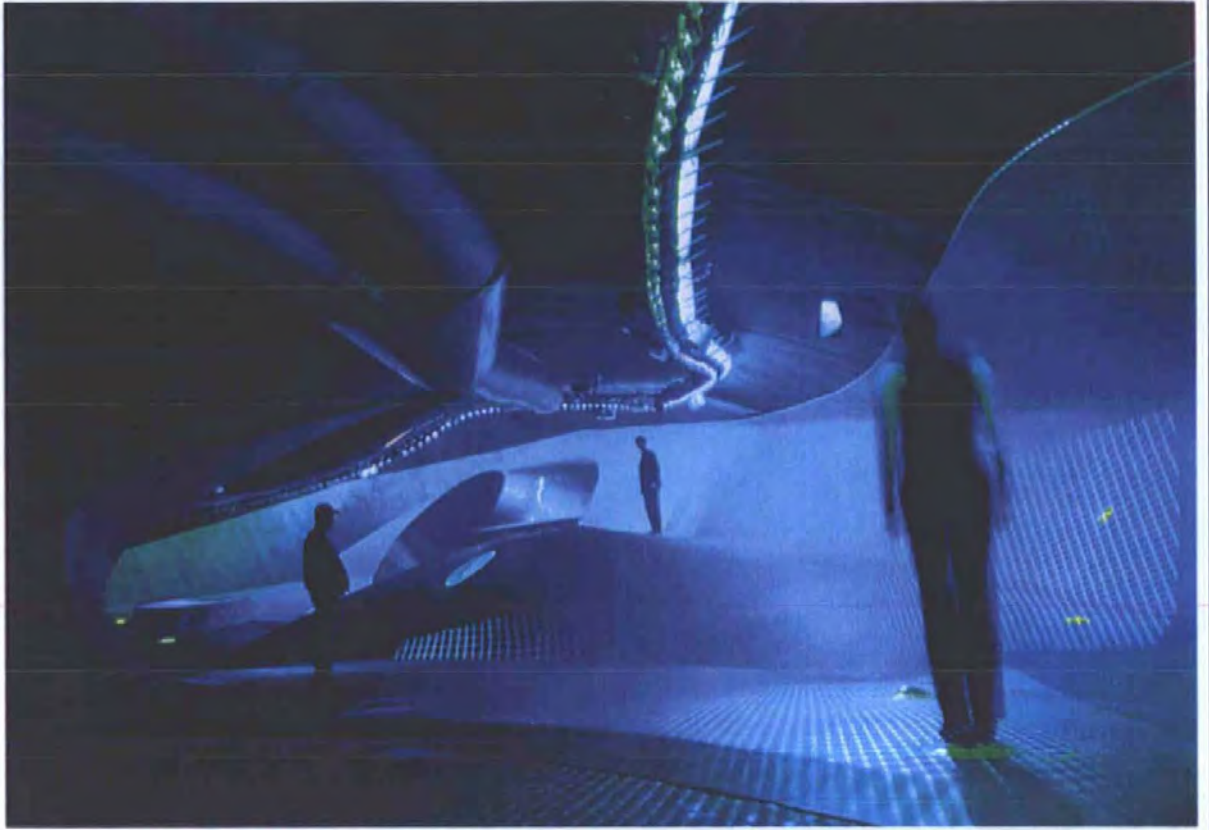


Figure 1.11. Kas Oosterhuis and Lars Spuybroek, Salt Water Pavilion.



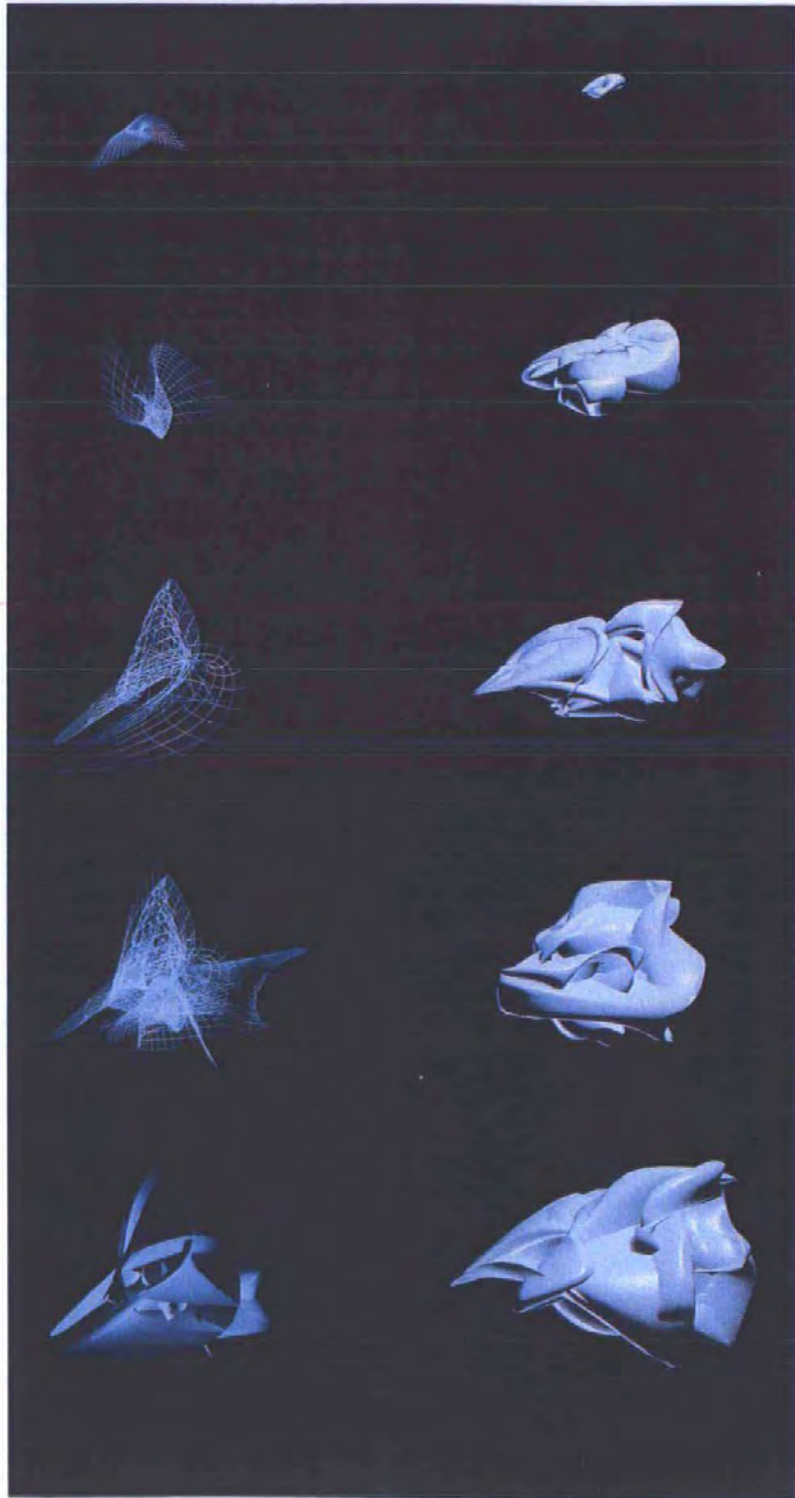


Figure 1.12. John Frazer, Manit Ratogi, Peter Graham, Evolving virtual environments.

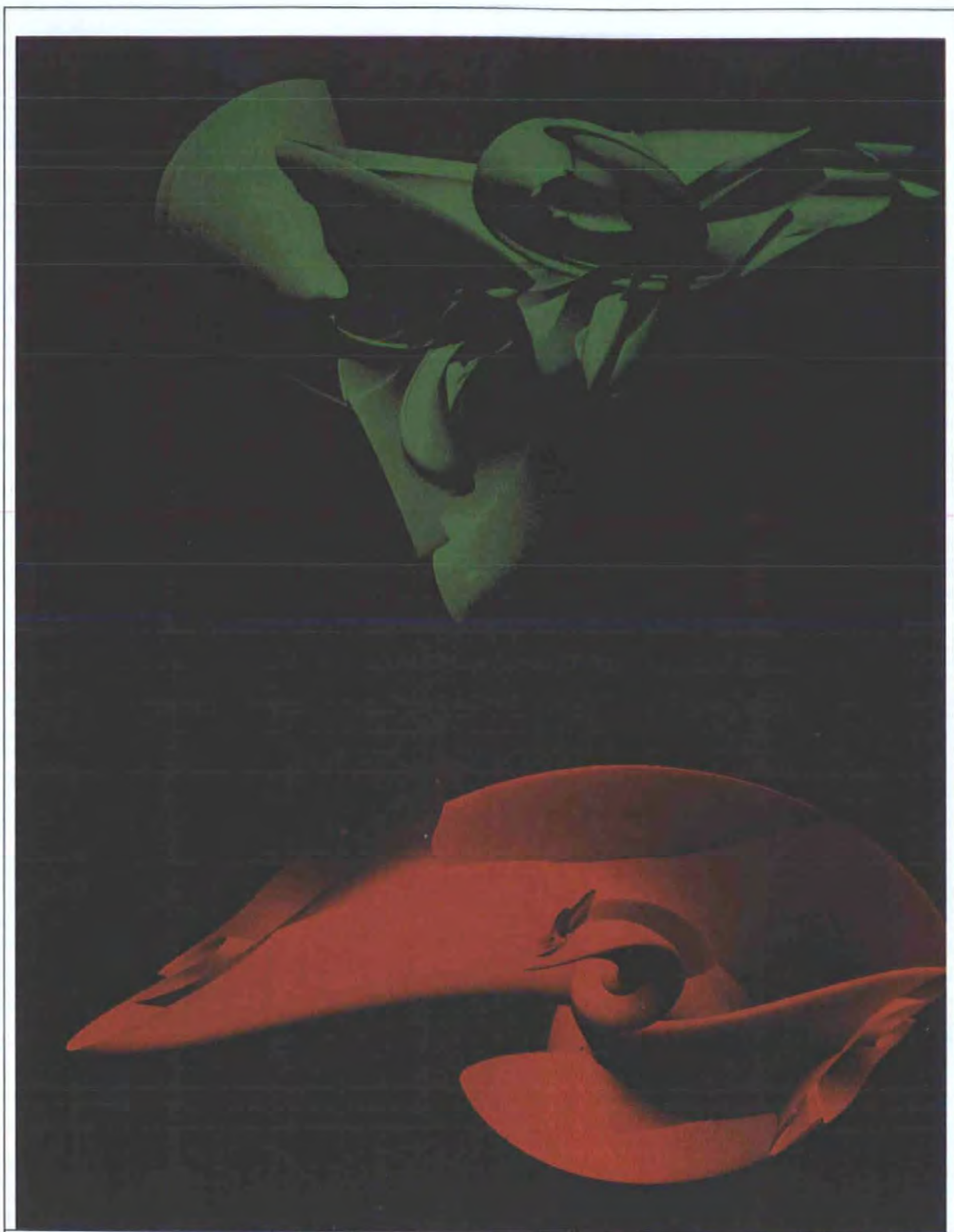


Figure 1.13. Karl Chu, Ad9GrBel57.0Sa314 (top), AdRdSpRo57.0Sa615 (below)

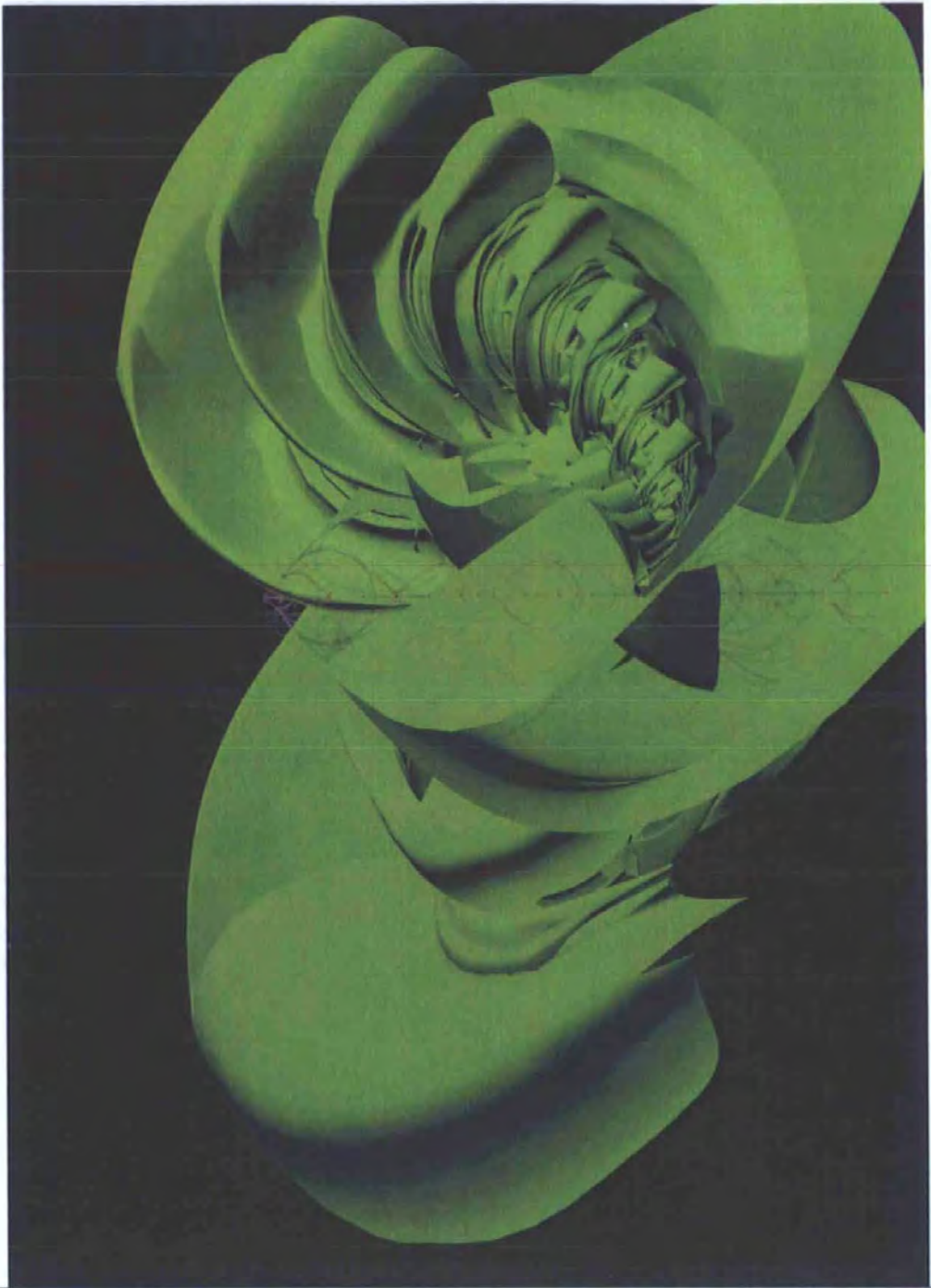


Figure 1.14. Karl Chu, Phylogon 1



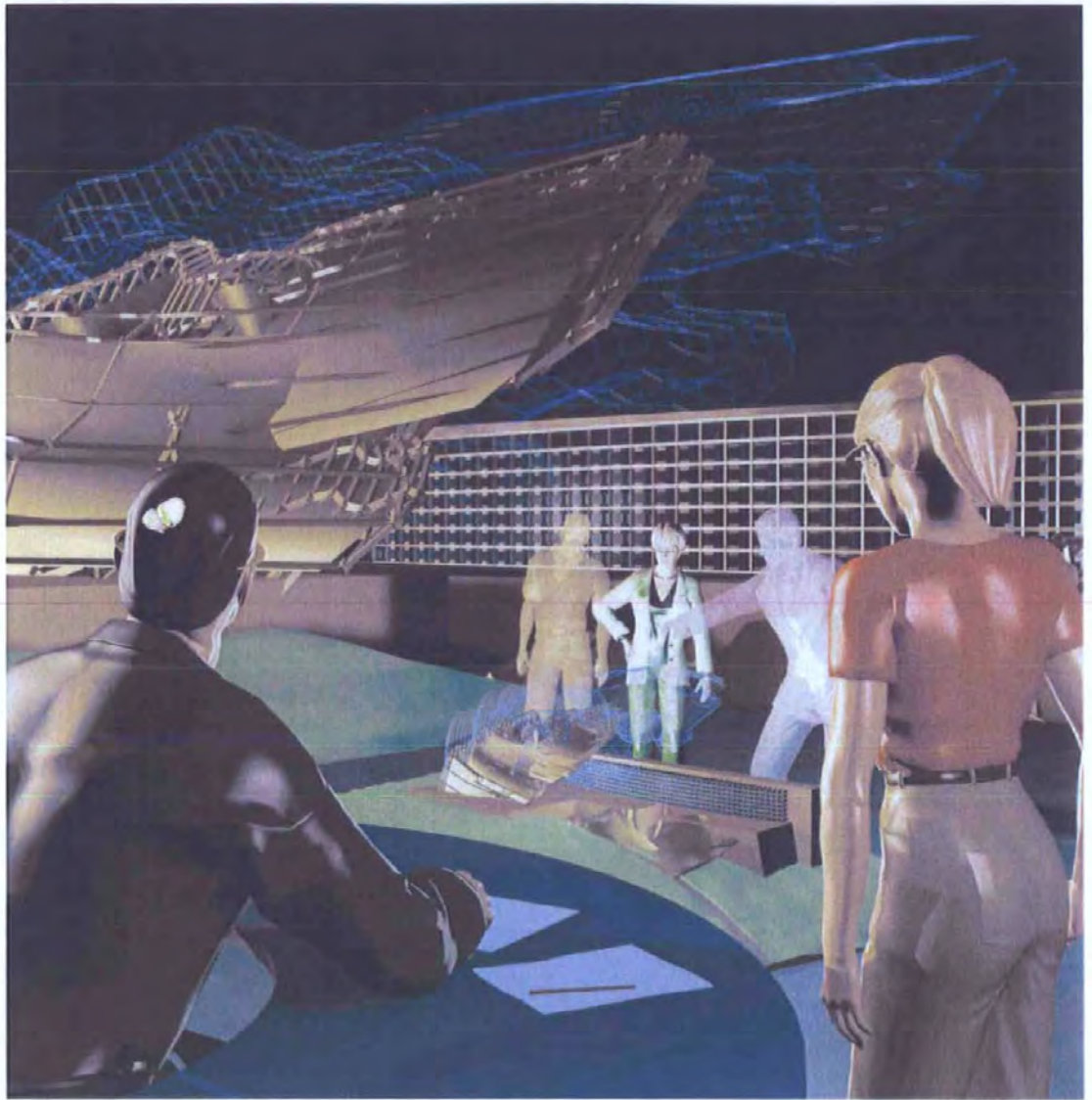


Figure 1.15. Peter Anders, Cybrid.



Figure 1.16. Dunne and Raby, Car radio for exploring the tunable city.



Figure 1.17. Dunne and Raby, Nipple Chair.





Figure 1.18. Nina Pope, Hybrid Housing, site specific art for Ickworth House.

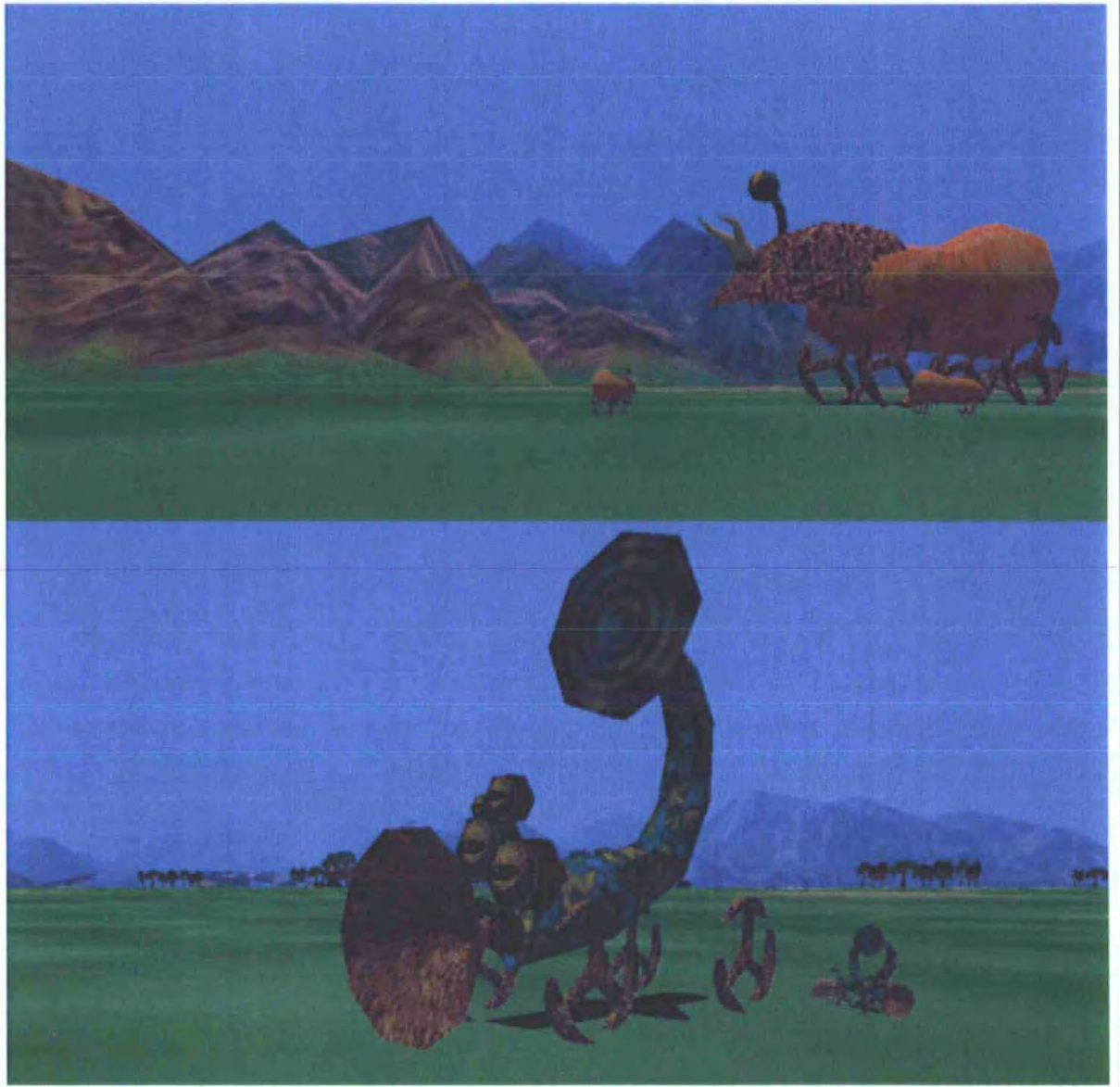


Figure 1.19. Jane Prophet, Technosphere.

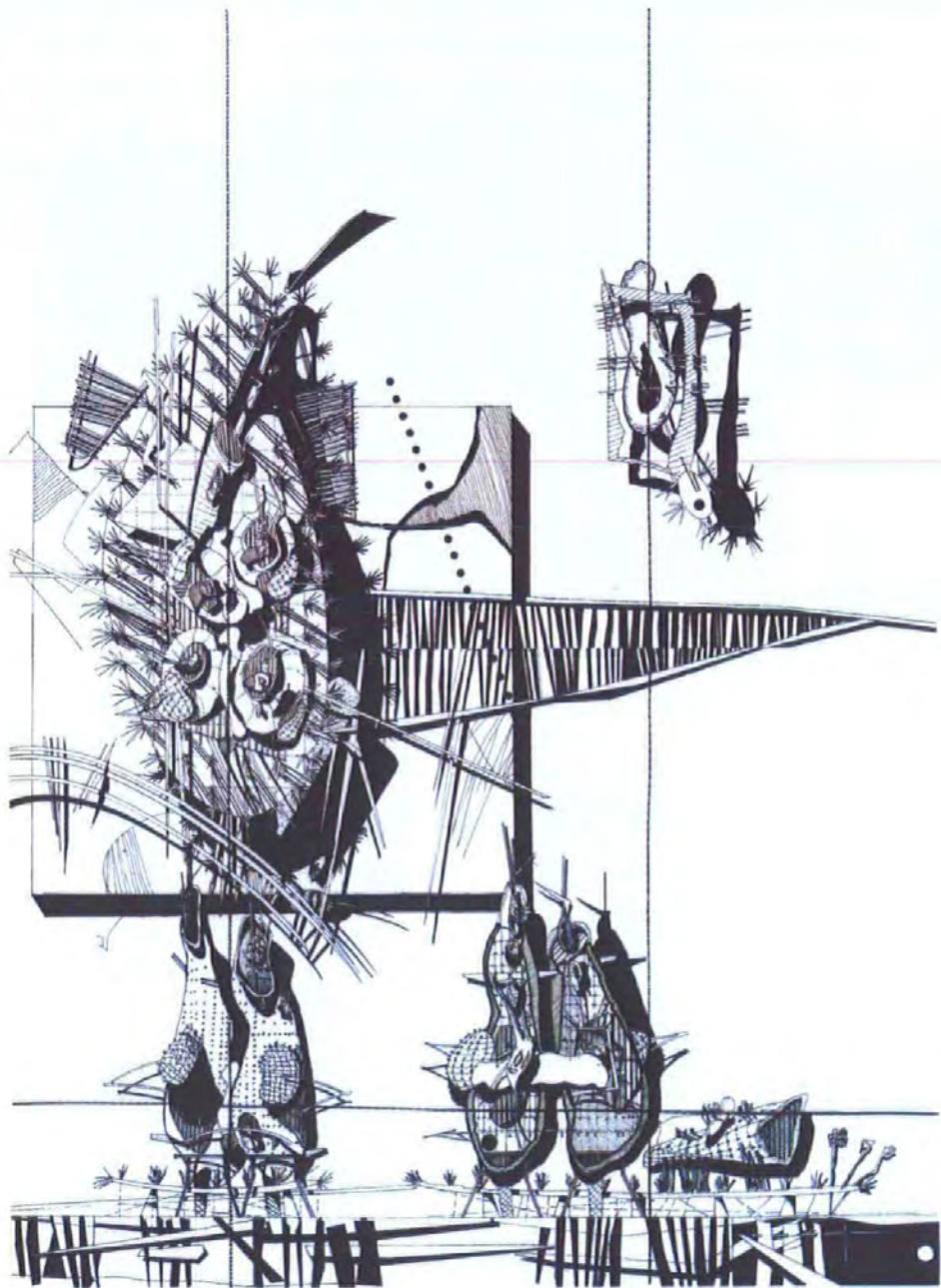


Figure 1.20. Jane Prophet, Decoy



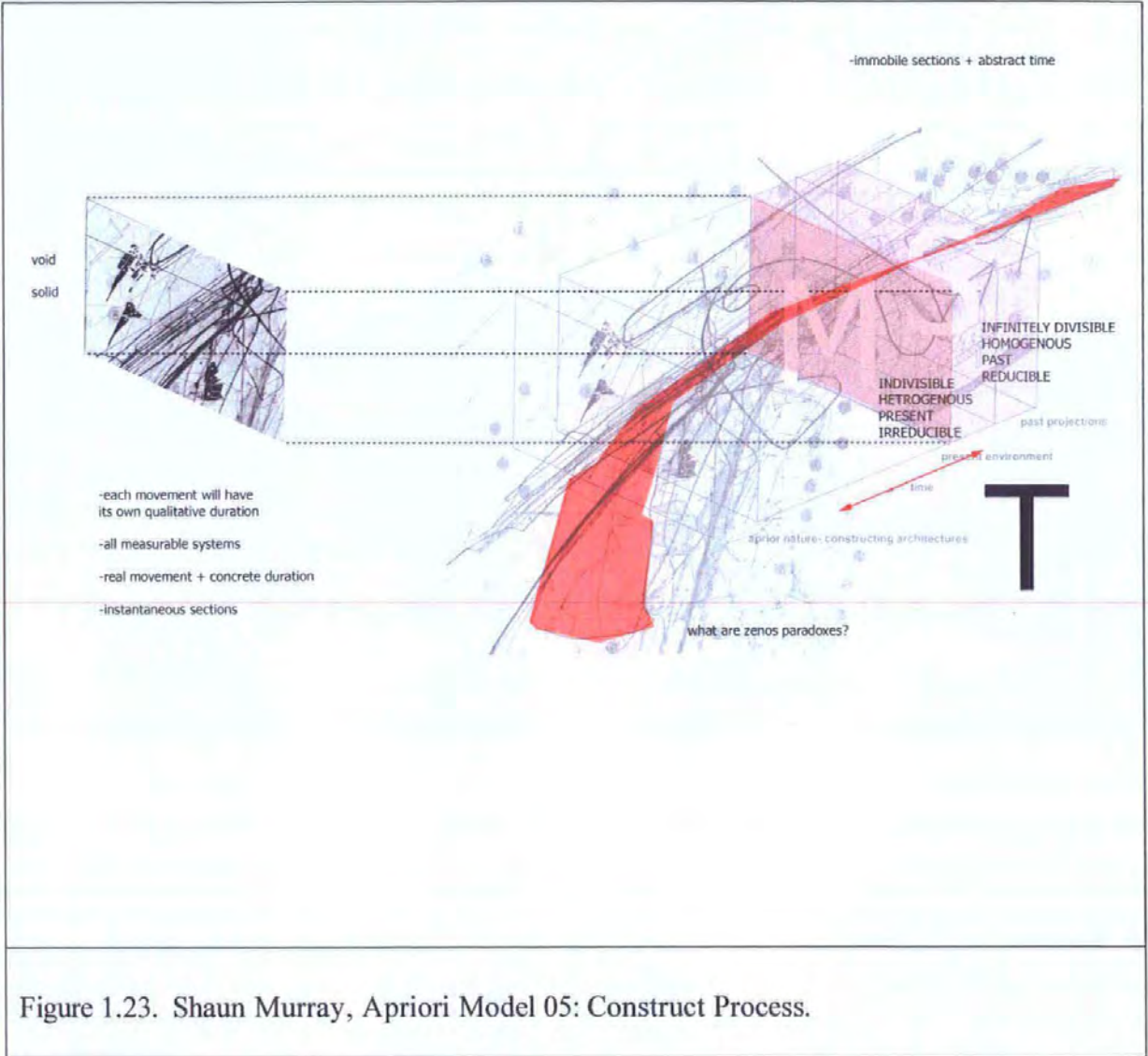


Figure 1.21. Neil Spiller, *The Martyrdom of Saint Sebastian*.



MILLENNIUM PAVILION PLANS SECTIONS AND ELEVATIONS

Figure 1.22. Neil Spiller, Millennium Pavillion.





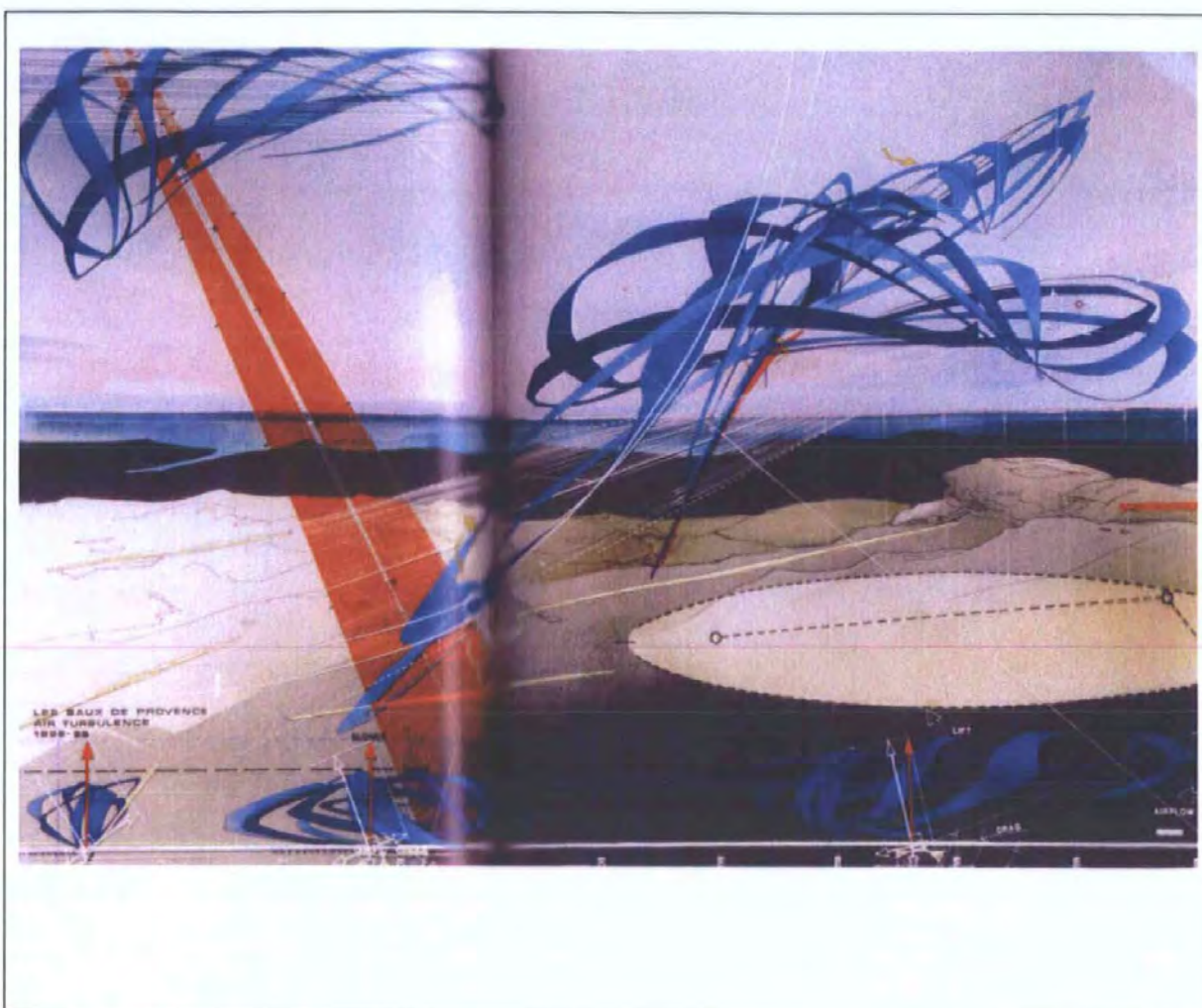


Figure 1.24. Shaun Murray, Air Turbulence, Les Baux de Provence.



D> SOFTROOM

DIE ZEIT MAGAZIN 1999

**LIVING 3000AD DIE ZEIT**  
**WHAT WILL IT MEAN TO BE HUMAN AT THE TURN OF**  
**THE THIRD MILLENNIUM AND HOW WILL THIS BE**  
**MANIFESTED IN OUR ARCHITECTURE?**

THE 21ST CENTURY MAN IS CHAMELEONIC. ADAPTING TO THE SURFACES OF THE URBAN ENVIRONMENT, ONLY THE VIRTUAL ELITE CAN AFFORD THE DISCREET MIRRORS AND THE ELEGANT GILL-FLAPS OF SELECTIVE BODY MUTATION WHICH REMAIN A PROHIBITIVELY EXPENSIVE PROCEDURE. THE MALE PILL IS FINALLY SYNTHESIZED: MEN WHO ARE ON THE PILL HAVE PINK EYES, ENABLING BESTSOLD OVERHEATED WOMEN TO IMMEDIATELY IDENTIFY SAFE PARTNERS — KRISTIN ESHAM

A VISION OF A FLUID, SHIMMERING ENVIRONMENT AND ITS GENETICALLY MUTATED INHABITANTS, CREATED FOR THE NEW YEAR'S COVER FEATURE BY DIE ZEIT, THE GERMAN NATIONAL NEWSPAPER'S COLOR SUPPLEMENT

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PHOTOGRAPHY: TONY WOOD

Figure 1.25. Softroom, Living 3000AD, Die Zeit.





Figure 1.26. Nic Clear & Bastian Glaessner GLP.

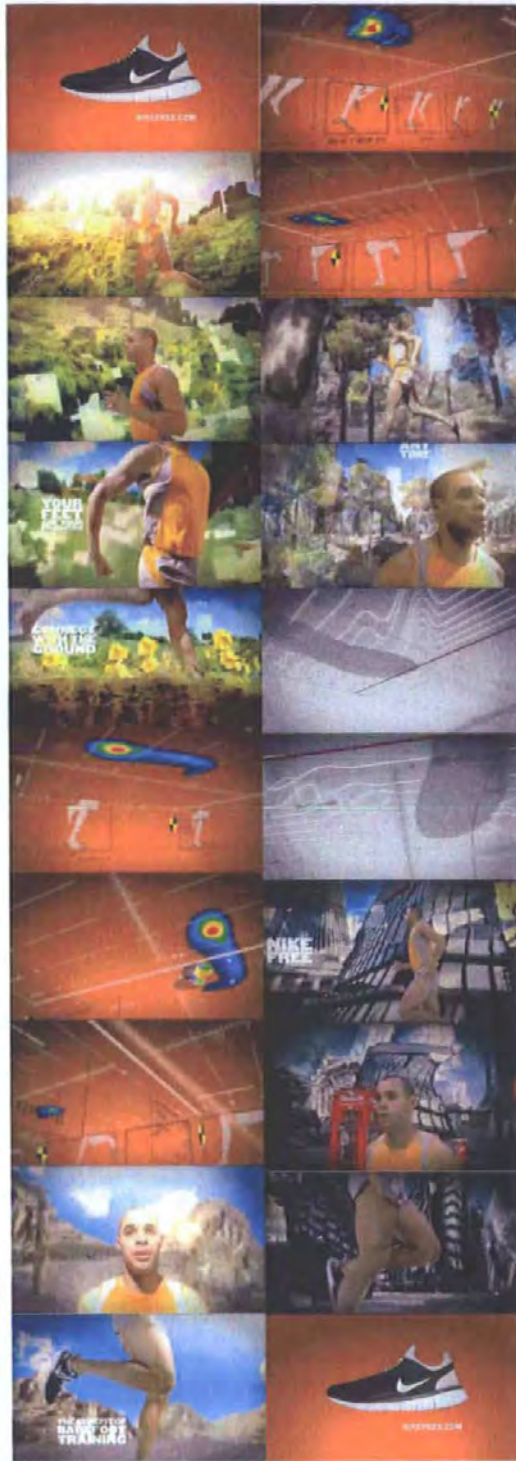


Figure 1.27. General Lighting and Power, Nike Free.

## **2.0 Architecture's Cartesian Method**

*This chapter will illustrate how digital architecture has found itself with a methodology that has disabled its ability to make progress as a research field. The sections will demonstrate that mainstream architecture's use of a Cartesian split time and space model has led to a crisis in the methods it uses to engage with the contemporary model of the internet. Section one will look at how Descartes' coordinates system, which underpins contemporary drawing packages, emerged. Section two will identify how easy it was for architecture to adopt the systems and embed them within their methodologies and practices. Section three will address how, through the impact of post-modernism, these methodologies weren't developed inline with contemporary models for time and space, and so have left architecture with inadequate tools to engage with digital culture. Section four will look at the rise of post-Cartesian discourse within the field of 'human geography' that prioritises social systems to understand space. Section five identifies the 'social production of space' as an opportunity for digital architecture to adapt its methodology and recover as a research activity.*

### **2.1 Split Time and Space**

*The first part of this chapter looks at how architectural drawing systems are rooted in a split model of time and space. By reflecting upon scientific and industrial developments throughout the Enlightenment, the section charts how a coherent but divisible model of space and time are capitalised upon. Citing Descartes' coordinate system, through to the development of the timepiece, a public temporal consciousness is traced in which time becomes increasingly economised. It is suggested that architecture's adoption, and persistent use of, the Cartesian coordinate drawing system predisposes itself to capitalise upon the split time-space model.*

Architectural process centres on the development of drawings. Plans, sections and elevations are the contractual elements that define the role of architects and their design responsibilities. Nearly 400 hundred years after Descartes developed his coordinate system, architecture and its digital drawing packages remain tied to this system as a means of describing the relationship between form and structure. However, the Cartesian coordinate system emerged from a complex network of determinants, which are

crystallised in the concepts of the Enlightenment. Significant for heralding a rational approach towards understanding human experience, the Enlightenment precipitated a scientific and mathematical revolution in which 'reason' became the key framework to ascertain truths.

René Descartes' (1596-1650) mathematical and philosophical models for separating mind from body led to his proposition that understanding occurs in the mind, and experience can no longer be measured through the senses (Trusted 1994:70). Consequently, time/space experiences become divisible as space becomes a mental construct and time is simply a measure of duration. Descartes' distance from the human subject enabled him to develop abstract frameworks such as the Cartesian coordinate system, which enables a location to be specified within a two-dimensional plane. Through this, Descartes established a basis for mapping, and eventually the architectural drawing systems in which plans, sections and elevations continue to define architectural practice. Isaac Newton (1642-1727) further extended time's division from space through his theories of mechanics, which relied upon absolute models for both subjects (Trusted 1994:98). By the middle of the 18th century, timekeeping became miniaturised and portable with John Harrison's (1693-1776) seaworthy 'watch'. This provided the British Navy with a reliable and accurate method of navigation, but it also signified the co-modification of time as a quantifiable, discrete subject which was separate from space (Harvey 1990:252). Towns and regions retained their own times developed according to the specific rise and setting of the sun until the late 19th century. By then, the scale of the rail networks was large enough to demand simplification to the complexity of having multiple times that ran concurrently across countries. In the USA, for example, there were 80 different railroad times. In 1884, representatives from around the world met in Washington to establish the 24-hour time zone model, and although slow to be adopted, the advent of the wireless telegraph and the broadcasting of time signals around the world from the Eiffel Tower in 1913 quickly brought about a global framework for time. (Kern 1983:14)

Stephen Kern identifies 1880 to 1918 as a critical period in the transformation of Western time consciousness, and details the consequences of the absorption of time-based technologies and the effect they had on modern society. He describes the enormous shifts that occurred as the time of the world began to tick outside of private time, forcing populations to deal with a new world time. Brought about through early media technologies, industrialised workplaces, art and culture, the world became a temporal place when clocks and timetables became part of everyday life. In some instances even the

public's sense of time became something that could be manipulated for economic benefit. This was reflected in the deliberate speeding up and slowing down of cinema film (Kern 1983:118), which was introduced not only to enhance dramatic scenes but also to get people out of the cinema quickly in order to allow the next paying audience in.

Benjamin's 1936 description of the impact of the camera and cinema experience on the public describes modern technology's ability to extend our spatial horizons as the time-based medium offered new 'optics' for directors to represent environments.

"Our taverns and our metropolitan streets, our offices and furnished rooms, our railroad stations and our factories appeared to have us locked up hopelessly. Then came the film and burst this prison-world asunder by the dynamite of the tenth of a second, so that now, in the midst of its far-flung ruins and debris, we calmly and adventurously go travelling." (Benjamin 1970:238)

While Benjamin described technology's capacity to extend time's separation from space, he also described its ability to distort the equity of the two elements. This distortion extended to actual experiences in the example of the French railway's decision to modify their station clocks to run five minutes ahead of the train in order to give people time to board (Kern 1983:13).

By the time Einstein's special theory of relativity (1905) and the general theory (1916) united time and space, 20th century models of production and consumption were capitalising upon the Euclidean split of time and space (Harvey 1990:266). The two concepts become co-dependent economies in the form of units to be adjusted to maximise profit. For Henry Ford, time was adjusted to maximise space as the worker was removed from the full process of manufacturing a car, and located at a single position on a production line. For the American engineer Frederick Winslow Taylor, tasks were analysed according to the use of time across an entire day, and new production schedules were developed to maximise production by planning and strategising the use of managers and workers, as well as by providing incentive models for motivating the workforce (Harvey 1990:125).

The International style of architecture of the early 1900s embraced this 'machine age' to develop architectural solutions that rejected ornament for glass, steel, concrete and industrialised mass-production techniques. The radical simplification of form and the



machine aesthetic implied a new future for humankind, but it embodied a split time and space in its design and production.

*This section has reflected upon the development of the Cartesian coordinate systems for space and the consolidation of time from space as quantifiable units, providing mainstream architecture with a method that could underpin its tools for drawing and its systems for managing large scale projects in the modern era. The next section will illustrate the ease with which architecture adapted the divided model of experience to benefit and develop a highly successful profession based upon the Cartesian premise of time and space.*

## **2.2 Architecture's Use of Split Time and Space**

*Architecture, as it moved from local craft to an industrial model through to modernism, took advantage of a framework for experience that saw time and space divided. This section will describe the breadth of professional practice within architecture that succeeds due to methods that retain time and space as being understood as discrete systems.*

Architecture as we know it, as both a profession and a creative practice, relies upon sophisticated production processes to develop a designer's ideas from a sketch into an actual working building. Many aspects of the contemporary production process rely upon Cartesian frameworks that allow projects to be economised according to the schedules involved. Like many modern industrial practices, architecture has been subjected to the use of technologies and systems that have made it more efficient and more profitable to a wider audience. By evidencing the discipline's adherence to a Cartesian model of time and space as discrete concepts, it will be possible to demonstrate that any design of a spatial experience will remain limited.

Le Corbusier's 'machine à habiter' notion and his 1923 book *Towards a New Architecture* expressed a commitment to engineering technologies as a solution to the poor housing of the early 20th century, as well as providing a framework for integrating Cartesian models into architecture (Vidler 1998:291). The embellishment of split time and space can be identified within the use of the materials, structures and design and construction approaches that Le Corbusier used in his housing schemes. Among them, the Unité

d'Habitation in Marseilles defined a language for large scale post-war modernist architecture and demonstrated Le Corbusier's desire to deliver a solution to the problem of collective housing through modern processes (Harvey 1990:68). By addressing the configuration of space and the use of construction methods, both of which were derived from his 'Modulor' system of mathematical dimensions and proportions, Le Corbusier designed the 18-storey building to contain 337 apartments based upon 23 variants of housing types, from single people to families with up to eight children. In order to prepare for the design and build of the Unité, Le Corbusier had already proposed a fundamental need for a closer association between architects and engineers (Le Corbusier 1923:14). Following his brief and frustrating experience developing French housing schemes for the Vichy Government in 1941, he assembled his own research group ASCORAL (Assemblée de Constructeurs pour une Rénovation Architecturale), and in 1946 he founded ATBAT (Atelier des Bâtisseurs) a team of highly skilled engineers from the aircraft and railway industries (Jenkins 1993:7). This strategic integration of disciplines established the contemporary relationship between architect, engineer and construction teams that is responsible for the construction of large-scale buildings as we know them today.

ASCORAL and ATBAT developed the 2,785 detailed design and construction drawings that were required to describe the building, a systematic approach that ensured the building's direction. The design approach heavily references Le Corbusier's Modulor system, which was intended as a 'proportional regulator' (Jenkins 1983:10) through which the design team could generate the building's dimensions. Modulor was used prior to Unité in the Duval Hat factory, and Le Corbusier intended for it to be used throughout architecture and design, even down to the standardising of paper sizes. The system was derived from his Modulor man, a 20th century revision of Da Vinci's Vitruvian man, which was an anthropomorphic system for identifying proportions and subdivisions within the human body (Kipnis 1998:735). An image of the Modulor man was impressed into the external walls of the Unité d'Habitation, and pointed towards a system of design which contributed significantly to the dimensions of walls, ceiling heights, and even door handle designs.

Coupled with the revolution in management and project design through his employment of ASCORAL and ATBAT, and the use of the Modulor man as a system for space design, Le Corbusier's design methodologies established modern architectural processes. But in doing so, they consolidated Cartesian science with the creative and production processes of architecture. Underpinned through the technical drawings and specificity of engineers, his



use of concrete and the development of the 'bréton brut' style that led to so many poor imitations across the world, delivered not only a 'machine for living', but machines for making buildings.

The architectural approaches that emerged after Le Corbusier, from small scale projects to large city developments, follows procedures and uses tools that differ greatly in terms of depth, but which are essentially similar in linear path. The architectural design process can be identified by the following stages of design; 1) schematic, 2) design development, 3) presentation and revision, 4) detailed development and construction design, 5) bidding, and 6) overseeing construction. Through the first three stages - including the development of the brief for the building, its design characteristics and the revision of these toward a final approval - the design process can be quite formative as designers explore creative solutions that meet the client's needs. This is known as the architectural programme or brief (Heath 1984:183). At this point in the design process, the 'programme' represents the primary interface between the architect and the potential users of the building, and depending upon the interests of the client they are involved to a lesser or greater extent. In many urban planning projects the lack of research and depth at this stage resulted in poor design solutions. The limited social scope within many architectural programmes can be identified as a methodological weakness, a point that will be discussed later with regard to the design failures of the large scale Pruitt Igoe social housing project.

Once past the architectural programme phase, the complex task of developing detailed construction drawings and documents begins in order to describe the project. These documents substantiate the 'brief' that then becomes the legal contract for what should be built and provides the framework for a contractor and quantity surveyor to cost the works for the bidding process. The sixth and final stage is not necessarily carried out by the architect, and many contemporary design offices relinquish the task of managing the building of a project to contractors. The term 'brief' originates from British law and refers to the instructions that a solicitor receives from their client about the facts of a case that they are involved in (Heath 1984:184). The legally binding nature of the drawings in part four reveals their role in specifying dimensions, materials, and relationships between structures, rather than any creative function.

Operating at different scales, and using a sophisticated grammar of marks and symbols, architectural drawings have little to do with the experience of an intended space. Based entirely on the Cartesian coordinate system, technical drawing for construction requires no

concept of time or perspective, removing not only the fourth dimension but the third as well (Ingraham 1998:111). Architectural drawings have always operated as a sophisticated and esoteric articulation about the construction of buildings (Allen 2000:151). Plans, elevations and sections are complex abstractions that describe processes and systems that require knowledge not only of the building of buildings, but how they become spaces in order to interpret them. Contemporary drawing packages used on computers operate through Descartes' mathematical coordinate system as they are able to not only support the drawing up of plans but connect to specific product databases. They can provide a document support tool that maps design to a cost database, and offer workflow management tools that are networked between designers in order to monitor the progress of a specific job (Allen 2000:151). Products such as Arch-CAD, developed by Graphisoft, not only describe the drawing and management potential of their product but provide an online Return-On-Investment calculator that demonstrates how much money you could be saving through the efficiency of its leading product:

“Graphisoft's Return-on-Investment (ROI) calculator will allow you to benchmark your productivity, time allocation to specific design activities and overall profit potential from implementing ArchiCAD 3D modelling into your practise.” (Graphisoft Product Information 2006)

The close relationship between drawing through a Cartesian coordinate system and the ease that the quantities of materials, their dimensions and monitoring of time are interrelated through the software demonstrates the high level of the strict economising of time, space and money. The contemporary software packages now assume and promote the idea that capital and construction/creativity are not merely co-dependent, but inseparable. They are entirely reliant on time and space as discrete entities in order to maximise profit by their manipulation (Allen 2000:146). Taylorist in its rhetoric, the Graphisoft Estimator software goes as far as extending the mathematical dimensions of time and space to a fifth level – that of money itself.

“5D Reporting - using the construction model as the link between cost and time, the system produces cost loaded schedules for financial analysis.” (Graphisoft Product Information 2006)

The use of drawing packages has not only succeeded in extending the Cartesian division of time and space but has capitalised upon the opportunity of networked computer systems to enable the development of buildings to proceed quickly and economically under these conditions (Allen 2000:152).

Another area in architecture that can be understood to have been both instrumental in the development of a contemporary architectural building programme and the perpetuation of a split model for time and space are the project management tools that were developed during the 1950s. The Critical Path Method (CPM) and the Program Evaluation and Review Technique (PERT) both emerged at a time when engineers saw the potential for technology to provide solutions to the many ambiguities of large scale projects. CPM was developed by the Du Pont company in Delaware using their UNIVAC 1 computer in 1956, and was used as a means of scheduling construction work. In 1958, the Special Projects Office of the Navy Bureau of Ordinance required a means of monitoring and controlling the 3,000 contractors and agencies working on the development of the Polaris missile. Both approaches extend the Gantt approach to project management that was developed in the context of World War One military initiatives, but used a network plan to cope with the flexes within time that occur between milestones within Gantt's linear graphic model. The network plan concept uses a graphical plan to describe the dependency relationships among the project activities using the simple logic that "all activities preceding a given activity must be completed before the given activity may begin" (Moder et al 1983:7).

Adopted widely for small to large-scale construction projects since the 1960s, both CPM and PERT remain the principal methods in managing and controlling time, staff and finance. Since the 1990s, they have been adapted to cope with constraints within the project flow. The original CPM and PERT processes had been criticised because of problems in handling changes to a project brief, their heavy reliance upon estimates - a major cause of uncertainty - (Goldratt 1997:121), and because bottlenecks occur according to dependencies within the linear plan (Maylor 2003:142). However, the models of experience go unchecked, and time, space and money remain discrete components within the digital spreadsheets and network project tools that manage the work flow. The design of buildings and the scoping of architectural projects are done within the models of production such as CPM and PERT, as software such as ArchiCAD has already demonstrated.

*This section has demonstrated how the modern architectural method capitalised upon Cartesian systems in which time and space are separated. It described how architectural drawings have become a legal constituent in the linear production process that is used to design and make buildings. The functions and rhetoric of contemporary CAD packages are*

*used to illustrate the perpetuation of split time and space within design, whilst CPM and PERT remain the teleological basis for scheduling. The section used Le Corbusier's 'Modulor man' and relationships with science and engineering to establish aspects of the modern architectural methodology that remain today. The next section will look at how this relationship came under stress through post-modernism.*

### **2.3 Post-modernism, Architecture and Science**

*This section traces the impact of post-modernism upon architecture's relationship with science. It describes the global climate of the late 1960s and early 70s in which Fordism came under stress and new, flexible forms of capital production were developed, contributing towards the breakdown of the teleological models that underpinned modernism. Along with the legacy of poorly initiated large-scale housing schemes, architecture's relationship with progressive science became more problematic and, as a consequence of this, its methods did not develop inline with microelectronics and nanotechnology, both of which embrace post-Cartesian theories. This critical divorce from science left architecture with a brief only to explore the 'image' of buildings through post-modern architecture, while retaining design and construction methods that remained based upon Cartesian systems. The limited understanding of quantum theory and relativity resulted in a restricted method for architecture. This may be compared with the early failings of the Artificial Intelligence program, which found itself investing heavily in dualistic models of computing that subsequently held the field back. This section provides a backdrop for how digital architecture finds itself using Cartesian tools whilst professing to be a post-Cartesian discipline.*

*"Architecture has maintained its dedication to linearity in the face of what seems like astounding counter-evidence: the drift and turbulence of forces that can barely be resolved and dissimulated into the vertical striation of space by the column; the tenuousness of graphite on paper or ink on mylar; the loss of resolution in repetition and reproduction; the interior mess of the wall; the extreme materiality and dimensionality-and, in this, the loss of control - of everything architectural. Architecture has, without question, seen linearity as a way of upholding proprieties belonging so completely to its history that it is hard to imagine what architecture would be like without them." (Ingraham 1991:73)*

Architecture's use of time and space as discrete units became consolidated in the surge of industrial practice that was developed through the 20th century. Le Corbusier's work

throughout the modern movement of architecture is memorable for his references to the machine age, and suggested a technological determinism. However, his highly humanist imperatives are best understood in the context of the age. Many of his projects arose as a response to the poor living conditions and economic problems for housing large communities after the Second World War. Le Corbusier understood the economic potential of Fordism for producing a social benefit through the modernisation of construction management and the application of engineering processes. However, the legacy of large scale design management, poor imitations of large scale housing schemes, inferior use of materials and construction techniques led to a backlash against modernism. As global economic models change and post-Fordist modes of production emerged, the use of technology in architecture lost its conceptual rigour, with post-modernism critiquing the 'panacea' of science. Consequently much of Le Corbusier's initiatives are misunderstood, and he has since been implicated in the blame for housing schemes such as the Pruitt-Igoe in St. Louis and Ronan Point in East London. This backlash against modernism isolated architecture from pursuing critical enquiries and research with science and technology during the 1970s. This was a time when developments in the electronics and computer industries reached the general public and began to demonstrate how time and space could be distorted through telecommunications and miniaturisation. Having lost its place alongside the technologists, post-modern architecture became concerned with the debate surrounding image and form, concentrating upon the style of facades and curtain walls that were hung upon the concrete and steel frames of buildings. This loss of momentum and the resulting disengagement with engineers and scientists contributed to architecture retaining methods based upon the split model for time and space that underlies how buildings are designed.

The massive Pruitt-Igoe social housing scheme in St. Louis, Missouri was designed in 1951 by Minoru Yamasaki (designer of the World Trade Centre) and consisted of 33 apartment blocks, housing a total of 2,870 flats. Featuring design elements such as 'skip-stop' elevators which stopped at the first, fourth, seventh and tenth floors to ease congestion it was designed to support the city's transformation into a centre for trade and commerce after the Second World War. However, through a combination of flawed social integration policies and compromises in the original design of the spaces, the buildings quickly fell into disrepair and were heavily vandalised by the residents (Birmingham 1999:291). By 1972 when the project was demolished, the buildings had been unoccupied for years and the city's population had declined from the levels of the 1950s. The failure of the Pruitt-Igoe housing complex to meet the needs of the end users is discussed in the work

of Bell, Fisher, Baum and Greene, "Environmental Psychology". They cite Pruitt-Igoe as an example of methodological failure in the design process, as it did not sufficiently consider the human and social needs of its users (Bell et al 1996:399). Charles Jencks used the demolition of Pruitt-Igoe in his 1977 book *The Language of Postmodern Architecture* to herald the end of modernism, and used it as an opportunity to usher in a new approach (Jencks 1977:9).

Pruitt-Igoe and many other failures in large scale, social housing demonstrated an economic-led design and production model that followed Fordist and Taylorist models. Harvey states that it wasn't necessarily modern architecture that was at fault, and moreover it was the political systems that recognised the 'profitability' of producing housing using such economical methods (Harvey 1990:70). However, in the fallout of these poorly conceived social solutions, modernism's relationship with science was identified as part of the problem. This was suggested by Lyotard when he mapped modernism's faith in technology as providing the solutions to social ills, as well as the Enlightenment's view of science as the panacea which would possess the ability to identify truths and offer ultimate solutions (Lyotard 1979:25). Consequently, modernism's most vivid legacy is not its close working with science, engineering and technology to provide better social architecture, but that of handing developers a range of design and construction solutions for building large scale structures quickly and economically (Birmingham 1999:295).

Modern architecture's 'downfall' occurs at a time when the Fordist equations of time and space were beginning to over-stretch themselves as they extended globally and began producing inflexible product ranges that became repetitive and undesirable (Soja 1989:184). By the late 1960s, the United States found itself competing with Asian, South American and European economies, causing the Fordist model for production to become highly stressed as the value of raw materials and labour varied radically across the globe. The rigid nature of the large scale factory wasn't flexible enough to respond to overseas competition with new products, and workers were laid off as the repetitive nature of production began to generate mountains of unwanted goods. Harvey cites the collapse of the Bretton Woods agreement as a signal of the breakdown of Fordist models. Bretton Woods was established in 1944 and committed countries to maintaining its exchange rate to a fixed value in terms of gold. On its failure in 1971 - due to the dollar's inability to retain value in the light of a global recession - the detachment of monetary value from a mineral ore to a new system of floating exchange rates 'de-materialized' money (Harvey 1990:296).



By the mid-1970s, Western economies found themselves in deep recession, a state exacerbated by the oil crisis. In order to survive, industries were forced to consider alternative models for labour and organisation, as well as seeking out new products and technologies. Within this search, the separate economies of time and space began to be manipulated in order to provide alternative, 'flexible accumulation' models (Harvey 1990:298). Clothing groups like Benetton found a solution in developing an alternative model for production, breaking down the model of a single large-scale factory to use smaller distributed production units. Moving away from the single unit that produced a limited range of replicated products, Benetton used small production centres around Venice that typically employed between 30 and 50 people. Introducing information and communication technologies, the group found that they were able to control production and respond to consumer demand in a flexible and dynamic manner (Belussi 1986:8). In 1970, Toyota launched the Toyota Production System (TPS). This adapted car manufacture and managed employees more effectively than the failing Fordist model, which had struggled in 1950s and 60s Japan. 'Just-In-Time' was the title of the manufacturing and conveyance model that informed the demand of car parts in terms of which part was needed, when it was needed, and how many were required. Just-In-Time used a Toyota model for time - 'Takt-Time' - that was used to monitor the production time against the volume required (Ohno 1995:29). Coupled with 'Jidoka', a term referring to the ability to quickly stop and modify production lines if problems arise, the TPS became a prime example of post-Fordist production models, and one that enabled Toyota to respond to consumer demands. Through TPS, both supply and quality were monitored constantly and allowed the company to build cars in such a way that consumers felt they had more control and individual choice, as colours and specifications could be relayed from the showroom to the factory (Ohno 1995:30).

The TPS was one of many forms of production that responded rapidly to market forces. The use of computer systems for communication and production supported the development of further strategies for flexible accumulation. Subsequently, the high street began to change as companies shifted from concentrating upon managing their own production to investing in franchises, and using marketing to develop a brand.

"Flexible accumulation has been accompanied on the consumption side, therefore, by a much greater attention to quick-changing fashions and the mobilization of all the artifices of need inducement and cultural transformation that this implies. The relatively stable aesthetic of Fordist modernism has given way to all the ferment, instability, and fleeting qualities of a postmodernist

aesthetic that celebrates difference, ephemerality, spectacle, fashion, and the commodification of cultural forms...the need to accelerate turnover time in consumption has led to a shift of emphasis from production of goods...to the production of events (such as spectacles that have an almost instantaneous turnover time)". (Harvey 1990:156).

The shift from product to brand, and from goods to events, is central to Harvey's identification of post-modernism. Jameson's text *Postmodernism, or The Cultural Logic of Late Capitalism* (1991), provides a critical analysis of post-modernism as a significant break from modernism, as demonstrated through the manifestation of architectural activities of the period and the transformation of time and space relationships. Jameson suggests that the 'modifications in aesthetic production are most dramatically visible' (Jameson 1991:2) in architecture throughout any age. This allows him to use the field as a means of understanding the characteristics which indicate how post-modernism has become the 'cultural dominant'. The breakdown of persistent temporal models is central to Jameson's understanding of post-modernism, while Harvey's Time-Space compression is comparable to the continued reference of the spatialisation of subjects. This is the antithesis of the historiographic model of time which informed previous theoretical frameworks of culture, where events and processes were attached to teleological frameworks. Exemplifying this, Baudrillard's study of objects in simulation demonstrate a 'new spatial logic' for Jameson (1991:18), in which a lack of origin for subjects contributes to a 'flatness and depthlessness' across cultural production and interpretation, and time loses its linearity. Whilst comparing Heidegger's study of Van Gogh's paintings of peasant shoes to Warhol's 'Diamond Dust Shoes', Jameson identifies a non-hermeneutical conclusion to post-modern works that was present in modernism's production and analysis (1991:8). Hermeneutic models, or those that seek to explain through given truths, were characteristic of an interpretation of modern culture that saw architects pursue missions to improve humanity through the truths provided by science and technology. Post-structuralism dismissed the hermeneutic model and any theory that relies upon absolute truths instead embracing a relative approach, and Jameson suggests that the break from these approaches are (amongst other) the symptoms of the post-modernist culture that embraces the destruction of grand narratives and the death of the subject. Jameson also describes post-modern architecture's use of 'nostalgia' as further evidence of the breakdown of historiographical models of time through the 'cannibalising' of all architectural styles to generate a 'complacent eclecticism' (1991:18). This passive 'intertextuality', is made more active through the culture of re-makes within the film industry that support "a new connotation of 'pastness' and pseudo-historical depth, in which the history of aesthetic styles displaces 'real' history." (1991:20).

Jameson constructs a context in which architecture develops a post-modern relationship with itself through aesthetics rather than technologies. He reflects upon Mandel's three stages of machine power through the technological revolutions of the past 150 years: 1. Steam power, 2. Electric and combustion power, and 3. Electronic and nuclear power. In describing the lack of representational capacity that the computer has in its grey 'outer-shell' compared with that of the "racing car whose hood is adorned with great pipes, like serpents of explosive breath" (Marinetti, *The Futurist Manifesto* 1909) he reminds us that the PC is a machine of reproduction, demanding an entirely different "capacity for aesthetic representation" (Jameson 1991:37). Relationships with computers contribute to his subsequent proposition that post-modern architecture celebrates a 'sublime' form of this technology to support the development of an eclectic, image-conscious landscape that disregards itself from any hard science that had underpinned its modern activities.

"Architecture therefore remains in this sense the privileged aesthetic language; and the distorting and fragmenting reflexions of one enormous glass surface to the other can be taken as paradigmatic of the central role of process and reproduction in postmodernist culture." (Jameson 1991:37)

Subsequently, space and time - in a post-modern, culturally dominant context - become highly distorted currencies. Not only is there a closing of the 'critical distance' that provided the modern producer and theorist a space to 'stand outside', but Jameson suggests that 'postmodern bodies are bereft of spatial coordinates and practically incapable of distantiating' (Jameson 1991:48). As a series of strategies for understanding post-modernism, Jameson demonstrates how the breakdown of time as a Cartesian currency, and architecture in its creativity, results in buildings in which function is subordinate to form. This reconfigures the modernist tenet that form should follow function<sup>2</sup> and posits a shift from absolute time to extreme relativity.

The methods that identify post-modern architecture at its most extreme are entirely driven by form. Gehry's Chiat/Day Building in Venice, California for example, used Oldenburg's enormous binoculars as its entrance, and cast concrete pillars in a twisted manner to undermine their perceptual strength. This indicated the uncoupling of form from function

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<sup>2</sup> The phrase that was adopted by the American architect Louis Sullivan informed his methodologies in the design of skyscrapers and buildings in the early 20<sup>th</sup> century. Coupled with Adolph Loos' claim that ornament is crime, these two principles massively informed the work of Le Corbusier, Gropius and van der Rohe who defined the modern architectural movement which post-modern architecture has since sought to undermine.

as material technologies are used to support theatrical facades. Construction processes in architecture adapted accordingly and the distributed range of manufacturers and material components involved in constructing buildings accelerated modern models to find flexible modes for producing buildings without the 'scientific' ingenuity that is required, since the integrity between form and structure was removed.

"In this new machine, which does not, like the older modernist machinery of the locomotive or the airplane, represent motion, but which can only be represented *in motion*, something of the mystery of the new post-modernist space is concentrated." (Jameson 1991:45)

Although modernist values had developed the robust production approaches for the management and construction industries, architects had been discredited from their involvement in science and technology. Prince Charles' humiliation of architects such as Richard Rogers when he described the glass and steel proposal for the 1980s extension to the National Gallery as a 'monstrous carbuncle'<sup>3</sup>, compounded architecture's position and contributed to a nostalgic post-modern aesthetic.

Latter day modern and post-modernist architecture - rich in image, vernacular puns and theatrical forms - was forced to use methods that inhibited any deep relationship with science. For a discipline that requires the close integration of engineering, the architectural method in post-modern architecture has since been identified as a weak point in architectural history as is denial of science inhibited its development. Following the pastiche, kitsch and mock facades that architects such as Farrell and Gehry provided, architectural relations with engineers were revisited through Rogers, Sterling and Calatrava but in a climate in which glass, steel and even concrete were seen as playing a part in a retro image of the future. Even architects who were closely associated with the post-modern style now disassociate themselves with the term. Gehry and Johnson prefer the term 'deconstructivism' which seeks to realign what they do with modernism approach's (Harvey 1990:356).

In the time that architecture lost and found a revision of its relationship with science, engineering technology had moved on. During the 20th century, the critical approach to understanding technology was vibrant in many fields such as electronics, and eventually computer science, and theoretical models such as Einstein's General Theory of Relativity began to replace the Newtonian and Cartesian models of time and space. The development

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<sup>3</sup> Speech given by HRH The Prince of Wales at the 150th anniversary of the Royal Institute of British Architects, Royal Gala Evening at Hampton Court Palace, 30th May, 1984

of the semi-conductor, which occurred during the early part of the 20th century, involved the critical advances made in theoretical physics by Max Planck (quantum hypothesis) and later Albert Einstein (photoelectric effect), and would eventually lead to solid state electronics. By 1947, the transistor had been invented at Bell Laboratories, and the stabilisation and miniaturisation of electronic devices progressed with the hearing aid (1952) and the transistor radio (1954). Within five years, Texas Instruments had developed the integrated circuit which would herald the irresistible miniaturisation of technology.

By the mid-1960s, the first integrated circuits held 1000 transistors in a cubic inch, a figure which would rise to 500,000,000 by 2004. Moore's Law suggests that our rate of technological development doubles every 18 months, and points toward the age of nanotechnology. Nanotechnology is a term which has been widely misunderstood due to the complexity of the issues concerned, but nanotechnology represents science's synthesis of 20th century theories of time and space, binding the two together in processes that are explicitly associated with 'natural' systems. Scientists remain divided as to how significant the area is, and it remains to be seen as to how soon nanotechnology will start to affect our lives. At one end there is Jamie Dinkelacker's optimistic 'Molecular Epoch' that promises the "total control over the structure of matter" (Wood et al 2003:33), while George M. Whitesides more cautiously suggests that the mimicking of natural evolutionary processes, even at a single cell level, would be a "staggering accomplishment" (Whitesides 2001:74). Then there is a dystopian vision for a technology that Drexler describes as having the potential to reduce the "biosphere to dust in a matter of days" (Drexler 1996:172). The debates are complex and the propositions continue to be hotly debated as the field is in its infancy. However, what is relevant to architecture is at what level is it able to interface and inform its method according to these developments.

An example of architectural practice that could be understood to have misinterpreted the quantum context in which nanotechnology operates is the *Powers of Ten* film developed by the Office of Ray and Charles Eames. The Eames Office used film and exhibitions to articulate mathematical and scientific ideas including; *Mathematica, a World of Numbers and Beyond* (1961) and *A Computer Perspective: Background to the Computer Age* (1971). These shows articulated the complexity of technology and science to the public. They enjoyed great praise for their clarity, and the architects are also renowned for their short films that presented ideas for the exploration of educational concepts. The 1977 film *Powers of Ten* depicts the relative scale of the universe in factors of ten. It's a fascinating piece of work that, through its successes, communicates the universal vision that



modernism had about science and technology but which also, through its flaws, demonstrates a crude and out of touch interpretation of science at that point in time. Although largely praised as a means of describing the universe, the film contains critical errors, which suggest that the Eames' desire to communicate and over-simplify encouraged them to hold on to an outdated, Newtonian model of the universe. For example, the frames of view that the animators used to step us through a journey to outer space manipulate the size of the Earth incorrectly in order to fit the planet snugly within the frame. Stars are shown as fixed points in the sky despite the high speed with which they move away from Earth, a decision that suggests that the Eames wanted to retain a static model of the universe in order to allow them to overlay the constellations as seen from Earth. While the film admits its lack of knowledge of the microscopic, it wasn't up to date with scientific discussion when it extended the journey from outer space into the inner space of a man's hand. In particular, the use of spheres to represent subatomic particles - which quantum theory had by that time encouraged us to understand as both waves and particles - suggests the Eames' overwhelming desire to unify the universe in an illustration that could be understood by the human eye. Although subtle errors, they can be interpreted as symptoms of architecture's detachment from science, while the Newtonian physical connections that constrain the science within the film can be associated with the office's use of materials as component elements in the construction of larger buildings. The Office of Charles and Ray Eames is recognised as introducing the process of using pre-fabricated steel components to construct buildings in order to further integrate architecture with engineering, a method which now underpins the construction industry at all levels (Steele 1998:19). Architecture's divorce from science has been furthered by the Eames' work, through their fascination for communicating the effects of science in supporting ideas, and the confusion between knowledge and rhetoric that has affected how architecture is seen as fit to research contemporary scientific knowledge.

In closing his analysis of post-modernism Jameson describes the conditions that place Cartesian systems under massive stress for use in any cultural activity. Jameson suggests that "space-postmodern hyperspace has finally succeeded in transcending the capacities of the individual human body to locate itself, to organize its immediate surroundings perceptually, and cognitively to map its position in a mappable external world" (Jameson 1991:44). Maps have become redundant in their existing form and he references the work of physicist Heisenberg who developed the post-Newtonian 'Uncertainty Principle' as an indicator of their limitations to provide truths (Jameson 1991:52). Despite these conditions in which Cartesian systems are at breaking point, the tools and methods of architectural

practice remains entirely based on Descartes' coordinate system. Although the context of an actual building site and the laying of bricks may not require a more complex model of physics, digital space and its mathematical constitution is absolutely where architects should be able to exercise post-Cartesian design. The lasting role that Jameson finds for the future of maps beyond the Cartesian coordinate system, is in providing a spatial framework for an individual's sense of place, and the potential of a cognitive map. Although not clear, it aspires to the "invention and projection of a global cognitive mapping, on a social as well as a spatial scale." (Jameson 1991:54). Published pre-internet, the social priority in Jameson's role for post-Cartesian maps is a profound indicator of how he supports architecture in developing a more sustainable method for its relationship with science.

Science isn't immune to flaws in its own method and on many occasions technological determinism has limited scientific inquiry. Reflecting upon the intellectual and financial investment that was poured into Artificial Intelligence (AI) it is possible to identify how the assertion of a 'linear' model of experience caused the scientific field to falter. Even more relevant to architecture's disposition is how AI recovered itself through the use of organic models and non-linear models.

In the 1960s, the Artificial Intelligence (AI) project set out to emulate human activity in order to suggest how the brain might work. Using machines that were developed primarily for military purposes in the Second World War, the project looked to the processing potential of early computer technology to simulate the complexity of the brain and its connected actions (Gere 2002:55). The technological determinism that became attached to the programme of wanting to build a simulation of intelligence affected the commitment to using particular computational approaches, and consequently suppressed any technological diversity within the field.

In the early 1970s, a series of technologies were published as approaches for enabling Artificial Intelligence. Most notably, Roger Schank developed 'scripts' and Marvin Minsky 'frames'. Both were methods for the representation of knowledge that could be translated into logic for computer systems (Dennett 1984:144). While Minsky's frames enabled the recognition of artefacts by detailing an object's attributes, Schank's method of scripts addressed experiences and journeys, and therefore involved time. Scripts can be understood as conceptual units that describe a causally-related sequence of events with which we have become familiar. The classic example for both development and demonstrating success, would be if a robot could follow the events that occurred in

ordering food in a restaurant (Penrose 1989:18). Described as a script with cause and effect embedded within its linear narrative, computer programmers set about developing systems that could anticipate every step in the process. Unquestioned at the time but destined to cause the first AI project to falter, Schank's scripts were constructed around the linear progression of time and an absolute faith in the algorithm. Penrose describes how the determinism of 'hard AI' to ignore the "physical embodiment of the algorithm" generates a Cartesian 'dualism' that leaves the algorithm with "some kind of disembodied existence" (Penrose 1989:21). The weight of the linear methodology and the 'dualism' made computers operate in a systematic way that meant they were unable to learn for themselves, a serious defect for a system that is supposed to mirror human behaviour (Dennett 1984:145). Suchman compounded the critique of scripts, (plans as she described them), by highlighting their isolation from the social and environmental contexts in which we negotiate actions. By detailing the improvised nature of our relationship that emerges with objects and circumstances according to each situation we encounter, Suchman described the flaws in AI's use of stable objective plans.

"Our imagined projections and our retrospective reconstructions are the principal means by which we catch hold of situated action and reason about it, while situated action itself, in contrast, is essentially transparent to us as actors. The planning model, however, takes over our common-sense preoccupation with the anticipation of action, and the review of its outcomes, and attempts to systematize that reasoning as a model for action itself, while ignoring the actual stuff, the situated action, which is the reasoning's object." (Suchman 1987:39)

Artificial Intelligence recovered its research method by investigating previous avenues that it had suppressed in its determination to see quick results that apparently mirrored human behaviour (Pepperell and Punt 2000:76). This centred on neural networks, which are open ended and associated with an analysis of how natural systems work rather than how they look. This research was redeveloped and applied with more powerful computers, and was successful as a means of generating knowledge-based systems by exploration, rather than definition (De Landa 1996:186). This critical reflection upon the 'nature' of the field is useful for digital architecture in identifying the nature of the technological solutions that may address its deficiencies. Whilst Chu and Frazer use AI procedures to develop forms and structures, this does not mean that they understand the 'nature' of architecture. A reflexive analysis of architecture would involve all aspects of its social, physical and technological processes. Suchman's work in 'situating actions' led to the association of digital systems with social and environmental contexts, and forged a critical link between Human Computer Interaction and sociology (Dourish 2001:122). From looking at AI's

sustained use of 'complex' and 'natural' systems and the acceptance of socio-environmental factors in its research, we can see how digital architecture would benefit from reflecting upon its professional and theoretical practice in order to identify the ingredients of a social technology.

*This section has demonstrated architecture's loss of critical relations with the scientific community during the 1960s and 1970s, and the modernist adherence to Newtonian physics. It has also indicated how the discipline has been compromised by the success of its methods for design and construction, which are based upon Cartesian models. The inertia behind the management and construction techniques developed during modernity is not to be underestimated. In 2006, many architects are not required to manage the buildings that they have designed, and large construction companies are employed to administer the job according to economic schedules. The lack of deep involvement within science and engineering is being recovered through new architectural practices, but the lack of a sustained understanding of integrated models of time and space that occurred through the development of technologies up to the present day has left contemporary digital architects with a legacy of tools that hinder their ability to develop more complex digital experiences.*

#### **2.4 Human Geography and the Recovery of a Social Space.**

*This section will describe the theoretical discussions that emerged as the Fordist economies for time and space began to fail at the end of the 1960s and early 1970s. As producers sought more flexible models for production, the Cartesian frameworks that underpinned previous manufacturing processes began to be distorted and a compression of time / space occurred to find new, flexible forms of accumulating wealth. Against the backdrop of a series of cultural, political and industrial changes Human Geographers developed ideas that demonstrate the beginnings of a collapse of time and space as understood as discrete concepts, and introduced the 'human' as a core constituent of understanding experience. These concepts are presented to illustrate the shifts in understanding towards a social relational model for 'experience' that occurred while architecture was concentrating upon recovering itself through the 'look' of its buildings, which remained built upon Cartesian systems. The author will later propose that the social*

*priority that emerges within human geography offers digital architecture an opportunity for developing a sustainable post-Cartesian method.*

During the 1970s, Torsten Hägerstrand, professor in the Department of Social and Economic Geography at Sweden's Lund University, developed his model for Time-Geography that would allow geographers a means of examining the spatial and temporal coordinates of people as they moved through their day. By bringing together time and space within a *space-time path* he constructed studies of social activity across towns, using maps that were intimately linked to schedules (Parkes and Thrift 1980:243). A simple solution to the Cartesian separation, and one that was indicative of a desire to place human activity within a single place of experience, Hägerstrand's models remained highly calibrated perspectives. Time and space were not integrated but remained charted against each other.

At a similar time, Pierre Bourdieu began constructing a people-centred model for the social construction of time and space known as Habitus, which focuses upon the human interrelations within communities. Habitus provides us with a model for the close relationship between a community and a space. Bourdieu proposed that any valid perception of a spatial context has to be derived by being part of it (Bourdieu 1977:81). He used the Algerian village of Kabyle to document and demonstrate the close tensions between the performances, behaviours and habits of occupants and how these constituted a 'cosmology' of the place. This cosmology could then be understood as an algorithm that distinguished a particular perception of a place from other environments. However, his methodological use of Time-Geographic methods to record activities in the village, despite its inter-relational model for the experience of time and place, has been criticised for its reliance upon the Cartesian systems embedded within the Time-Geography approaches. Michel de Certeau, in his critique of Habitus, cites these strategies as the means that Bourdieu employs to support his "logic of practice" and finds what he calls "an economy of a proper place" (1984:55 (the practice of everyday life)). This 'economy' for Certeau is too contrived and, as he suggests, may well fall apart when applied to the more technocratic spaces of today rather than small villages in France and North Africa 40 years ago. Nevertheless, the Habitus established a framework for exploring the ties between body, actions and society. It looked at how they become complicit and intrinsically linked with our perception of spaces.



Certeau's *'The practice of everyday things'* (1984), constitutes social activity within an integrated framework of experience. His investigation into how the human subject responds to societal formations does so with a bound model for time and space. Certeau's text on 'railway navigation and incarceration' for example, is useful in understanding the nature of our sociological attachment to a place. He positions the reader in an unfamiliar place in which our relation to an environment is touristic and detached. From the glass of the train and the rails that keep us on course (but away from directly engaging with what we see), he depicts the unusual detachment that we have with spaces, and he contrasts this with the experience of walking through a town or city. On returning from our travels, Certeau describes our return to the workplace, and highlights the intense social and spatial intercourse that informs our relationship with, and perception of, a place.

"Everyone goes back to work at the place he has been given, in the office or the workshop. The incarceration-vacation is over. For the beautiful abstraction of the prison are substituted the compromises, opacities and dependencies of a workplace. Hand-to-hand combat begins again with a reality that dislodges the spectator without rails or window-panes. There comes to an end the Robinson Crusoe adventure of the travelling noble soul that could believe itself intact because it was surrounded by glass and iron." (de Certeau 1988:114)

Certeau was excited by the transgressions that occur as we choose to walk through cities, and explores our relationship with spaces and how their powers shift due to perspective and action. Walking becomes an 'enunciation' (de Certeau 1988:98) through which we are able to express our place in the hustle and bustle of the city matrix - economic, political, structural and physical (de Certeau 1988:94). These are dialogues that are expressed in actions with familiar and unfamiliar places, and form part of the rich grammar that we have for understanding places.

Henri Lefebvre - whose translation of 'The Production of Space' was published in 1991 - was highly critical of any analysis of space which is constructed upon the Cartesian separation of thinking and doing, time and space, or the natural and the human worlds. Through his texts, Lefebvre offers an open model which allows us to apply gravities toward issues that are found in many writings upon space, but never to separate them from one another (Shields 1991:51). His framework of critical connections is derived from a perspective in which space is a 'produced' phenomenon and any aspect of its form cannot be analysed without being understood how it is 'produced' and the conditions that enable it. Although complex and highly contingent, Lefebvre offers a threefold dialectic that allows him to locate and extend spatial experiences; 1. spatial practices, 2. representations

of space, and 3. spaces of representation. The three areas embrace many parallel writings upon space such as Bourdieu and Certeau, which prioritise specific concerns of spatial practice, but Lefebvre allows the three areas to breathe and overlap with each other in order to prevent any one from being seen in isolation from writers such as Thrift who concentrates upon representations of space.

Both Bourdieu's Habitus and Certeau's 'flaneur' approach to walking the city can be understood by Lefebvre's reference to the 'spatial practices' of human activity, and they extend an understanding of the performances and routines that constitute our perception of environments. Within Lefebvre's bracket of spatial practices we can understand how environments are complicit in the apparent 'routines' performed by shoppers, tourists and skateboarders, for example, and how places are constituted by these activities. In addition, the planning and design of buildings and spaces wholeheartedly directs their existence towards perpetuating particular activities to ensure their own survival within a landscape (Shields 1991:53).

Representations of space are described by Shields as the abstract "codes, theories, and the conceptual depictions of space linked to production relations" and can be understood to be the detached by-products of the machinations of both industry and academia. These include maps, plans, coordinates, diagrams, and any interpretation of space to a quantitative and constructed level that remains abstract. Lefebvre illustrates the concept further as he describes the spaces to be 'not-yet social' (1991:190) and cites the starting point for many schemas - 'the empty space' - as a flawed model for 'determinants' such as social components; young people, old people, women, businessmen to be explored within. These contrived interpretations of spaces are loaded with a cartographer's intentions in order to promote a particular model of an environment.

'Maps are typically totalizing, usually two-dimensional, Cartesian, and very undialectical devices with which it is possible to propound any mixture of extraordinary insights and monstrous lies.'  
(Harvey 1996:4)

The last component in Lefebvre's dialectic is 'spaces of representation', which embodies the complexity for the subject of space that has emerged through the critical texts of many contemporary writers. Space is no longer a given concept that can be measured and objectified, but it exists in a constant tension between production and perception. The city and its occupants are not able to reflect and act upon themselves to retain a persistent view of space. There remains a relational dynamic between social, physical, intimate,

economical and cultural attributes. This is a dynamic which is becoming more and more complex and relational as digital technology increasingly complements the relationship between its constituent parts with the communications that mediate our traditional association with spaces. Bluetooth technologies embedded within posters that send us files as we walk past, satellite navigation maps that people study as people drive through actual towns, and the imminent launch of Skype's mobile phone that uses WiFi signals to provide us with free telephone calls are some examples.

These dynamics are constituted by the language of spaces, the images and symbols that construct and persuade us of different values, narratives and systems for operating within a space. Shields uses the world's largest shopping mall; West Edmonton Mall in Alberta, Canada, as a figure for exemplifying Lefebvre's model for a space that is substantiated through signs and images (Shields 1991:55). With over 800 stores, 110 places to eat and an amusement park, the place becomes dislocated from local geography and open to a global vocabulary of contradictions. The Mall becomes an environment in which a production of new spaces through leisure and consumerism occurs. Shields describes the consumption of dislocated symbolic notions as a catalyst for an 'alternative cosmology' (Shields 1991 p. 55) within which the users can 'play' and distance themselves from the abstract powers and machinations of ordinary life. Shields remains highly critical of the mall as a form of space, but uses it to recognise how the values and logics for space can be disrupted, and how Lefebvre's 'spaces of representation' impacts upon our perception of space and our spatial practices. For Lefebvre, the state of being within which we are subject to the images and symbols that construct our lifestyles, and inform the manner in which we produce models of space, remains a priority for understanding our social motives. It is the 'spaces of representation' that remain closest to our individual aspirations for change and direction (Lefebvre 1991:39), but which also contains a contingency for the transgressions that often describe spaces' notions of legitimacy through their illegality. These holes in the 'net' of space where transgressions turn into 'détournements', diversions and alternatives to the dominant social order are exciting opportunities where new forms of spatial production may emerge to contest the controlling powers.

"The bourgeoisie and the capitalist system thus experience great difficulty in mastering what is at once their product and the tool of their mastery, namely space. They find themselves unable to reduce practice (the practicosensory realm, the body, socio-spatial practice) to their abstract space, and hence new, spatial, contradictions arise and make themselves felt. Might not the spatial chaos engendered by capitalism, despite the power and rationality of the state, turn out to be the system's Achilles' heel?" (Lefebvre 1991:63)

From city ghettos to peer-to-peer music exchange networks, the make-up of spatial compositions becomes reconfigured (Rheingold 2002:82). There emerges the potential to offer productions of space which extend spatial practices, representations of space, and spatial representations. Lefebvre's anti-Cartesian thesis establishes a complex and inter-relational framework for experience in which space and time are no longer separated.

As the subject of experience becomes integrated, writing also becomes highly critical of the social experiences that perpetuate a split time and space model for their own benefit. Barbara Adam explores the impact of the co-modification of time, 'clocktime', upon the human condition (Adam 1995:52). In particular she looked at children and how the school day has become a template for professional life, which represents a critical interface into industrialised society. Through written and spoken evidence she describes the crisis between 'personal time' and 'clock time'. A crisis that places stress upon our bodies in physical and psychological forms as many of us sustain a lifestyle that balances an adherence to the clock and other constructed forms of temporality, with a biological and social form of time that can be as equally demanding (Adam 1995:61). Paul Ricœur uses St. Augustine's struggle with The Bible's grand narrative and his own apparently insignificant time frame, to extend an inquiry into the tensions between 'time of the world' and 'time of the soul' (Ricœur, 1984:25). These complex and simultaneous models for time that we are apparently seen to be holding, present a multiplicity of times (Nowotny 1994:19) that is not always easy to reconcile. Although discussing time, these three texts present a critical challenge to industries and other elements of society are built upon a Cartesian model for experience.

*This section has illustrated the field of human geography, which developed primary texts for the social production of space following the demise of the Fordist culture. Inverting the formerly 'physical landscape' dominant model of geography, the proponents of the field use the human subject as a framework with which to understand how 'space' and 'time' are experienced and produced. Many of the inquiries involve a critique of Cartesian systems as a frame of reference for understanding our experience of space, and instead construct far more complex and relational 'people-space-time' methods. The methods demonstrate what can be understood as post-Cartesian qualities that have been more recently integrated into architectural discourse. The next section will look at the opportunity that the rise in a social priority for space offers for architecture, and how this offers a framework through which it can recover its digital agenda.*

## **2.5 Post-Cartesian Social Methods Emerge in Architecture**

*This section will use the momentum that human geography offers through its highly social perspectives upon the experience and production of space, to construct a context in which digital architecture can re-address its aims and methods. The section looks at particular theoretical and methodological architectural practices that emerged as cyberspace matured into the domestic and industrial form that it takes now. It will identify the social priorities within the methodologies and use them to suggest that the use of certain social technologies offers an opportunity to recover the aims of digital architecture.*

“Then we have computer science. It is true that software cannot exercise its powers of lightness except through the weight of hardware. But it is the software that gives the orders, acting on the outside world and on machines that exist only as functions of software and evolve so that they can work out ever more complex programs. The second industrial revolution, unlike the first, does not present us with such crushing images as rolling mills and molten steel, but with "bits" in a flow of information traveling along circuits in the form of electronic impulses. The iron machines still exist, but they obey the orders of weightless bits.” (Calvino 1988:8)

Following architecture's distancing from science, its methods have remained in some form of crisis demanding questions such as 'what is architecture?' and 'what's the matter with architecture?' (Gunkel 2001:73). Gunkel finds relief from these questions in the work of Ben Nicholson, who trained as an architect in the 1970s but failed to obtain the professional qualifications. When the internet emerged as a social, technological, commercial medium Nicholson identified the term architect as being used in a whole new context - one that extended the practice of people who 'make and organise space that anyone can enter' (Nicholson 1999:79) in the actual world, to those that do the same for people in the virtual. Comparing our experience with navigating through actual buildings to that of digital websites, Nicholson constructs an opportunity for architecture to rethink its methodological practices. "The hyper-visitor has just crashed architecture's party, to un-tech the well manicured, encyclopaedic nature of experience" (Nicholson 1999:79). Referencing the non-teleological form of the internet where "time forward, backward and time around are given value", (Nicholson 1999:79) he constructs a context for architecture to reconsider how it has become a victim of its own methods.



His position is best understood by Loaf House, his design for a dwelling in Chicago. Although it began as a proposal for an actual building, it ended up being entirely virtual. Nicholson's journey through a design phase and analysis of the function of the building led him further and further away from understanding his job as someone who should specify bricks and mortar, but to someone who should specify an enclosure that "permits one to occupy space, engage in various relationships and generally enjoy the view" (Gunkel 2001:79). In dematerialising the building, he pushed the concept of what it is to be an architect to a limit at which the material that is used to define the practice dissolves to leave a critical practice.

Nicholson's method is useful because while the majority of established writers and designers who defined digital architecture in 1995 extended architectural practice into cyberspace through surface, form, genetic design, function and image (see definitions of practice at end of section 1.1, chapter 1), he steps outside of the architectural continuum that has perpetuated a Cartesian method and proposes something radically different, but which remains as architecture. Gunkel uses Nicholson's 'blasphemy' (Gunkel 2001:77) in opposing the materiality of architecture as a means of describing the discipline's crisis in dealing with digital architecture. "What's the matter with architecture, therefore, is that it both resists its self-dematerialisation into the digital bits of cyberspace and is, at the same time, unable to solidify its dedication to materiality in opposition to such dissolution." (Gunkel 2001:83). Nicholson, who appears in the final 'Architects in Cyberspace' edition, *Reflexive Architecture*, uses a runner bean as a metaphor to unpick architecture's Cartesian dilemma. The runner bean's reproductive potential, and connection to currency and measurement, represents a reconciliation of Cartesian duality through its embodiment of 'measure and chaos' (Nicholson 2002:13). Used in the context of contemporary digital architecture, Nicholson suggests that the metaphorical digestion of the bean which terrified Pythagoreans because of the bean's miniature image of life (when dissected and looked at closely they appear to have human reproductive organs), would allow the field to move on from trying to retain the dichotomy between material practice and de-material theory, and social dynamics as an index of the organism. "Architecture is ready to make a place that is beyond measure and materiality, where anthropocentricity gets cracked once and for all time, severing the corporeal shackle." (Nicholson 2002:13).

Nicholson's architecture returns the focus of Digital Architectural method to the experiences that it generates for the navigator and the manner in which temporal and spatial conditions change.

“The clicker, a spatial guerrilla, has invented a new realm that is alert and receptive to a different sort of beauty from one we have held dear for decades. When a clicker visits the Parthenon, Elgin’s Marbles are cut from London and effortlessly pasted to Athens; and should a story of each stone figure be called for, its frame will be clicked for content. In 1911, when the world witnessed Picasso’s Cubist painting, it could not go back to what it used to know. Today, clickers experience the same predicament, only this time the necessity for the builder’s trowel to be the sole renderer of architectural space is being outstared and someone’s about to blink.” (Nicholson 1999:79)

Although not explicitly social, he diminishes the architectural struggle with Cartesian systems and allows a digital practice to develop that isn’t defined by the construction of things that look like architecture. Nicholson’s approach exposes the inhuman application of Descartes’ coordinate systems and provides an opportunity for a digital architecture to emerge that integrates human agency into the definition of spaces. Nicholson’s perspective relies on a model of the internet that is associated with its domestic and industrial form and function at the end of the 90s, and not the science fiction vision that many of the other Architects in Cyberspace began with. In critiquing utopian visions of the internet, Gurak reminds us of the William Gibson supposition that we can “separate our ‘minds’ from our social and emotional states [and that this] encourages the worst kind of Cartesian thinking and detracts from our responsibility to learn how to live together in a diverse, complex democracy.” (Gurak 1997:2). Identifying the aspirations of early authors who wrote about the potential for virtual reality to split body from mind, Gurak reminds us how crude many early visions of the internet were; visions that informed the early work of digital architects.

Equally mature for its time was Mitchell’s City of Bits published in 1996, which allowed many people connected to planning and design to understand how the internet would transform their methodologies (Mitchell 2002:230). As well as describing it as ‘anti-spatial’ and ‘negating geometry’ (Mitchell 1996:8) he also depicts it as highly social in constitution.

“The online environments of the future will increasingly resemble traditional cities in their variety of distinct places, in the extent and complexity of the ‘street networks’ and ‘transportation systems’ linking these places, in their capacity to engage our sense, and in their social and cultural richness.” (Mitchell 1996:121)

Despite being heavily loaded with a historicism for the planners’ project, his objectives for designers are to have them turn to computer code and the use of software to create virtual

architectures. He envisages that these places could form the frameworks within which social relations and economic transactions can take place (Mitchell 1996:160). Mitchell's 'down to earth' (Spiller 2002:213) description of cyberspace, without the science fiction, envisages digital architectures that retain a dialogue with actual space while reinventing their methods.

"We are entering an era of electronically extended bodies living at the intersection points of the physical and virtual worlds, of occupation and through telepresence as well as through physical presence, of mutant architectural forms that emerge from the telecommunications-induced fragmentation and recombination's of traditional architectural types, and of new, soft cities that parallel, complement, and sometimes compete with our existing urban concentrations or brick, concrete, and steel." (Mitchell 1996:167)

Ten years later in 2006, the experience of the internet is different to the one widely imagined in the early 90s. Whilst it isn't a Gibsonesque virtual reality, aspects of Mitchell's soft cities are clearly identifiable in peer-to-peer and socially constituted systems such as eBay, Del.icio.us and MySpace. All of these bind together activities and relations within digital space and are architectural in their social and systematic construction. They echo many of Mitchell's visions of cyberspace but contain little 'material' spatial qualities. Rheingold's interest in the transformation of how we understand the internet over the past 10 years includes a recognition that the spatial model of community has transformed. Citing Wellman, who claims that "we find community in networks, not groups" (Wellman 2001:227), Rheingold depicts a contemporary image of the internet that has developed socially not spatially, and the use of mobile technologies will only compound this (Rheingold 2002:57). Operating as an anti-thesis to the Gibson premise that cyberspace would be found in a virtual space on the networked hard-disks of computers, Rheingold highlights the apparent inversion that it has occurred in the "mesh of sensors and computing devices that are increasingly embedded in the environment" (Rheingold 2002:82).

"In the early 1990s, the visions of 'virtual reality' modelled a world where humans would explore artificial universes that would exist inside computers. Less widely reported were even wilder speculations of a world of the early twenty-first century where the computers would be built into reality, instead of the other way around." (Rheingold 2002:82)

Rheingold's cyberspace is defined and substantiated through the social activities implicit in the communications and services available. Through the loss of momentum for a virtual spatial cyberspace there has been a growth in social systems like peer-to-peer networking,

distributed shopping and the new generation of personal publishing (blogging, podcasting, MySpace). We can also see how Nicholson's de-materialisation of architecture has occurred when sites such as MySpace retain a spatial nomenclature but use no images or forms.

Shields further undermines the technology of the virtual reality systems developed during the 1980s and 1990s (and which informed the tools of digital architecture), by arguing that they provided a simulation of 'material' reality in order to understand how better to control it (Shields 2003:47), rather than any motive to de-materialise it. Ten years ago, when *Architects in Cyberspace* was published, Gibson's image of the internet provided a spatial framework in which designers could extend Cartesian tools to generate spaces, forms and surfaces. But as the technology leaned toward social priorities we can see how designers such as Dunne and Raby disassociated themselves with screen-based, three-dimensional practice, to concentrate upon augmented systems that used actual space, and which relied upon social and personal interactions. Classified as Interactive Architecture, we have seen that, as a discipline, it remains in the 'threshold' between virtual and actual space. Nicholson's de-material design space, and Rheingold's social networks offer a new critical opportunity within which digital architecture can recover itself. Avoiding the visual-spatial *a priori* for understanding cyberspace that coupled so many architects to Cartesian systems, it is possible to envisage a method for the field that uses social technologies to define architectural spaces.

*This section has demonstrated that architecture was understood to be in crisis regarding its resistance to 'self-dematerialise' its practice while aspiring to theorise about architecture beyond its material form. It introduced the work of Nicholson, who provided evidence of a commitment to a 'de-material' architectural practice. It also demonstrated how cyberspace is now being considered as a social construct and not a spatial one, and that Nicholson's method presents an opportunity for digital architecture to recover itself through the use of social systems instead of Cartesian ones.*

*This chapter as a whole has demonstrated how architecture developed a crisis in its determined use of Cartesian systems. Section one identified how the split time and space model emerged and led to Descartes' coordinate system, which was adopted by architecture. Section two looked at how architecture had capitalised upon this model to develop modern methods and how they've become embedded, not only in the design method but also in the production schedule of creating buildings. Section three discussed*

*how the global manufacturing and production models changed to more flexible forms of accumulation and how these post-modern developments questioned architecture's relationship with science. Post-modern architecture was used to highlight how aesthetic concerns became a priority within architectural method, and yet it was unable to advance the Cartesian methods that remain in design and construction due to its critical divorce from science. The pattern of events that left architecture with no post-Cartesian tools with which to approach cyberspace was compared with the AI project that faltered due to a similar technological determination. Section four introduced the field of human geography, which by the 1970s had shifted its focus away from physical space to social space, as it became increasingly critical of Cartesian ways of conceiving of time and space. The theoretical investigations prioritise the social and relational production of space over a Cartesian one in which time and space are separated. Section five uses the social component as an opportunity for digital architecture to recover a method that allows it to de-materialise its Cartesian structural and physical language while retaining a critical dialogue with space. The next chapter will introduce the social computing technologies that the author considers appropriate in supporting a method for a social digital architecture.*

### **3.0 Recovering Digital Architecture**

*This chapter provides research and technical methods towards a recovery for digital architecture. It has been argued that the primary failing of digital architecture is the lack of tools it has to allow it to engage practically with its own theoretical depth and embrace socially constructed forms of experience. Within contemporary forms of computing we can find social processes that provide the appropriate means of supporting a digital architecture that integrates a social dynamic into its practice.*

#### **3.1 Social Cyberspace**

*This section will demonstrate architecture's close relationship with social concepts, and uses Bill Hillier's work in *Space Syntax* to describe how they are limited due to the constraints of physical time. It will use Manuel Castells' articulation of the *Networked Society* in establishing the internet's social make-up as a new form of material, which is similar to the de-material processes that the previous chapter suggested were required by digital architecture. Social navigation is introduced as a *Human Computer Interaction* concept that has parallels with the socio-spatial dynamic between architecture and society in Hillier's work. From this comparison it is proposed that social navigation may hold the key to a recovery for digital architecture, as it exhibits the qualities of Castells' 'social material' while being highly temporally dynamic.*

At the end of the last chapter it was demonstrated how the internet had not materialised as a spatially dimensional phenomenon and that the largely unforeseen social characteristics had been overlooked by the early 'Architects in Cyberspace'. Initiated upon the 'tabula rasa' of cyberspace, digital architecture became associated with the rhetoric of an alternative reality that never emerged (McCullough 2004:10). However, while architecture returned to find familiarity in the physical computing systems described as *Interactive Architecture*, the internet has adapted according to what it was good at; being a distributed community. Peer to peer computing, the rise of instant messaging, voice-over-IP phone services and collaborative web services have all contributed to a socially driven agenda for



that internet that is now being re-branded as Web 2.0<sup>4</sup>. In order to understand how architecture could incorporate this shift in focusing on social systems it is important to look at why architecture hasn't already associated itself with them.

Although often hard to identify, the social agenda for architecture is implicit in its practice, as Hillier identifies in his introduction to *The Social Logic of Space* (1984). Associating 'social' with the "decoration, embellishments, or even modifications of shape" (Hillier and Hanson 1984:1) he complements the practical purpose of design with the further capacity to affect culture:

"Invariably, artefacts are both functional and meaningful. Insofar as they are the first, they are of practical use; insofar as they are the second, they are of primarily social use, in that they become a means by which cultural identities are known and perpetuated." (Hillier and Hanson 1984:1).

Interested specifically in how architecture is arranged to support good social practices, Hillier binds the task of 'ordering space' in buildings to the 'ordering of relations between people'. However Hillier identifies a further architectural problem to that of materiality; namely, that while its impact upon people is rather obvious, it's very hard for architectural theorists to talk about the "sociology of buildings". Describing this as a "permanent disability", he suggests that it is easier for architecture to talk about styles and appearances than to "manufacture a socially relevant discourse out of these surface properties" (Hillier and Hanson 1984:2). Consequently architecture, while aware that it is highly relational in its effect upon people, concentrates on what it is trained to discuss; the plan and the look of buildings once they are constructed. This associates Hillier's 'disability' with the central concept of limited models of time within architecture. That is, the design and construction of buildings is separate from its audience until its doors are opened, and the subsequent publication of analyses of a space that occurs through images and through words (Hillier and Hanson 1984:3). For Hillier, the experience of a building is a four-dimensional relational system that is subject to change according to social and environmental conditions. Neither the design and building stage, nor the publication of architectural texts are able to support a relational, time-based context for understanding the social complexity of an architecture.

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<sup>4</sup> Web2.0 refers to the second generation of internet technologies and systems that allow people to collaborate and share information. Systems such as wikis, recommendation sites and social networking services all offer technical mechanisms that allow shared authorship and indexing. These qualities are understood to be intrinsically different to the Web1.0 model which was based on publishing and not sharing.

Digital architecture is located by definition within networked spaces in which linearity and limited dimensions are only the traces of a legacy of older media such as print. In the distributed and asynchronous space of the internet, digital architecture has a context in which a relationship between 'form' and 'social' can be entwined.

"Localities become disembodied from their cultural, historical, geographical meaning, and reintegrated into functional networks, or into image collages, inducing a *space of flows* that substitutes for the space of places. Time is erased in the new communication system when past, present and future can be programmed to interact with each other in the same message." (Castells 1996:406).

Castells chastises architecture and describes it as a "failed act" since it has been incapable of a "mediated expression of the deeper tendencies of society" (Castells 1996:448). He uses human geography to support his 'space of flows' model, which is derived from post-modern conditions and the rise of the network centred society. Castells identifies a change in the social production of space in which "we may be heading toward life in parallel universes whose times cannot meet because they are warped into different dimensions of a social hyperspace" (Castells 1996:448). This 'schizophrenic' condition is similar to that of the difference between digital architecture's original interpretation of cyberspace (William Gibson's parallel world that has subsequently been depicted through cinema and virtual reality spaces) and that which has emerged as the highly social form of the internet in which websites now rarely use spatial metaphors. While deeply concerned about the split models of space that are emerging he finds an opportunity for reconciliation in the distributed nature of the network that allows itself to support new social structures:

"Since networks are multiple, the inter-operating codes and switches between networks become the fundamental sources in shaping, guiding, and misguiding societies. The convergence of social evolution and information technologies has created a new material basis for the performance of activities throughout the social structure. This material basis, built in networks, earmarks dominant social processes, thus shaping social structure itself." (Castells 1996:502)

Castells' new social 'material' provides the opportunity for digital architecture to overcome Hillier's 'disability' and offers mainstream architecture methods for embracing a social complicity. In addition, conceiving the social network as a material is similar to Nicholson's de-material approach to architecture, but in addition, it retains the ability to still create places, which Nicholson could only do through theory.

What then, are the technologies available for digital architecture to construct a 'social material'? Of the many approaches to developing contemporary Web 2.0 technologies that profess to be social networking services, a specific similarity to that of architecture and its socio-spatial dynamic can be found in the field of social navigation. Introduced in 1994 by Dourish and Chalmers, this term was conceived as a way of delineating between the types of navigation that can be found on the internet; social, spatial and semantic (Dourish and Chalmers, 1994). Identified at a point when the internet had yet to emerge as a "consensual hallucination" or as a semantic web<sup>5</sup>, the subsequent development of social navigation systems has survived while virtual reality has struggled. Originally described as "navigation towards a cluster of people" or "navigation because other people have looked at something" (Höök et al 2003:4) it has since broadened to encompass a wide variety of methods that involve social interactions across the internet.

As a specific field within Computer Human Interaction (HCI) social navigation is not concerned with the design of buildings. By definition, its attributes are closely matched to the socio-spatial dynamic that Hillier establishes within architecture. In his second book Hillier constructed a definition of society to support architecture's role in constituting it. In a complex set of relations, he proposes that society should be understood to be an abstract concept consisting of 'genetic' inter-social arrangements that are realised in space-time. By arguing that society has no material qualities, architecture becomes the materialisation of social dynamics at particular points in time.

"Although society is this dematerialised genotypical thing, the means by which it is projected through time is anything but dematerialised. On the contrary, while the material form of society at any moment of time is not that society, it is *the means by which that society is transmitted into the future.*" (Hillier and Hanson 1996:402)

Society's material expression then becomes architecture, although "buildings are not maps of interaction. They are maps of the social genotypes of human interaction." (Hillier and Hanson 1996:403). For Hillier, architecture operates as the contingent 'phenotype' for social interactions. He defines it as contingent in order to qualify its limitations across time, since all buildings are incapable of responding once built. This qualification is the

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<sup>5</sup> The Semantic Web is a project by Tim Berners-Lee to create a universal medium for information exchange. Using standardised markup languages and processing tools it makes it possible to link pieces of information together to enhance their meaning when searching for them. The Semantic Web is often described within the same context as Web2.0, with many of the contemporary applications being part of the transition to a full Semantic Web.

critical difference from the modernist programme for an architecture that assumes the role of providing permanent 'phenotypes' for society (Hillier 1996:403).

The socio-spatial dynamic that Hillier establishes is extremely similar to that of the objectives of social navigation in which the journey of the user in digital space is informed by the social environment that they find themselves in, which remains affected due to their interactions and choices.

"What emerges from this is a picture of a reflexively populated information space. By 'populated', I mean that it contains not just information, but also people who are acting on that information, and who can see the effects of each others' actions and exploit that information in managing their own activities. By reflexively populated, I mean that not only does the structure of the space have an impact on the action of the users, but the action of the users have an impact on the space." (Dourish 2003:291)

The value of social navigation in its similarity to Hillier's role of architecture, clearly lies in the socio-spatial dynamic that ties people to space in a highly relational framework (Chalmers 1999:62). Both in built architecture and social navigation "people are active participants in reshaping the space" (Höök et al 2003:8). However, it is for digital architecture that social navigation offers the most opportunity. While Hillier recognises built architecture's limitations in responding quickly to social change, the time-based nature of digital space provides digital architecture with a technical framework with which it could sustain a temporal dynamic beyond the ability of built architecture. Consequently social navigation appears to represent a form of Castells' 'social-material' which is based upon post-Cartesian understandings of space. This capitalises upon the qualities of digital space without having to become an 'interactive architecture' that remains in actual space.

*This section established the social complicity that is embedded within architectural practice, and the discipline's dilemma in only being able to respond to society in a limited model of time. Hillier's work was introduced to demonstrate how social practices and architectural design are closely bound, but how built architecture is disabled from seeing through this relationship in the form of analysis because actual buildings are slow to change. From Castells' disappointment with architecture's inability to respond to society appropriately, the concept of a 'social material' emerged through his Networked Society, which offered the ability to shape society. This abstract material offers post-Cartesian properties which, it was proposed by Castells, could support a new methodology within digital architecture. Social navigation was introduced as a field of Computer Human*

*Interaction that has similar properties to the socio-spatial dynamic that Hillier describes within architecture. The section proposed that social navigation appears to have the qualities to recover a post-Cartesian method in cyberspace for digital architecture. The next section will go into detail in describing what social navigation systems are and how they work.*

### **3.2 Social Navigation**

*This section consists of five parts that will describe the context in which social navigation emerged, and the technologies that were identified as having the properties to support its definition as a research field. Social navigation, although introduced as a concept in the mid-90s, was not consolidated until 1999 as a research field within Computer Human Interaction. Each part traces the different technologies and their attributes as they contribute to the establishment of the field and lead to the construction of a series of methods that continue to demonstrate its particular value in building socially relational spaces.*

#### **3.2.1 Emergence and Context of Social Navigation**

The term social navigation arose in 1994 in the paper entitled 'Running Out of Space: Models of Information Navigation', published by the Rank Xerox Research Park. Three forms of navigation were identified as having emerged as the internet became more populated and was used in increasingly diverse ways - spatial, semantic and social (Dourish and Chalmers, 1994). The Dourish and Chalmers paper was written at a critical stage in the development and consumption of the world wide web, when early internet service providers (ISPs) were establishing themselves. At the same time, Human Computer Interaction (HCI), which was founded upon the study of computer human relations, was undergoing increased pressure to adapt its theoretical models as computing was becoming a part of everyday life. Defined in the 1960s, when computers were large-scale specialist systems used for industrial and academic purposes, the field developed research around the basic model of a human and computer separation (Chalmers 1999:56). This binary opposition of human and computer, and the interface and processes which supported their interaction, had become far more blurred as the information age supported a society that was increasingly surrounded and immersed in new forms of data (Höök et al 2003:1).

Teletext, home computers, games consoles and video recorders had all been successfully sold to the public and had all extended the models of HCI. The shift toward 'graphic user interfaces' (GUI's) that began through researchers at Xerox PARC and informed the development of Apple's Macintosh and Microsoft's Windows operating systems greatly enhanced the usability of computers and subsequently the field of HCI became located between hardware , software and human.

As the multimedia age of the early 1990s attempted to provide home PC users with new forms of learning and entertainment, the public were ready to begin looking further than a CD-Rom for their information (Gere 2002:137). The multimedia revolution that was fuelled by hyperbole about the benefits of buying re-formatted books led to television and publishing companies opening 'multimedia' departments. However the public weren't convinced by the rhetoric and the short-lived industry failed to take off (Punt 1995:388). Despite this, the publishing industry had managed to sell a convincing model of navigating information; hypertext. The non-linear process of moving between linked pieces of information helped transformed the public psyche, as it began to crave more information in a simple and dynamic manner (Benyon et al 2005:17).

This consumption of hypertext as a model for gathering or searching for new knowledge was limited massively by the knowledge that what was on a CD-Rom was predictable based upon its subject focus. Despite the reformatted images, desktop video and the searchable texts, the products provided no new knowledge to that which was already on people's bookshelves. The internet, however, promised no limits and it delivered access to individuals and organisations who contributed to it on an exponential basis. By the end of the 90s, e-commerce, the internet economy and their related technical industries had become the centre of the US economy (Castells 1996 :151).

The internet was live and unstable and even its slowness didn't inhibit the principles of 'browsing' that spurred people on. The forms of information that society would find themselves consuming broadened as software became tailored to support the range of activities that people took part in. With access to an internet connection came an email address, making the home PC a communications system. This social presence was evident from the earliest of journeys on to the world wide web and it is this that establishes social navigation as having a credible basis for definition and investment to support users of the internet (Dourish 1999:16).



Multi-User Dungeons, or Dimensions (MUDs<sup>6</sup>) as they have become known since the social fantasy gaming framework evolved to demonstrate more broader uses, are referenced as important stepping stones in the growth of networked communications culture (Erikson and Kellogg 2003:24). Along with Collaborative Virtual Environments (CVEs<sup>7</sup>) such as Active Worlds that attempted to deliver virtual reality through the internet, these socially constituted media forms contributed toward Dourish and Chalmers' desire to differentiate between the modes of navigation that were emerging through the use of the world wide web.

In 'Running Out of Space: Models of Information Navigation', Dourish and Chalmers (1994) discuss the use of spatial metaphors and language to support users' movement through the information structures of the internet. The paper highlights three spatial models of navigation; spatial navigation, semantic navigation, and social navigation. The first, spatial navigation refers to systems for moving around that are heavily based upon mimicking the actual world through language or imagery. Virtual reality systems are an obvious example, although many systems use the grammar of space; forwards, backwards, home etc. The second category is semantic navigation and refers to a system of navigation based upon similarity and linkages between objects or subjects. There may be a spatial framework at play, but the organisation and interaction for the user is dependant upon the meaning of the objects and the underlying semantic relationship between them. The final model is social navigation, which they define as being "movement from one item to another [that] is provoked as an artefact of the activity of another or a group of others" (Dourish and Chalmers 1994:1). Dourish and Chalmers point out that much social navigation occurs between people in environments or frameworks with a significant spatial quality ie. MUDs and CVEs. However, the paper extends the definition to indicate that a great deal of social navigation can occur without any spatial framework at all. At the time Dourish and Chalmers provided the simple example of the additional links that people list on their websites to other 'favourite' or 'related' web pages. Since then, with the use of the internet having grown enormously and new forms of online experience emerging, there are now many instances of social navigation.

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<sup>6</sup> A MUD (Multi-User Dungeon or Domain or Dimension) is a multi-player online game that predominantly uses just text to interact with other players. MUDs often combined social chat with role-playing to develop and play out fantasy game scenarios.

<sup>7</sup> CVEs (Collaborative Virtual Environments) are online three dimensional virtual reality spaces where individuals and groups can socialize and work. Individuals are represented as avatars and many of the environments mirror actual spaces and are made of Euclidean building components. Many of the spaces are developed specifically for collaborative activities allowing people from distant places around the world to meet and work together.

### **3.2.2 What is Social Navigation?**

Social navigation is a term that has been expanded upon in the work of a number of HCI researchers and computer scientists. In particular the Swedish Institute of Computer Science (SICS), the Department of Computing, Napier University and the Department of Computer Science at Strathclyde University have done much to qualify and extend its meaning from its emergence in the Dourish and Chalmers paper. Social navigation finds its roots within the technologies that defined the internet and its history is complex because of the interpretation of these technologies. For Benyon, Höök and Munro the definition and development of social navigation is a broad inquiry that embraces a wide array of projects, but most importantly focuses upon the 'social' opportunities that are gained through supporting collaborative navigation methods (Höök et al 2003:5).

Collaborative relationships between users across a network emerged from a series of research projects that described the process of using people to support the activity of others as they used electronic mail systems and early forms of the internet. Two forms of social navigation were identified; direct and indirect. The former referred to live and synchronous navigation derived from a web-based social context (a virtual shopping store) in which a viewer can receive 'directions' in real-time, while the latter referred to the many systems that are asynchronous but which leave trails of navigation from previous social activity (referral or recommendation sites) (Munro et al 1999:3).

In its most basic form social navigation on the internet can be the listing of other people's pages on your website. This process of posting navigation points for others to visit according to your own interests represents an asynchronous and non-reciprocal form of navigation. Non-dynamic and updated only by the host, these links demonstrate the principle of indirect social navigation. Further developments include automated systems that follow rules according to users of sites and digital documents, their choice making procedures and building patterns that correlate with other users who may be navigating through similar information. The early development of these systems originated in filtering systems as electronic mail was the primary use of a computer network. Through the research dedicated to developing filtering systems Malone et al (1987:391) introduced the terms 'cognitive filtering', 'social filtering' and 'economic filtering', each process

highlighting different priorities that were used to sort important emails from ones that could be ignored.

*Cognitive filtering* relied upon the recipient scanning for key words within emails. If these words or terms were present then emails were tagged for interest. *Economic filtering* simply referred to the scale of the email. If the recipient was busy then the size of the email and how many people it had been posted to affected the decision whether to read, flag or ignore it. *Social filtering* prioritised the people who had sent a mail or who were on the receiver list that the recipient was interested in, and through these social signals people choose to read, flag or ignore a message. Although crude, these three models informed the development of the Information Lens System (Malone 1987:392) that sorted email into folders depending upon characteristics, defined by the user and searched for by the software. In many ways the Information Lens has informed the 'rules' that many of us still use in mail packages to filter messages into folders, and to support our assessment of the ones we'll want to read urgently, and other that are less important. Although the systems are beneficial they have their constraints, and rely heavily upon the user's ability to control the rules in order to anticipate future communications. Many errors can occur in the reading of subject lines and an enormous amount of 'spam' mail still gets through however sophisticated the filtering is. However this early use of social filtering paved the way for more complex forms that would capitalise on the nature of the network, and reinforce the 'social' aspects to directing and informing an individual's navigation through an information system. Google's free email service Gmail was launched in April 2004 and features many advanced filtering systems, some of which are specifically socially orientated. Allowing users to categorise emails through 'conversations' it is possible to group together a series of email dialogues with another person which prioritises social activity over the traditional chronological model. Gmail is spread through recommendation rather than subscription. By passing Gmail accounts on to friends, Google hopes that such a social approach will limit fake email addresses being generated, thus reducing spam.

The development of social filtering has led to the phrase 'folksonomy' to describe the collaborative taxonomy that emerges as people support the definition of particular subjects. Folksonomy is a term associated with the collaboratively constructed categorisation methods that are used in some contemporary social computing websites. Through the 'tagging' of media such as photographs on Flickr, or bookmarks on the Del.icio.us websites, the community of users collectively construct a social taxonomy for a subject.

Unlike a taxonomy that is defined by a series of editors resulting in a gated fellowship of discourse, a folksonomy is mediated by a collaborative community.

### **3.2.3 Recommender Systems and Collaborative Filtering**

In 1992 Goldberg published a paper describing the 'Tapestry' electronic mail system developed at the Xerox Palo Alto Research Park, which allowed users to receive files according to who they had been read or published by (Goldberg 1992). This simple system implemented collaborative filtering, which allowed users to tag documents with annotations that other users could filter out. This would allow them to receive documents when particular people had replied to originals that were sent to a user group. By watching what people found interesting based on what they replied to, the system demonstrated a social navigation that would inform later systems as the internet developed (Dourish 1999:17).

Commonly known as recommender systems, a series of projects began to appear in the mid-90s which provided a simple way for members of a network to affect the organisation of data according to the navigation and selections that people made after viewing it. These projects and their technologies defined the processes involved in collaborative filtering and are best understood as a component of the emergence of social navigation in computing and HCI. Research examples cited at the time included music, film, recipe, restaurant and book review sites that allowed visitors to rate content (Dourish 1999:17).

In the example of videos@bellcore.com (Hill et al 1995) the video recommender system involved 291 visitors who had rated 1750 movies. The bellcore site's audience had generated over 55,000 ratings that users submitted via email. The reviews were sorted through a series of choices that each user returned to the site; ranking a selection of 500 movies 1-10 (10 being high) and additionally marking them as 'must see', 'not interested' or 'unseen'. Once submitted, the systems 'prediction equation' is able to provide new users with a list of movies that it knows the user hasn't seen, but which have a consistent score close to the movies that they indicated an interest in.<sup>8</sup>

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<sup>8</sup> In their paper, Hill, Stead, Rosenstein and Furnas provide the following example of a return from the system:

Suggested Videos for: John A. Jamus.

This early form of social navigation was further extended through a browser to the same effect, and demonstrates a basic approach to using people's knowledge to support others who may require direction.

At a similar time a music recommender system named Ringo was developed by the MIT MediaLab. It was substantiated by over 2000 users, who contributed to a database of reviews of music and artists (Shardanand and Maes 1995). Through a basic selection process Ringo uploads people's scores and provides them with three alternative returns

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Your must-see list with predicted ratings:

- # 7.0 "Alien (1979)"
- # 6.5 "Blade Runner"
- # 6.2 "Close Encounters Of The Third Kind (1977)"

Your video categories with average ratings:

- # 6.7 "Action/Adventure"
- # 6.5 "Science Fiction/Fantasy"
- # 6.3 "Children/Family"
- # 6.0 "Mystery/Suspense"
- # 5.9 "Comedy"
- # 5.8 "Drama"

The viewing patterns of 243 viewers were consulted. Patterns of 7 viewers were found to be most similar. Correlation with target viewer:

- # 0.59 viewer-130 (unlisted@merl.com)
- # 0.55 bullert,jane r (bullert@cc.bellcore.com)
- # 0.51 jan\_arst (jan\_arst@khdld.decnet.philips.nl)
- # 0.46 Ken Cross (moose@denali.EE.CORNELL.EDU)
- # 0.42 rskt (rskt@cc.bellcore.com)
- # 0.41 kkgg (kkgg@Athena.MIT.EDU)
- # 0.41 bnn (bnn@cc.bellcore.com)

By category, their joint ratings recommend:

- # Action/Adventure:
  - # "Excalibur" 8.0, 4 viewers
  - # "Apocalypse Now" 7.2, 4 viewers
  - # "Platoon" 8.3, 3 viewers
- # Science Fiction/Fantasy:
  - # "Total Recall" 7.2, 5 viewers
- # Children/Family:
  - # "Wizard Of Oz, The" 8.5, 4 viewers
  - # "Mary Poppins" 7.7, 3 viewers
- # Mystery/Suspense:
  - # "Silence Of The Lambs, The" 9.3, 3 viewers
- # Comedy:
  - # "National Lampoon's Animal House" 7.5, 4 viewers
  - # "Driving Miss Daisy" 7.5, 4 viewers
  - # "Hannah and Her Sisters" 8.0, 3 viewers
- # Drama:
  - # "It's A Wonderful Life" 8.0, 5 viewers
  - # "Dead Poets Society" 7.0, 5 viewers
  - # "Rain Man" 7.5, 4 viewers

*(Hill Stead Rosenstein Furnas 1995 Recommending and evaluating choices in a virtual community of use, Proceedings of the SIGCHI conference on Human factors in computing systems, Denver Colorado, p.197)*

based upon how the database correlates their data with other users. A return of (1) suggest new artists/albums that the user will enjoy, (2) lists artists/albums that the user will hate, and (3) makes a prediction about a specific artist/album. As with the videos@bellcore.com example the returns guided the users according to the ratings of others and finds patterns within a user's submitted likes and dislikes. Ringo also provided access to users' reviews, which were intended to expand upon the basic number score, and thus give the user an insight into how someone else felt about the music;

"I'd rather dive into a pool of dull razor blades than listen to Yoko Ono sing. OK, I'm exaggerating. But her voice is \*awful\* She ought to put a band together with Linda McCartney. Two Beatles wives with little musical talent."  
(Shardanand and Maes 1995:214).

An entirely open system, and liable to any critical reflections, the reviews provided a very social dimension to the recommendations that videos@bellcore.com wasn't able to. (Konstan and Reidl 2003:52). This collaborative filtering system became very appealing to a wide community since it hailed itself as a socially generated system, which supported people's desire to contribute to it. This represented the antithesis to the collections of lists and histories that were being published by organisations and companies on the internet, that were edited and compiled according to their interests and the interests of profit. In particular the CD-Rom products of the age such as Microsoft's Encarta and Grolier's Encyclopaedia, all framed histories in particular ways, and demonstrated the un-dynamic move from books to CD-Roms. Since then the same products have been placed online, but they now receive more competition from wikipedias and blogs which utilise the same socially constructed principles as the early recommender systems.

Projects such as 'videos@bellcore.com' and 'ringo' paved the way for more complex forms of collaborative filtering such as the Referral Web project (Kautz et al 1997:64) and the GroupLens Research Group at the University of Minnesota who developed a research programme of the same name for the collaborative filtering of Usenet news (Konstan et al 1997). These projects all contributed to the development of social navigation through collaborative filtering and are often cited in key texts within the field.

The field of collaborative filtering within computing has continued to develop new means of correlating and mining socially derived data to construct and inform choice-making and navigation on the internet (Konstan & Reidl 2003:45). Recent projects such as the Racofi (Anderson et al 2003) music extends the correlation and similarity methods for supporting



the collaborative filtering of music types by making use of the Resource Description Framework (RDF<sup>9</sup>), Web Ontology Language (OWL<sup>10</sup>) and technologies such as XML. The framework was developed by the World Wide Web Consortium (W3C<sup>11</sup>) as a means of developing the Semantic Web project. This would allow web pages to be constituted by metadata that could describe the data in more detail and allow other systems to understand it and build links with it. Tim Berners-Lee sets out a vision of the future in which all data can be linked to support multiple tasks, enquiries and information because the meaning of data is made transparent by programming technologies (Tim Berners-Lee et al 2001). XML (Extensible Markup Language) is a general purpose language that can describe data in many different forms, and allows it to be shared across the world wide web to support the WC3 aspirations. As a consequence, it has supported the advancement of many collaborative filtering systems.

More recently in August 2005, Richard Jones and LastFM merged to launch the LastFM music player and accompanying website that uses recommender systems and collaborative filters to stream live music from global web radio stations according to a user's preferences. Typing in one band will stimulate a succession of artists to be played that are aggregated against the initial choice according to a community of subscribers. The audio player has a simple interface that allows the user to indicate that they like the track or not, and in doing so extends their music profile on the LastFM database. As time passes the system promises more and more accurate propositions that are similar to a desired music style. The system is built upon the already established AudioScrobbler technology that did much the same through a plugin to audio players. AudioScrobbler posted data to a database that documented a user's likes and dislikes and thus built user profiles based upon these choices. LastFM is incredibly successful due to its simplicity (Kahney 2003). The live stream that runs in the background allows users to passively tag music with ease. In addition the LastFM website provides a wide range of statistics for your profile and the profiles of others, allowing you to compare music interests and search across music styles. Socially navigable linking to friends or groups soon unlocks connections to relevant music.

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<sup>9</sup> Resource Description Framework (RDF) is a means of describing online data with meaning. Part of the semantic web technologies, RDF allows for more specific meanings to be associated with terms and uses a three part expression: subject-predicate-object, for example; "The sky has the colour blue" in RDF would be as a triple whose subject is "the sky", whose predicate is "has the colour", and whose object is "blue".

<sup>10</sup> Web Ontology Language (OWL) is another technology that supports the semantic web. OWL is a mark up language used for publishing and is used to attach more data to a term to qualify its meanings.

<sup>11</sup> World Wide Web Consortium (W3C) is an international consortium to develop standards for the internet. The Consortium is led by Tim Berners-Lee who originally authored HTML.

### **3.2.4 Leaving Footprints in Digital Space**

Social navigation - through recommender systems and collaborative filtering - is well suited to dealing with large amounts of contributors and provides information to support their direction and choice making. By 2005, recommender systems were present in many economic forms on the internet and contributed to the term Web2.0 that described the social emphasis of a new generation of websites. Amazon Books is a popular citation as it was quick to adopt the 'others who bought this book, also bought these...' link which made correlations between what consumers were buying and what may also interest them. By linking photographs to keywords (tags) users of the Flickr online image archive service ([www.flickr.com](http://www.flickr.com)) are able to navigate through millions of relevant images that are uploaded by individuals. By viewing one image you can quickly find a host of others associated with the tags that users commonly use. Flickr, now owned by Yahoo, has also linked 'blog', 'RSS' and 'friends' systems to the photo archive, allowing people to socialise through the tags and construct relationships through associations found within the archive.

At a similar time to the emergence of Flickr, [del.icio.us](http://del.icio.us) was released (2003). In many ways this consolidated the social navigation principles by simply allowing people to store bookmarks / favourites online and tag them so that they could be linked to other people's bookmarks. If links on homepages were the beginnings of a social navigation and recommendation system, then [del.icio.us](http://del.icio.us) is the synthesis of a networked model for a shared database of links. The critical element is the 'tag' that is attached to the page to allow people to search and find pages and, more importantly, to connect a user's own tagged subjects to others with the same tag. This simple framework supports thousands of people who are now using a user-tagged search to find relevant websites because of a social aggregate rather than a search engine which doesn't provide any user information.

The same principle operates with the 'Stumble' toolbar that users can install beneath their Firefox navigation bar. Stumble is a means of storing a list of favourite sites in a Stumble account. Upon arriving at a site a web user can choose to store it to inform an online profile by clicking the 'I like it!' button or the 'Not for me' button. These choices develop a profile of interests and characteristics based upon the sites visited. Should the user want to see similar sites they simply hit the Stumble button and Firefox takes them to a related site.

Basic in their filtering technologies and limited in recommending systems, Amazon, iTunes and Flickr are all very popular databases that utilise social navigation through forms of collaborative filtering of large amount of people and content. More specifically designed to focus upon small user groups to encourage interaction, a host of parallel technologies supported social navigation principles through the development of the internet in the 1990s but did so by using graphic interfaces. *Edit Wear* and *Read Wear* was a concept presented by Hill and Hollan in 1992 (Hill et al 1992) that was seen at the time as an extension to the Computer Supported Cooperative Work (CSCW) research that HCI was exploring as networks became more prolific and early forms of 'group ware'<sup>12</sup> were being designed. The paper discussed the implementation of *Edit Wear* and *Read Wear* upon the scroll bars of documents. In essence the system used the scroll bar as a space in which to display how much people had *edited* particular parts of a text. Manifested as coloured graphs along the height of the scroll bar, the illustrations suggest that it was easy to see where the particular sections of the document had been edited by different people as the file was passed from one person to the next. *Read Wear* did precisely the same, only it displayed the sections in which people had dwelled, who had read a section last and how often had they been read. Effectively acting as footprints of people's activity, the work was extended into *Menu Wear* and *Spreadsheet Wear*. This proposed that through the transparency of wear, or evidence of use, users could cooperate better. The authors used Schoen's Theory of Professional Activity and his proposition that people working in groups like to reflect upon a subject through studying its history before modifying it, as a theoretical context for their research (Hill et al 1992:1999) .

The evidence of others' presence, of making evident the 'patina that forms on physical objects as they are used' (Wexelblat 2003:223) that was explored in the *Read Wear* projects has been extended by Wexelblat's *Footprints* project. Wexelblat established the need for an 'interaction history' based on his experience of the black streaks left on roads and guard rails, which encouraged him to slow his car down by inferring the previous 'interactions' that other cars had with the road and rails (Wexelblat 2003:223). The historically rich nature of actual objects motivated his project to attempt to provide an 'interaction history' that could complement digital journeys, hence the name *Footprints*.

In developing the work Wexelblat introduces a theoretical framework of six elements to support the building of history-rich interfaces:

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<sup>12</sup> Groupware is software designed to facilitate the work of groups of people. This technology is often used to support the communication, cooperation, problem solving, and negotiating that occurs in organisations.

**Proxemic versus Distemic;** are urban planning and social anthropology terms to describe how users of systems 'connect' to spaces or processes, proxemic being closely connected, distemic being distant and unconnected.

**Active versus Passive;** references how much work the users have to put into generating a history of use for a system, is this an active or can it be automated process (passive).

**Rate/Form of Change;** describes the processes of documenting historical transformations, some systems are able to allow history to be researched in an intact manner, others less so and a sense of decay or concealment of the past occurs as the present writes itself over these histories.

**Degree of Permeation;** the extent to which the history of a system or object is 'visible' in the use or interpretation of it in the present. Many objects still have the evidence of their past use on them, but do not impair their present day use.

**Personal versus Social;** some histories are personal and others part social consequence, Wexelblat considers it important to manage the differences between these versions of history to support the appropriate interpretations available to a user.

**Kind of Information;** the scope of information available is potentially enormous for any interaction system, and isolating the valuable parts is important for the function of a system. Wexelblat defines the critical elements as; what, who, why and how as a means of supporting a system.

(Wexelblat 2003:226)

These elements in critical and technical tension supported the development of a series of component tools that record and visualise users' movements around websites. The data is collated and represented in a way to support other people's visits to the sites by displaying user movement through the pages, the popularity of pages and the comments that people left about the content. The three tools, that were all made to employ different aspects of the theoretical framework, measured the effectiveness of an interface with different combinations of historical data. The results from the tests demonstrated a reasonably positive response to the social support that occurred through the historical 'footprints' left behind by others. In general these footprints allowed people to move quickly to the required information, although it seems that 'the nature of successful navigation is far harder to establish since the goal of browsing is very subjective. Wexelblat's work is important for the field of social navigation because it introduces a theoretical framework for the development of specific applications that deal with frameworks for history and extending the physical concept of history rich to the virtual.

The development of social navigation, since Dourish and Chalmers introduced it as a term, and the subsequent technologies that associated themselves with the concept were consolidated as a research field in the publication of social navigation of Information Space (Munro et al 1999). Hook and Svensson, who were central to the publication, began

work on projects that embodied social navigation methodologies. Through PERSONA they developed the EFOL (European Food On-Line) shopping system, which supported the exchange of different food recipes as a means of encouraging cultural exchange. The more recent work 'Kalas' remains within this area, and employs a recommender system to allow people to exchange, contribute, search and communicate around the subject of recipes. The work represents some important actualisations of what was previously described as just 'recommender systems' in order to demonstrate the social impact of social navigation. By adding a chat space the project weights the involvement with the system towards a very direct form of social navigation. People's direction through the system is heavily influenced through the direct social interaction that guides and influences their decision making. A principal difference is that the designers introduced real time avatars to allow users to identify where people were 'shopping' for recipes. This visual social activity is aimed at mimicking the experiences that we have in actual shops, as we watch other shoppers and are susceptible to being influenced by their choices. By introducing live avatars people were given the opportunity to interact with people through the chat facility (Svensson and Höök 2003:201).

The results of the work and of a subsequent study suggested four particular consequences of the 'indirect social navigation' nature of Kalas. These were privacy, social affordance, social experience and understanding recommender functionality. Privacy was a vivid element of users' feedback; the introduction of an open chat space and the visibility of each member as their avatar followed their movements was resented by some users who felt concerned that their activity was being logged. Svensson and Hook list 'social affordances' as a key attribute that social navigation can contribute to expanding user experiences of the internet. By following people's activity it should be possible to support their understanding of the affordances of unusual environments (Svensson and Höök 2003:213). Ironically, although Kalas does try and make the system functionality as transparent as possible, feedback suggested that it was more 'frustrating' seeing people doing things that they weren't able to. The social experience of the system was revealing, with feedback suggesting that users felt their experience 'more alive' by the incorporation of the ancillary communications and social technology (Svensson and Höök 2003:214). Finally the researchers reported upon the awareness that the users had of how the recipes were filtered. The responses generally assumed that the recommendations were made according to group activity, but what's more interesting is the shift in models of practice that is occurring through Kalas and other social navigational systems and how the audience is affected by this.

### **3.2.5 Collaborative Virtual Environments**

Of all of the systems so far addressed in defining social navigation systems, few of them include any graphic representation of a spatial environment. They have largely relied upon text-based data to substantiate the recommender, collaborative filtering and historical systems. A particular branch of the research field has embraced representations of spaces and has explored social navigation techniques that are present in the interaction that users have with each other and the environment depicted. Collaborative Virtual Environments (CVEs) are often manifested as virtual, three-dimensional spaces in which users are represented as avatars and navigate through an environment to support their collaborative activities.

Emerging from Virtual Reality technologies, CVEs became a relevant field for HCI's Computer Supported Collaborative Work to explore. Many of them focus upon studying tasks and relationships in virtual spaces in order to measure and derive principles for extending HCI practices (Jeffrey and Mark 1999:112). Consequently the priority of these spaces changes according to the focus of the collaboration. Active Worlds ([www.activeworlds.com](http://www.activeworlds.com)) was launched in 1995 after its predecessor WebWorld developed by Ron Britvich was initiated in 1994 (Huxor 2001:283) and is cited a great deal as an established platform for non-bespoke CVEs. The 3D world was intended to mirror the role of a 2D browser and allow people to populate a virtual space with shops and social spaces, to build communities, meet people and purchase items as though in actuality. The project was directly inspired by Neal Stephenson's 'Snow Crash' cyberpunk novel of 1992. This featured the concept of the Meta-Verse, a successor to the internet which represented a future for virtual reality as an economic and social space existing alongside actual space. Active Worlds is now an enormous digital project made up of thousands of worlds in which buildings have been built and landscapes modelled.

Its largest world is Alphaworld, which supports tens of thousands of avatars and built structures, and claims to be virtually larger than the state of California. The system has complex construction software to support the building of places and has established communications which allow people to talk synchronously through a window to avatars, or asynchronously by leaving messages using 'Telegrams'. These system features have made the project very attractive to the CVE community and researchers who develop projects specifically within ActiveWorlds. Avon Huxor used ActiveWorlds to develop his Virtual Office project to explore the possibilities of extending social relations through specific



research-orientated subject focuses by constructing virtual spaces within Alphaworld. By linking his virtual office to an online document-centred, collaboration tool entitled BSCW (Basic Support for Collaborative Working) it allowed him to construct a hyperlinked space that gave visitors and researchers different levels of access to project files (Huxor 2001:284). Huxor found many problems with behaviour within ActiveWorld environment: visitors generally were not interested in walking around environments, only building them and waiting for visitors; the system lacks the substance that we use space for such as documents and artefacts for working, making tutorial and meeting rooms practically useless; the spaces were open to any visitors so making a space appropriate for interested users only was problematic; and the behaviour of other users was often abusive as they 'passed' through meeting spaces. Although the spatial qualities of the Virtual Office were largely unbeneficial the primary success seems to have been the chance meetings that occurred as a result of 'seeing' people browsing. The visibility of people in ActiveWorlds obviously prompts an immediate framework for social navigation that standard websites do not describe; that of being able to see other people who are looking at the same data. Acting as a 'locale' (Huxor 2001:288) for the subjects covered, the Virtual Office attracted people who were interested in the area and occupants could see them as they interacted with the space.

The sense of social navigation that was effective in Huxor's Virtual Office was a guiding factor in McGrath and Munro's Knowledge Garden, which was developed at BT's Martlesham laboratories. Described as a 'creative bricolage' (McGrath and Munro 2003:182) the authors propose that social navigation is also a process that derives from the serendipity of being around particular places at the right time, and how the appropriate amount of people or bits of information can inform or complement a new idea or direction. They go on to suggest that the typical place which delivers this 'bricolage' of results is the inbox of our email system; a place in which we pick up email directed to us or we gather details about other relevant subjects that we are then able to follow up. This is particularly relevant as new search systems are emerging such as Google's Personalised Web Search, or their Personal Web Alert system that emails users if specific keywords are published to the internet. Such technologies extend the work that projects like BT's Jasper and ProSearch developed in the mid 90s. Jasper allowed users to 'store' pages of interest and then email other users links relevant to their own 'stored' pages of interest.

From the McGrath and Munro hypothesis, and technologies such as Jasper and ProSearch, BT labs developed a three-dimensional representation of shared information resources

known as the Knowledge Garden. The system presents a space where a user can see how often their files are being accessed, or discussed. The space also includes a communications system which allows users to talk via text and speech, as well as share applications. The Knowledge Garden becomes a metaverse for a group's research interests, with the live searching and updating presenting a need for management of the growing links and documents. Its name relates directly to the form that the visualisation takes; a garden space, with the evolving structures of informational links being the plants. Although not available online, the prototype's documentation conjures up a sense of emerging libraries and 'active' knowledge as people prune their links and work to keep it up to date, with search engines growing in line with the related materials. The representations of people in the space as they browse and view content allows for discussions and gives a sense of the 'bricolage' that the authors aspire to. The virtual world Second Life ([www.secondlife.com](http://www.secondlife.com)) which was launched in 2003 has become a highly successful three dimensional shared space. Featuring it's own currency to encourage participants to construct their own environments, the spaces are highly personal and creative due to the complexity of the digital construction tools available to them. By October 2006 it was reported to having approximately 850,000 user accounts and was being used as a live music venue for established bands such as INXS and Duran Duran. As the processing power of home PCs grows and broadband connections become widespread, virtual environments such as Second Life will inevitably grow in popularity, but what is critical for all of their successes is their ability to support social interactions.

Developers of CVEs argue that, by reproducing the interactional patterns that people are familiar with in the actual world, virtual worlds have a head start in allowing users to communicate and collaborate with each other (Harrison and Dourish 2001:89). Using movement and gesture, people can identify someone's intentions through actions as well as speech - moving toward them, waving, sitting down next to them. However a virtual environment that looks like actual space does not necessarily support the development of communities. Dourish describes how the manipulation of the characteristics of a space is a key aspect in appropriating a space and turning it into a place. The moving of chairs, the opening of windows are all part of how people find familiarity in a space and begin to feel comfortable enough to exchange ideas and communicate more freely (Dourish 2001:91). Along with the sense of place that is derived from the way that a community uses a space due to environmental conditions (something that virtual spaces lack), Dourish encourages designers to concentrate upon social interaction before designing the visual 'look' of a space.

*The previous five sections have illustrated the context in which social navigation emerged to become a field of Human Computer Interaction, and the technical characteristics that defined its ability to construct socially relational spaces on the internet. Part one described a brief historical background within which navigation through digital information was traced from CD-Roms to the internet, and how communication tools such as email established a need to differentiate between the ways users moved from one website to the next. The section introduced the concepts of spatial, semantic and social navigation and described their differences. Part two developed a more complex model for the subject and introduced the concept of direct and indirect social navigation. It gave examples of how early technologies used filtering as a means of supporting the way we organise information, in particular relationships with people. Part three demonstrated how filtering technologies became the early technology that defined social navigation. A series of projects were cited that illustrated how they supported the definition of the field including movie and music review websites, and how recommender systems and collaborative filtering remain effective technologies for supporting contemporary forms of social navigation. Part four introduced a variety of ways in which people are able to codify webpages and documents to help other people understand their content and to navigate to other related spaces. The recent act of tagging was associated with the mark-making potential of previous technologies and a range of projects was used to demonstrate how the research field had developed its own technologies in order to test its value. The final section introduced Collaborative Virtual Environments that are often cited as a valuable element of the history of social navigation. Although, like many virtual reality technologies they have faded from use, they demonstrate a potential to construct socially dynamic spatial architectures. The next section will reflect on the potential of social navigation as a dematerial technology that relates to digital architecture.*

### **3.3 Social Navigation and Architecture**

*This section will demonstrate that social navigation has the characteristics to offer digital architecture with the appropriate theory and technology to restore its relevance and credibility through adopting a social dimension. It will identify how architecture is used to reinforce the methodologies within social navigation theory. It will briefly introduce the photographic research work of William H. Whyte, and explain how a series of theorists use*

*his study of architectural places to demonstrate how social navigation is a familiar aspect of human social activity. This section also explores how space and place were understood in order to further understand architecture's relationship with people, and how it helps us make choices about how we navigate through actual space. The section ends with a reflection upon a methodology for social navigation that, through its use of architectural references, offers many of the characteristics required for the recovery of digital architecture.*

In establishing social navigation, writers have already used references to built architecture in order to identify the characteristics of the field, and support its 'socio-spatial' value as a research field concerned with space. Determining the potential for social navigation and its related technologies to provide a methodology for digital architecture to recover itself is not difficult. Although there are no explicit references in social navigation research to digital architecture, there is an implicit relationship with built architectures and the way that they contribute to society. In addition, an area of research that includes Collaborative Virtual Environments can be compared to early digital architecture by the technical application of three-dimensional systems and, by extension their adoption of Cartesian dualistic architectural languages.

The architectural dimension within social navigation is persistent throughout many of its key texts. One that is often cited is the photographic investigation into how people used small urban places, published by Whyte in 1980. His studies of space investigate how different kinds of spaces encourage different forms of interaction, and how people use architecture to support a wide range of activities that were not necessarily part of the designer's objectives (Whyte 1980:29). Harrison and Dourish used Whyte to support a definition of the difference between space and place to establish how early forms of the internet might understand how collaborative systems can use the terms. Concentrating upon Whyte's detailed analysis of the varying levels of success that different spaces enable social interaction, Harrison and Dourish delineate between space and place; "the sense of place is dependent on much more than simply the spatial organisation of our surroundings, and more than the three-dimensional arrangement of artefacts. Places also call up cultural understandings which help us to frame our behaviour." (Harrison and Dourish 1996:69). By the end of the 1990s, as social navigation as a research field began to be consolidated, Dourish extended his definition: "while spaces take their sense from configurations of brick, mortar, wood and glass, places take their sense from configurations of social actions. Places provide what we call appropriate behavioural framing; on the basis of patterns of

social action and accountability, places engender a set of patterned social responses. Spaces provide physical constraints and affordances, based on things like the fact that it is easier to go downhill than up, that people cannot walk through walls, and that light passes through glass.” (Dourish 1999:27).

The definition of place through the identification of social and architectural processes allows social navigation the ability to concentrate upon the construction of people-centred social spaces which are defined through technical systems rather than architectural devices. Whyte returns as a reference for Dourish and Munro, Höök and Benyon, who argue for the imperative of a type of navigation that is driven by social interaction. Both use Whyte’s studies of New York to reinforce the claim that “what attracts people is people” (Munro et al 1999:3).

“What attracts people most, in sum, is other people. If I labor the point, it is because many urban spaces are being designed as though the opposite were true and as though what people like best are the places they stay away from. People themselves often talk along such lines, and that is why their responses to questionnaires can be so misleading. How many people would say they like to sit in the middle of a crowd? Instead, they speak of getting away from it all, and they use terms like “oasis,” “retreat,” and “escape.” I am very glad my hypothesis blew up in my face. It has forced me to look at what people do.” (Whyte 1988:10)

The simplicity of Whyte’s observations of social activity in architectural contexts is as simple as Dieberger’s description of the social navigation that also uses actual street situations to reinforce the ideas; “the number of cars parked in front of a restaurant is an indication for its popularity as is the length of a waiting line before a theatre.” (Dieberger 2003:294). This socio-spatial relationship is present in a great deal of writings in social navigation, as authors and researchers attempt to shift our experience of the internet from one in which information is static and controlled by single editors to a dynamically reflexive experience in which a user’s activities affects the wider environment.

Hillier’s ‘space syntax’ is used in depth by Chalmers to support the reciprocal dynamic between people and architectures, and in particular for social navigation, the “by-product in the encounters along the way” as we move through spaces (Chalmers 2003:326). The journey through Hillier’s complicit social-architectural spaces gave Chalmers an opportunity to demonstrate how easily space syntax can be used in the mapping of websites. By comparing the responsive movement through built places with that of receiving and transmitting information as we move through information in a digital

context, we can understand how architecture and social navigation have a great deal in common. Using Hillier's approach, Chalmers suggests that so long as "activity" remains the central concern of an architectural system, then the architecture should remain relevant to its audience (Chalmers 2003:332). While extolling their similarities Chalmers also presents the critical difference between the two disciplines; "mutability: bits are easier to move around than bricks" (Chalmers 2003:340). However, in this observation Chalmers provides a critical opportunity for the field of digital architecture to bridge the difference between social navigation as a time-based, but often textual socio-spatial system, and architecture, which is space-based but un-dynamic.

Among the theoretical texts that establish social navigation, Buscher and Hughes came very close to what in retrospect can be understood to be the development of an early methodology for digital architecture. Unknown to them, and without specific reference to digital architecture they also cite Whyte, and use him along with other analysts of social practice in space to construct a triad of features for the construction of successful socio-spatial environments: 1. sociability, 2. reciprocity of perspective and 3. intersubjectivity. The first simply accounts for the need to 'see' the movement and location of other people, in order to fulfil Whyte's brief. The second proposes that people should be able to 'see' the same space to fulfil the socio-spatial dynamic. The last is the potential for transformative structures to respond to the above two systems of people and space, be it with walls in actual space or categories and lists in textual space. (Buscher and Hughes 2003:102).

The use of Whyte and Hillier in texts to both provide a similarity to an already established human practice, and to construct an understanding of the socio-spatial dynamics that underpin social navigation demonstrates the architectural sensibilities of the field. These sensibilities represent the characteristics of Castell's social-material and are present in the way that theorists and technical designers have aspired to support a close relationship between user and environment. The nature of collaborative filtering and recommender systems that transform as users make choices, and the 'footprinting' systems that embody a reflexive temporality all support a socio-spatial and yet dematerial system.

*This section has identified specific architectural references used by social navigation theorists to support their own research. Whyte's work in small urban spaces was used to demonstrate how the fields of digital architecture and social navigation have a common grammar for a socio-spatial dynamic. Dourish's sense of place was used to distinguish social navigation's objectives in developing places and not spaces through its emphasis on*



*social interaction, which is supported by Munro et al's use of Whyte's tenet; 'what attracts people is people'. Dieberger's illustrations of social navigation in the street led to Chalmers' study of the similarity but ultimate difference between the field's ability to construct dynamic socio-spatial environments; "bits are easier to move around than bricks". Finally, Buscher and Hughes were cited as a synthesis of social navigation's implicit use of architectural social principles, in their triad of features for the design of dynamic socio-spatial systems.*

*This chapter has introduced social navigation as an appropriate field of theory and technical process that fulfils Castell's need for a 'social material'. Hillier was cited to demonstrate the social involvement within built architecture and to highlight its temporal disability. The historical emergence of social navigation was described before aspects of its practice and manifestation through a variety of projects demonstrated its potential to construct socially dynamic spaces without Cartesian frameworks. Recommender systems, collaborative filtering, social evidencing and collaborative virtual environments were all used to describe technical and creative approaches to supporting social navigation. The last section identified the familiarity that the field already has with architecture, and suggests how appropriate it may be to support a methodological recovery in digital architecture.*

## **4.0 Evolution of a Methodology for Using Social Navigation in Digital Architecture Through the Author's Art and Design Practice**

*This chapter introduces the substantial practical programme that the author developed to support the doctoral thesis which ultimately led to the production of live, socially dynamic, digital architectures. The chapter is organised in three parts: part one introduces the types of work that were developed and identifies three distinct stages in their progress, part two details each of the eleven projects, and part three reflects upon their development and the emergence of a methodology within the work. The chapter is intended to support the study of the DVD documentation that accompanies this thesis.*

### **4.1 Overview of Practice**

*This section will provide an overview of the projects that were developed directly to support the development of a methodological approach for the use of social navigation technology within digital architecture. The section will introduce three categories that locate the types of work produced and indicate how they progressively developed towards the production of live, social digital architectures. It operates as a preface to eleven projects which will be presented in the following section, and closes with a brief description of the wider research context towards which the doctoral activity has contributed.*

The following eleven projects were carried out between Spring 1999 and July 2006. Among a variety of practice based projects carried out in this period the author identifies these ten that are central to the development of a methodology for the design of digital architectures which use social navigation technologies. The pieces can be categorised into three distinct types:

- i. Formative conceptual work
- ii. Illustrative applications of concepts
- iii. Live demonstrations of principles

The three types of work also describe the stages of development for the demonstration of the thesis through practical work. The formative conceptual explorations were a direct

response to the collaborative project 'Raindance', produced during the completion of the author's Masters in Design Futures at Goldsmiths. Raindance established the doctoral proposition that was subsequently explored through the proceeding eleven pieces. Raindance evolved from a response to a design brief provided by British Telecommunications and, as it was made prior to the doctoral investigation, is a far less strategic piece of work. Following the author's presentation of the work at the Community of the Future conference in the same year, he identified the research potential of both the technology used, and its relevance to architecture. After the identification of social navigation at this conference as a discrete research field, project work specific to the doctoral research began as phase one, with Rules for the Production of Space and Habitaculus both exploring relational geometries of social spaces. In 2001, after co-curating the VOID digital architecture exhibition and editing its accompanying book, the author proceeded to develop work in phase two that illustrated the theoretical concepts of relational social geometries in local architectural contexts. 'Places of Difference', 'SpaceLapse' and 'Figures' all used digital video to visualise the progressive dematerialisation of a street in Plymouth, as space, time and social factors slowly altered the socio-spatial dynamics.

The third phase of production work concentrated upon the implementation of the conceptual developments and the visual illustrations into live socio-spatial pieces. This began with the 'Reading Rooms' project that was initiated and completed during an artist's residency at Unitec, Auckland, and which remodelled the Design School according to the books that people borrowed. The final piece, 'Invisible Transmissions', augmented live email activity with a pedestrian's image of the University of Plymouth's Portland Square building. The progressive stages of the project work demonstrate how the ideas have evolved, yet retain the enquiry established at the outset of the doctoral programme. During the final 18 months, work such as 'Tag Clouds' demonstrate the evolution of a conceptual plan for the dissolution of form which is present in the development of the Cornwall Culture project and study (see next chapter), as the material qualities of a social digital architecture become more and more dissolved.

The following catalogue of works is also complemented by the author's close involvement in the larger research project Arch-OS, which was initiated at the inception of the Portland Square building, and the Institute of Digital Art & Technology subject groups location within it. Arch-OS is an ongoing digital architecture project that consists of a series of projects developed by researchers within the School of Computing, Communications and

Electronics to explore how to manifest the life of the building (Phillips and Speed 2003). Using digital technologies, the social, biological, communicative and ecological attributes that constitute the life of the building are articulated to enable visitors to 'see' more than just the physical and actual structure of the spaces. The author's doctoral activity has contributed to the social dimension of the Arch-OS project, and has led to projects such as the 'Digital Waterfall'<sup>13</sup>. Not featured in the preceding catalogue of works but is evidence of how the thesis has affected University of Plymouth research activity. The Digital Waterfall has led directly to the author's involvement in the Centre for Sustainable Development, a HEFCE funded centre for excellence at which the author has been appointed a research fellow.

*This section has briefly introduced the types of work that the author has undertaken in development toward the doctoral thesis. It has highlighted three types of work that led to the production of live, socio-spatial digital architectures, and how these projects fit within a larger research context within the Institute of Digital Art & Technology at the University of Plymouth.*

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<sup>13</sup> The Digital Waterfall is an Arch-OS project for the Centre for Sustainable Futures that uses live data about a building's water use and transforms it into information in the form of a waterfall. The more water that the building uses the greater the scale of the waterfall. The theory is that if people are given information about their environment and the uses of resources the more likely they are to adapt their behaviour and relationship with resources. The Digital Waterfall is in the process of being developed through the implementation of a large scale LED screen for installation in one of the Portland Square atrias.

## 4.2 Projects

*This section provides summaries of eleven projects that were critical in the development of a socio-spatial digital architecture. Each one demonstrates properties that formatively shaped the author's conceptual progress from conceptual ideas, through contextual illustrations, to live demonstrations. Raindance is included as a prelude to the subsequent direction of the practical research undertaken by the author, and was developed during the completion of a Masters at Goldsmiths. The work provides the critical context which constitute the practise based component of this thesis.*

### 4.2.1

<b>Title:</b> Raindance, social navigation
<b>Date:</b> Spring 1999
<b>URL:</b> <a href="http://x2.i-dat.org/~cs/raindance">http://x2.i-dat.org/~cs/raindance</a>
<b>Collaborators:</b> Richard Hackett, Noemi Sadowska
<b>Presented / Exhibited:</b> BT Prize winner in British Telecom Interactive Technologies for Internet competition.
<b>Published:</b> Speed, C. (1999) Raindance: Making Visible the Community of the Internet. <i>Proceedings of 13 Annual Conference - Community of the Future</i> . Siena, Italy. Published by the Human Communication Research Centre, The University of Edinburgh. pp.57-60.
<b>Description of Project:</b> Raindance was a design solution to a British Telecommunications competition for developing broadband media content for the first ADSL services that were being piloted by BT in West London. Studying MA Design Futures at the time at Goldsmiths, the author worked with Richard Hackett and Noemi Sadowska to develop a social visualisation tool which allowed visitors to the BT ADSL portal the ability to 'see' the busiest sites on the server. The simple interface translated the amount of people 'hitting' a particular site within a server into a diameter for a circle (Figure 4.1). Upon entry to the ADSL website the user was presented with a series of circles representing the many broadband services available; shopping, movies, games, news etc. Each of these circles could be seen to be expanding and contracting depending upon the amount of visitors they were receiving.

At the time the purpose of 'Raindance' simply enabled a virtual community of viewers to become more aware of itself by picturing the current activities on the whole system. It was argued that if cyberspace was like real space, when we arrived in a particular street or homepage we would be able to base our decisions on where to go within that space according to the visible traffic of other visitors. Some spaces, like bars, may be very busy while others, like specialist shops, may be very quiet. The project was compared with the many online services that present a hierarchical list of places to visit with no reference to the other people visiting the site. 'Raindance' was a simple illustration of how the traffic of users can be used to inform an interface to a website and enable visitors to 'see' their community. Raindance was presented at the I3 Annual Conference - Community of the Future, in Siena, Italy later in the year, where Kristina Höök and colleagues from the Swedish Institute of Computer Science were presenting recent work on the Kalas, social navigation project. Höök identified the project as a useful example of visual social navigation, and the author was introduced to the Kalas programming team, and the theoretical concepts of social navigation.



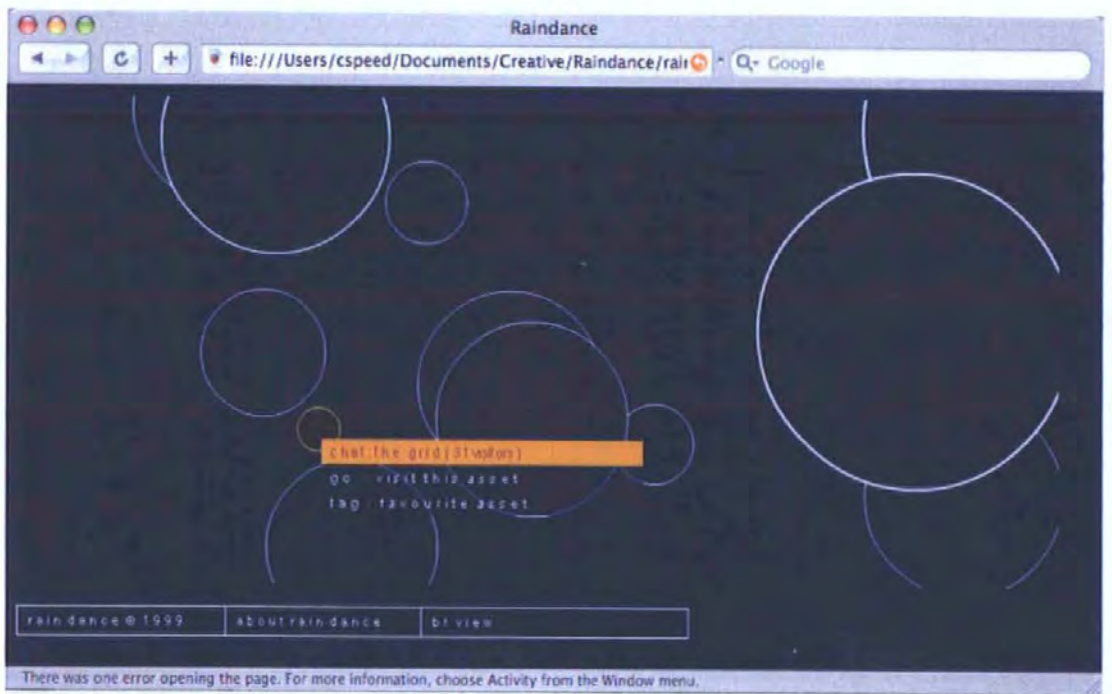
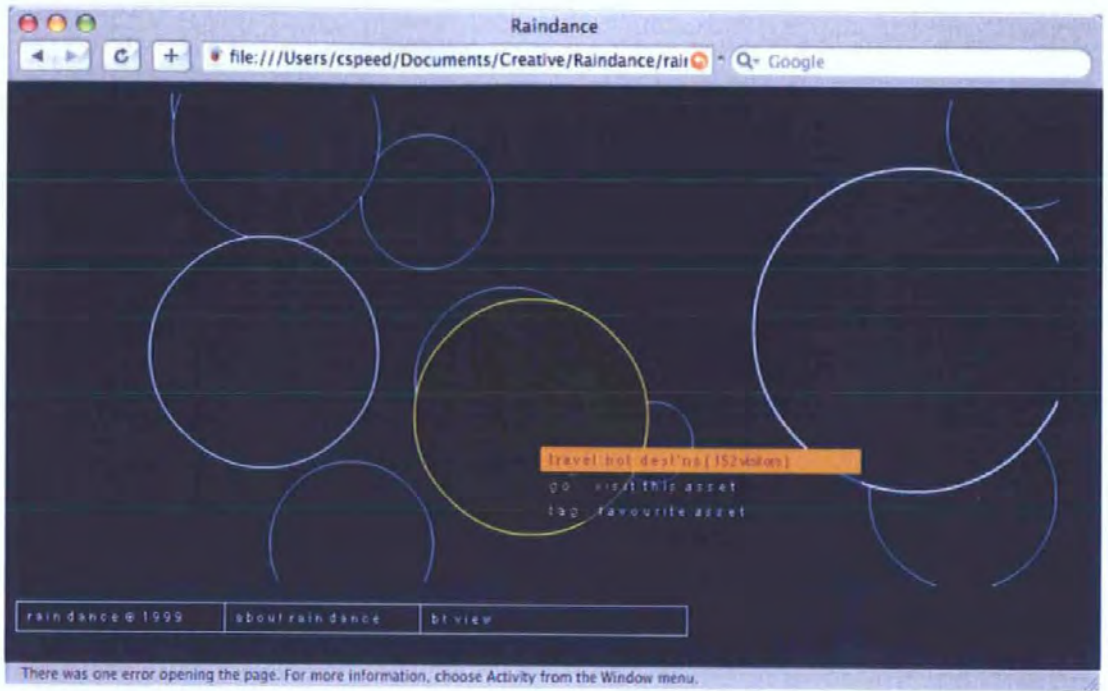


Figure 4.1 Raindance interface; circles diameter according to amount of hits.

#### 4.2.2

<b>Title:</b> Rules for the Production of Space
<b>Date:</b> Spring 2001
<b>URL:</b> <a href="http://x2.i-dat.org/~cs/rules">http://x2.i-dat.org/~cs/rules</a>
<b>Collaborators:</b> none
<b>Exhibited:</b> Studio 51, Plymouth.
<b>Presented:</b> E-naissance: New Configurations of Mind, Body, and Space Conference, Galleria D'arte Moderna e Contemporanea di Torino (GAM), supported by the Fondazione Fitzcarraldo, Caiia-Star public symposium, Turin, Italy, March 28, 2001
<b>Description of Project:</b> <p>Rules for the Production of Space are five, stainless steel 'one-metre' rulers of varying sizes (Figure 4.2). One of the five is a 1:1 scale version of a one-metre ruler, while the others are smaller and vary in size down to the smallest which is 20 cm long. The Rules extend the visual play upon the value of space according to size that was created through Raindance.</p> <p>At the time the accompanying text to the work emphasised Bourdieu's concept of the Habitus which suggested that economic, social and cultural dispositions mean that people move through their home environments in very different ways. The five differently sized one-metre steel rulers were introduced as a new technology that allows us to begin measuring places according to the value individuals place on them.</p> <p>In many ways the Rules became the template for a series of subsequent works that dealt with illustrations of social spaces that were adapted in scale according to the values that members of a social group placed upon them. During an invited talk at the E-naissance symposium in Turin, the author presented the work alongside cognitive science's illustration of the homunculus man. This peculiar looking human has body parts that are all out of proportion with each other, and is used to describe how the cerebral cortex understands the body according to the control of body parts. This comparison supported a creative and conceptual line of inquiry into how other non-visible spaces can be illustrated according to relational values.</p>

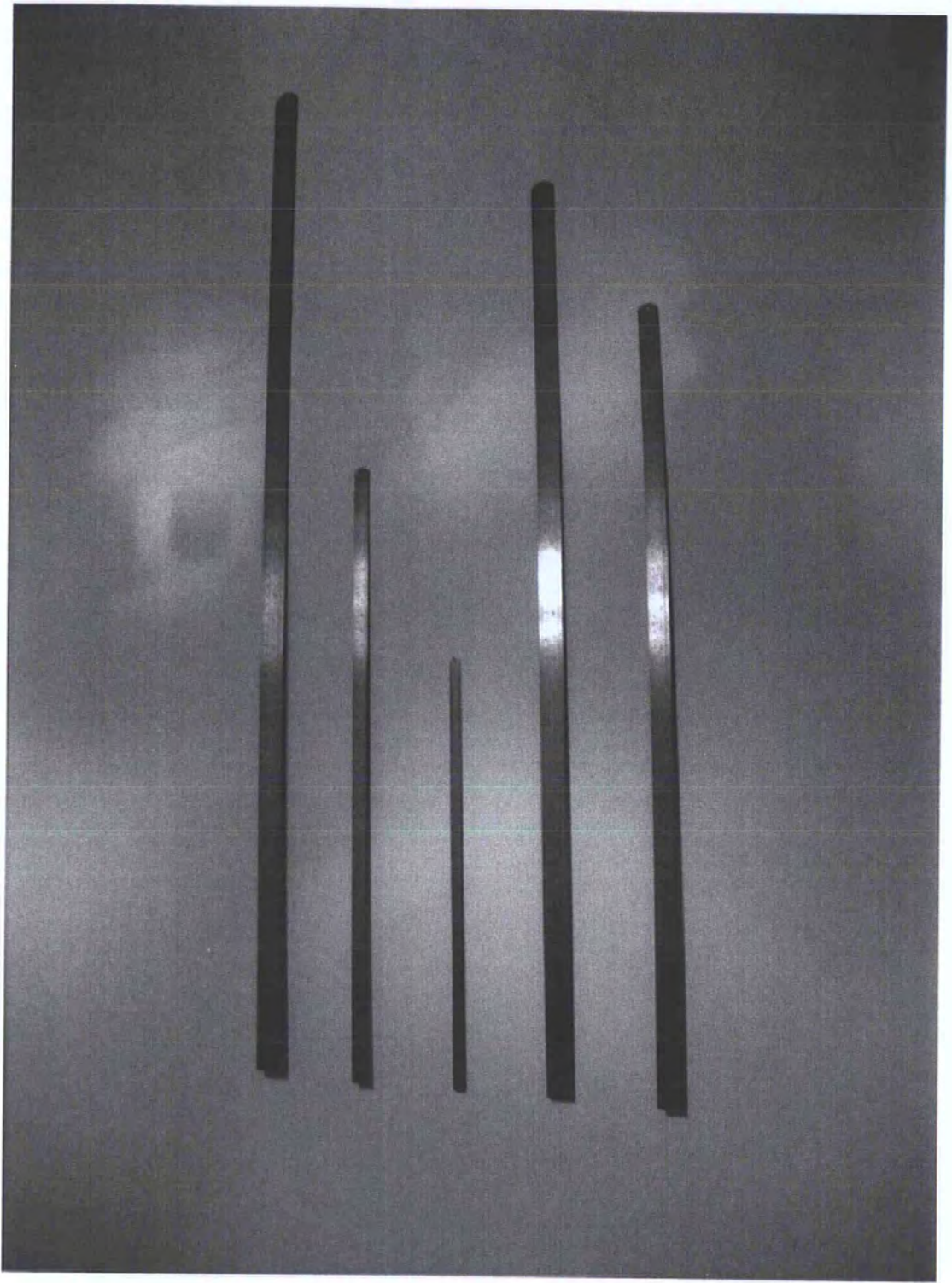


Figure 4.2 Rules for the Production of Space

### 4.2.3

**Title:** Habitaculus

**Date:** Summer 2001

**URL:** <http://x2.i-dat.org/~cs/habitaculus>

**Collaborators:**

**Presented / Exhibited:** V01D show, Plymouth Arts Centre

**Published:** Speed, C. & Grinsted, G. (2001) V01D. *Institute of Digital Art & Technology, and Plymouth Arts Centre*. University of Plymouth.

**Description of Project:**

The Habitaculus art work is an architect's model of four rooms with differently scaled furniture allowing us to see how the same environment may be understood differently according to an individual's use (Figure 4.3). By modelling the same room four different times it is possible to understand that space is not universal but the product of individual negotiation. Habitaculus represented an attempt to model this idea in physical form and explore the concept that a common space for a family or community is personally interpreted and that the social dispositions of its members change the way it is seen. Habitaculus illustrated difference by compressing and enhancing aspects of an architect's model of one room in a family's house. The different scale models for each family member revealed how each member interprets and prioritises components of their reality. While one member's room has an enlarged television, video and sofa, another member has enlarged photographs and sentimental objects. The third member uses the room to work in, so consequently the desk and chair outsize all the other components of the room. The outcomes were specifically reminiscent of science's homunculus man and builds on the continuum established by the Rules for the Production of Space.

The work assumes that communities are defined by a relationship between people and place, and usually it is activities that 'produce' the space. Thus a school becomes a place because of pupil activity. But as capitalism and consumerism manufactures space through economic power, communities have become increasingly complex and varied in the 'type' of people who make them up. In this way we can look at different people's production of spaces to help us understand the complexity of a community that inhabits a shared space. Habitaculus reveals the complexities of being within a so-called community that may well be undergoing change. It is fair to assume that a perception of a community is the sum of its different participant's ideas of what it is and what it does, however much they may conflict. Consequently, for all involved

from young people to old, how a place threatens, enthuses, enables or defends is central to the identity of that place and the way it functions for its associated communities.

Habitaculus was an analogue representation of the collapsing and expanding information architectures the author saw as beginning to define our online worlds.

The piece anticipated a socio-spatial dynamic within his development of architectures, and is a critical link in the narrative toward this thesis.



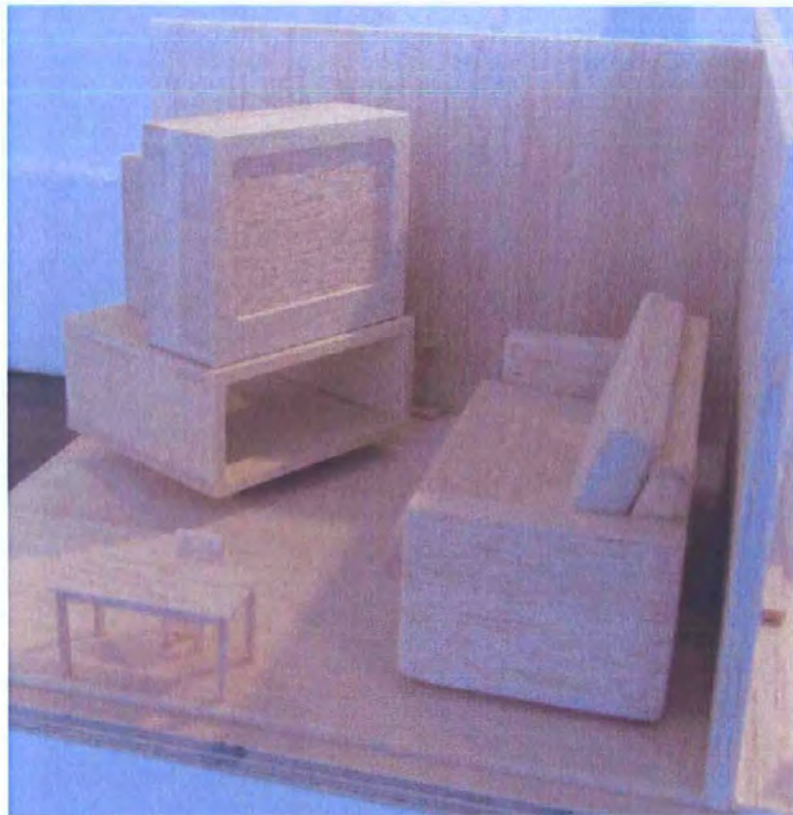
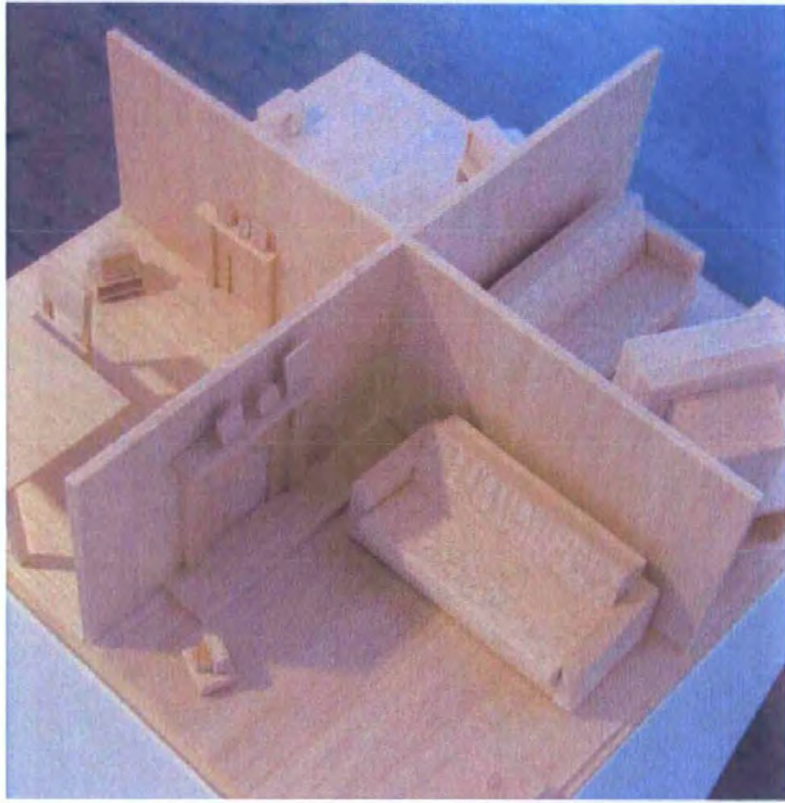


Figure 4.3 Habitaculus

#### 4.2.4

<b>Title:</b> V01D Book and Exhibition
<b>Date:</b> 22 <sup>nd</sup> June – 22 <sup>nd</sup> July 2001
<b>URL:</b> <a href="http://v01d.limbomedia.com">http://v01d.limbomedia.com</a>
<b>Collaborators:</b> George Grinsted
<b>Presented / Exhibited:</b> National Architecture Week, Plymouth Arts Centre
<b>Published:</b> Speed, C. & Grinsted, G. (2001) V01D. <i>Institute of Digital Art &amp; Technology, and Plymouth Arts Centre</i> . University of Plymouth.
<b>Description of Project:</b> <p>During 2001, the opportunity arose to curate a show at the Plymouth Arts Centre about the developments in digital architecture for the Arts Council's Architecture Week (Figure 4.4). Architecture Week is an annual event to encourage the public to engage with architecture and the built environment. The V01D show represented a chance to expose ten projects that took space, not as a Euclidean given, but as a negotiable and explorative concept. Each adopting a different perspective from which to produce their 'space', the works carefully plotted the complexity that arises for using one word to identify a common aspect of experience.</p> <p>The aspirations for the exhibition were to allow visitors to experience contemporary digital architecture - which was rare and exclusive at the time - and to contextualise practice within theoretical architectural context. The show was accompanied by a book that provided exhibitors an opportunity to expand upon their work, practice and theories and contrast them with a range of other texts and projects that weren't in the show but operated within the context of a book. Consequently, the two mediums offered a reflection upon contemporary and future architectural practice.</p> <p>The exhibiting artists were a mix of internationally recognised figures and local digital artists who were engaged with similar issues; Stephen Perrella (interview in book), Peter Anders (book), Ian Borden (book), Nic Clear and General Lighting and Power (exhibition and book), Fiona Bailey (exhibition and book), George Grinsted (exhibition), Mike Phillips (exhibition and book), and the author Chris Speed (exhibition and book).</p> <p>At the time, the show represented the first public exhibition and published foray for the author into the field of digital architecture. On reflection the use of the range of exhibitors and writers demonstrates the formative critical frameworks that are present</p>



within this thesis. From Borden's skateboarding paper that embodied Lefebvre's social negotiation of space to the vacuous but highly seductive graphic work by General Lighting & Power, the continuum of works began to identify the discipline's concentration upon surface and form, rather than the social.



Figure 4.4 V01D Digital Architecture Exhibition and Book

#### 4.2.5

**Title:** Places of Difference

**Date:** Summer 2001

**URL:** <http://x2.i-dat.org/~cs/places>

**Commission:** Developed part of a funded residency at the Crossing Over 6 – Digital Video Shorts, Micro Festival, FACT, Liverpool. Curated by Nina Czegledy and Iliyana Nedkova

**Exhibited:** On tour with Crossing Over including; Ars Electronica, Toronto Digital Film Festival. Presented by the author at the Biennale of Electronic Arts, Perth 2002

**Description of Project:**

Not satisfied with the three-dimensional model of a socio-spatial dynamic, an invitation to take part in an artists' residency for the 'Crossing Over' micro digital video festival provided the author with the opportunity to use time-based media to describe similar ideas. The three minute movie 'Places of Difference' compressed and enhanced aspects of a particular street in Plymouth according to a group of four participant's interests.

Mutley Plain is a notable street in that it has every conceivable type of shop along its 300 metres. This is largely attributed to the fact that when Plymouth's city centre was bombed during the war, Mutley Plain became the main shopping precinct and since it is close to the university, students have helped retain its rich mix of shops and stores. The street was digitally photographed and then stitched together to provide a high resolution continuous pan of all of the shops from one side to the other with no noticeable break. This long photograph was introduced to four participants: a student, a teacher from Germany and his daughter, a clerical assistant, and a retired local resident. Each were asked to identify which shops and stores they used the most, scoring each out of ten. This data was translated into a scale for each building and the photographic landscape was modified accordingly (Figure 4.5).

The video opens with a long pan of the street at regular height accompanied by a subtitle text featuring the homunculus man, explaining that the visual image of a street may not be the best way of understanding what it means for a variety of different people. The street is then depicted in its distorted manner as each respondent is seen talking over their use of the shops and stores.

The video has been warmly received at a variety of conferences on architecture,

anthropology and digital art, with the simplicity of its spatial transformation and the inclusion of actual people seen as providing credence to its propositions.

Places of Difference became the first of three movies that used Mutley Plain to express further socio-spatial and temporal complexities.



Figure 4.5 Places of Difference, 3 minute digital video.

#### 4.2.6

<b>Title:</b> SpaceLapse
<b>Date:</b> Spring 2002
<b>URL:</b> <a href="http://x2.i-dat.org/~cs/spacelapse">http://x2.i-dat.org/~cs/spacelapse</a>
<b>Collaborators:</b> Dan Harris
<b>Presented / Exhibited:</b> Broadcast 18/12/02 on HTV as part of Brief Encounters 2002 television programme produced by Wildfire Productions. Also presented by the author at the Biennale of Electronic Arts, Perth 2002
<b>Description of Project:</b> <p>Satisfied that digital video had been able to express different socio-spatial relations with a street through Places of Difference, the author worked with a graduate to develop another three minute short movie that explored socio-temporal relations with space. Using time lapse technology, each shop along a small part of Mutley Plain was manipulated in post-production to portray how many people visit it on a daily basis. By playing back each shop's time lapse at different speeds, according to its popularity, the collective image was of the street as it changed over time (Figure 4.6).</p> <p>The sky and pedestrians remained in real time and the result is a startling model of how social activity affects the temporal balance of a street. Pedestrians tend to see a street of shops as a connected unit, and when things alter along the street - such as the shopfronts - it is accepted as part of the street's dynamic nature. By speeding up and slowing down the rate of each shop's time lapse the viewer has an opportunity to see the street as a series of components, each with its own time according to its use. The result is a pulsating array of multiple time lapses that gives the viewer an insight into the complexity of a simple street.</p> <p>The style of the film used a voiceover and took on an educational tone in order to make sense of the complex image that was built up. The author at this point was making a reference to the narrative techniques present in Ray and Charles Eames' films such as the Powers of Ten, in order to provide an antithesis to their Newtonian model of time and space. 'SpaceLapse' articulated relational properties that were impossible to see with the eye, and could only be traced through the distortion of time. Publicly aired on HTV, SpaceLapse has been well received like its sister movie Places of Difference, and has subsequently been seen in a wide variety of academic contexts.</p>





Chris Speed & Dan Harris **space**lapse



Figure 4.6 SpaceLapse, 3 minute digital video



#### 4.2.7

<b>Title:</b> Figures
<b>Date:</b> Spring 2003
<b>URL:</b> <a href="http://x2.i-dat.org/~cs/figures">http://x2.i-dat.org/~cs/figures</a>
<b>Collaborators:</b> Dan Harris
<b>Presented / Exhibited:</b> IEEE Visualization 2003, Seattle. Presented alongside Places of Difference and SpaceLapse in a demonstration workshop.
<b>Description of Project:</b> <p>Having distorted space in Places of Difference, and time in Spacelapse, the author was interested in articulating 'people' as the final component of the relational triad. Working with six employees who worked at different shops along Mutley Plain, the author and Dan Harris made video portraits of each person describing where they shop along the street. Standing in their uniforms as they spoke, post-production techniques were used to manipulate their clothing to express their relationship with each other's shops in order to depict the social relations present in a consumer context (Figure 4.7). For example Clare, described her week as involving working at Boots, drinking in the Hogshhead pub and ending the week with a Domino's Pizza. Consequently as she mentioned each shop her clothing would switch to those of one of the other respondents. Three of the participants were shown simultaneously and their narrative triggered the swapping and exchange of each other's clothing as though their relationships with each other and the street were intimately bound.</p> <p>The idea was to illustrate how easy it is to forget that consumers are as much defined by shops, as shops are defined by the people who use them. It was this two-way relationship that the author wanted to express in 'Figures' and the difference between people's individual use of a street. Subsequently the video only features the street during the introduction, as it was intended that the line of participants would represent a different interpretation of the street but without the architecture. The hypothesis was that if it was people who contributed to defining which shops survived along Mutley Plain, then by representing the shops through their use by employees and customers, it would be possible to 'see' another form of the street. One that was made up of people rather than bricks and mortar.</p> <p>The movie became demanding to develop due to the complexity of each narrative, and isn't as clear as 'Places of Difference' or 'SpaceLapse'. However it was felt that</p>

the three of them demonstrated contemporary visualisation techniques that would be of interest to the Information Visualisation community. The work was presented in a 'demonstration workshop' at the IEEE Visualization 2003 conference in Seattle, where the three films received good feedback.

Although problematic, the last of the triad of movies completed a study of a socially dynamic space in which social navigation and architecture were highly implicit components. However, the author by this point was aware that the use of digital video rendered all of the ideas as models or illustrations of concepts encapsulated in a controlled form of time. What became more interesting were the strategies to begin manifesting these dynamics in real time, and in real architectural contexts.



Figure 4.7 Figures, 3 minute digital video.

#### 4.2.8

<b>Title:</b> The Random Lift Button
<b>Date:</b> June 2003
<b>URL:</b> <a href="http://x2.i-dat.org/~cs/random">http://x2.i-dat.org/~cs/random</a>
<b>Collaborators:</b>
<b>Presented / Exhibited:</b> Portland Square Building, University of Plymouth.
<b>Published:</b> Speed, C. (2002) Dismantling Teleological Navigation. In <i>The Art of Programming</i> . Amsterdam: Paradiso / Sonic Acts Press. P. 56-64
<b>Description of Project:</b> <p>Having illustrated social dimensions in architectural space through rendering video and constructing illustrations, the author was interested in beginning to develop actual experiences. The Random Lift project was conceived as an opportunity to exemplify further the role of space at the mercy of time, and how this affected people's mental models of architecture. In large commercial buildings, lifts are implemented to squash space and enable people to move more quickly from one work activity to the next. Consequently lifts can be understood to represent a temporal slippage in the experience of a building as a whole, users skip space and avoid people, places and the opportunity to see the 'whole' building. Conversely corridors and stairwells are often recognised as the most important social spaces within businesses, and many negotiations and affairs occur between office spaces than within them.</p> <p>The Random Lift Button (Figure 4.8) tries to interrupt the linearity of going to a familiar destination by offering the choice to travel without knowing where you are going. The intention of the Random Lift button was to place us directly in the centre of a non-linear moment, its outcomes uncertain and unpredictable. The dynamic navigation to unpredictable places forces the users mental model of the building to transform as new floors open up and the architecture to expand. Rather like a live Habitaculus model, the opening up of new floors was intended to be like moving into somebody else's Habitus and seeing spaces according to other social priorities.</p> <p>By June 2003 two Random Lift buttons were installed in to the Portland Square Building of the University of Plymouth. Visitors and occupants of the building regularly use them, although the author's request for the removal of all other buttons was turned down, and subsequently the random lift button tends to be used</p>

-for fun instead of serious navigation.



Figure 4.8 The Random Lift Button

#### 4.2.9

<b>Title:</b> Reading Rooms
<b>Date:</b> Summer 2002
<b>URL:</b> <a href="http://x2.i-dat.org/~cs/readingrooms">http://x2.i-dat.org/~cs/readingrooms</a>
<b>Collaborators:</b> Justin Roberts, Programmer
<b>Presented / Exhibited:</b> Snow White Gallery, Unitec, Auckland
<b>Published:</b> Qi and Complexity, Consciousness Reframed International Conference 24-27 November 2004, Beijing, China.
<b>Description of Project:</b> <p>Determined to begin modelling socio-spatial dynamics in real-time, the 'Reading Rooms' software was developed by the author while carrying out an artist's residency at Unitec, Auckland, New Zealand. The software used 'live' 3D animation to rebuild the architecture of the Design Faculty according to what students were borrowing from the campus library (Figure 4.9). By querying the university library's database and finding out what books a selection of students were borrowing, the software rearranged the layout of the buildings according to the subjects that the students were reading. For example, if an architecture student was reading a book about photography then a piece of the Architecture department would move to where Photography is based. This simple idea made it possible to see the trans-disciplinary nature of student study, the role that the library plays in facilitating the students' reading within and outside of their specialisms, and the multiple perceptions we have of a place and its architecture.</p> <p>The Reading Rooms project attempted to identify the invisible relationships that bind and integrate the two components that make the design school at Unitec operate. These are the architecture of a converted 19th century psychiatric hospital, and the students who study art and design subjects in that location. The first element in this relationship could be understood to be a highly spatial, but temporally dumb component. The second element is far 'fuzzier' and can be understood to be subjects who embody tastes, opinions, politics and attitudes toward the fields of study they are taught within the school. Of the two components in the formula that made up how the occupants inhabit and live within its architectural spaces, the place is not seen as separate components. Architecture and people remain bound closely together through experience, which may break some of the 'rules of the space'. However, to the naked eye the relationship was still dominated by the physicality of the old hospital as it keeps educational programmes apart and hides any of the 'fuzziness' of the people</p>



who are studying behind its walls. The Reading Rooms project set out to try and find a way of unravelling the two components in order to identify how invisible exchanges between the two can be seen to affect each other.

In the case of Unitec's rigorous architecture and organic students, the author identified the Dewey library categorisation system as a means of 'contextualising' both a model that would describe the architectural layout of the school from subject to subject, and offer space for the breadth and depth of what the students might be studying as they follow their programmes.

Simply by visiting the 100 rooms that made up the building and assigning a Dewey category to its taught subject; ie. Computer graphics 006 – 007 , interior design 747 – 750, it was possible to develop a spreadsheet that modelled the School of Design and the subjects that it taught. By asking an occupant of each room to provide the author with their library card ID number it was then possible to query the library database and find out the subject of the book they most recently borrowed from the library. To fulfil the visualisation of 'invisible relations' the author developed software that would model the movement of rooms within the school if each book represented a room on a plan. Consequently it was possible to see that students who were studying graphic design were actually reading books about photography, engineering students were reading books about postmodernism, and photography students were reading books about architecture.

The Reading Rooms project was a substantial breakthrough in demonstrating live, socio-spatial digital architectures. The indirect social navigation of students was found in the interrelations between the subject of the books that they borrowed, and became an implicit part of how the architecture was reconstructed. This construction of a socio-spatial architecture became a critical part of the thesis as a demonstration of the use of social navigation principles to inform a digital architecture. On reflection, the 'god's eye' perspective became a cause for concern, as it didn't offer a dematerial architecture, so it was this that was to become the focus of the next series of practical projects.

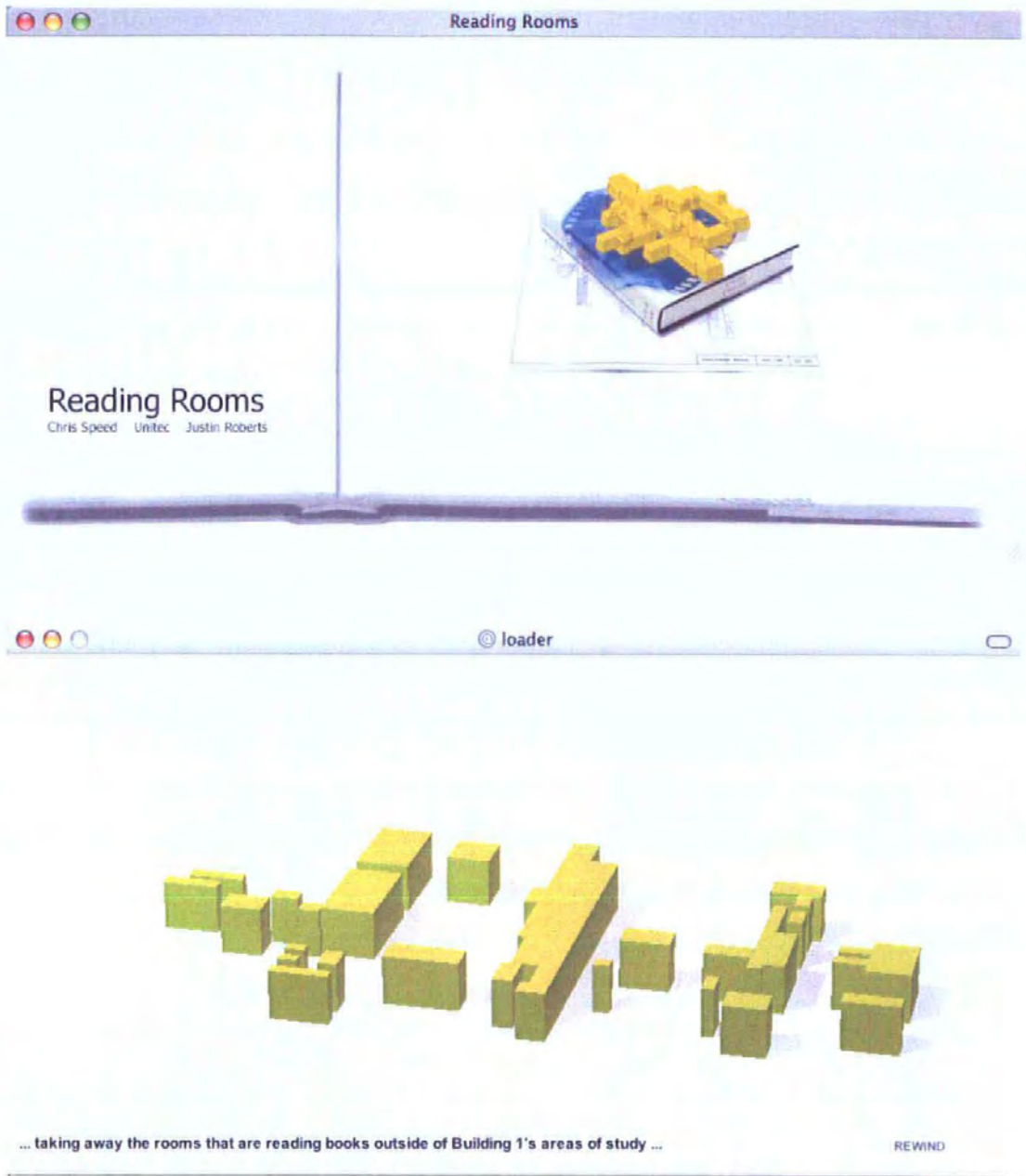


Figure 4.9 Reading Rooms, Live Socio-Spatial Digital Architecture.

#### 4.2.10

**Title:** Tag Clouds

**Date:** Winter 2005

**URL:** <http://x2.i-dat.org/~cs/images/board02.pdf>

**Exhibited:** Notion / Notation Show at the University of Plymouth

**Presented:** Invited talk for National Architecture Week, June 2006. MELT, Sheffield.

**Description of Project:**

The internal University of Plymouth 'Notion / Notation' exhibition provided an opportunity to explore how the Web 2.0 use of tag clouds could be understood to be a form of socio-spatial map. Used on websites such as the online book marking system del.icio.us, and the social photograph archive Flickr, a tag cloud is the collection of tags or keywords that an individual has accumulated through describing content. Each time a tag is submitted to the database it either adds the new word to the list or, if it exists already, it grows in size. Tag clouds consequently look like homunculus men in as much as they display the heaviest use of words as very large, and the least used as very small.

The exhibition was organised by the School of Media, and examined how artists develop ideas for work and how this ideas process is often as revealing as the work itself (sketchbooks, backs of envelopes). The 'Tag Clouds' piece involved asking all of the exhibiting artists for a list of their bookmarks. Once collected, an account for each artist was made on del.icio.us and the common websites that its database recognised from other users generated tags for each entry. As a result of this process a tag cloud was made for each artist which was then posted on to a large wall, among which was a picture of a homunculus man. The resulting tag clouds provided an extraordinary insight into the interests that informed each of the artists, and became a reflexive map of the works that many of them exhibited around the show (Figure 4.10).

As a component of the author's continuum of works that support the thesis, Tag Clouds was an interesting demonstration of how social navigation technology provides a 'map' of creative processes. Placed in the context of an art exhibition - an architectural space consisting of artwork to lend it a sense of place - each tag cloud was a dematerial map of the pieces of work. When viewed together, all of the tag clouds were a map of the show. As a conceptual strategy the work provided a highly

reflexive guide to the show and in many cases corresponded well with their work. The strategy was also very economical, as artists simply exported their bookmark list from their web browser, and the author posted them up to del.icio.us. The tag cloud technology did the rest because it was connected to a socially networked infrastructure.



John Matthias (32 Bookmarks)

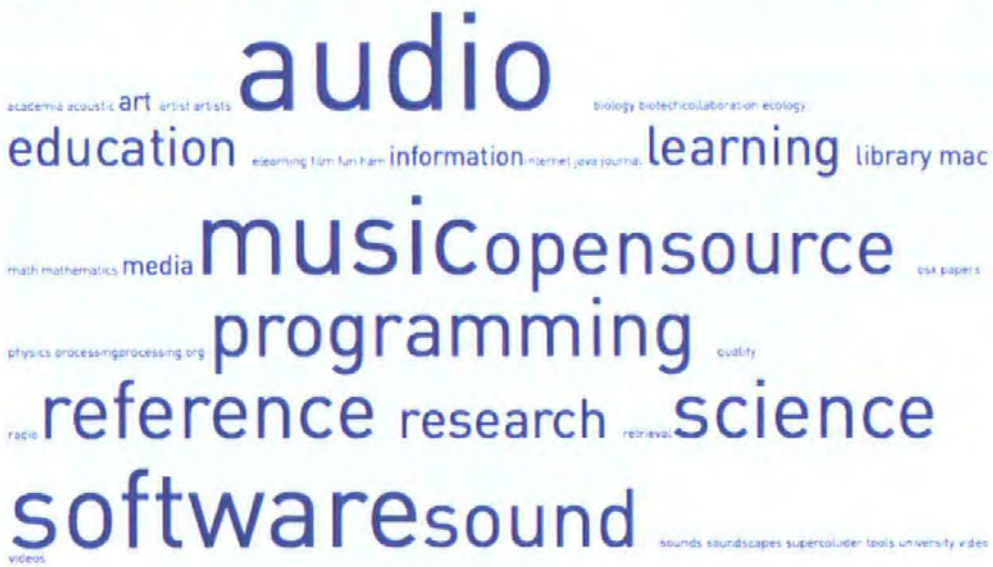


Figure 4.10 Tag Clouds.

#### 4.2.11

<b>Title:</b> Invisible Transmissions
<b>Date:</b> June 2006
<b>URL:</b> <a href="http://www.telesocialarchitecture.org">http://www.telesocialarchitecture.org</a>
<b>Collaborators:</b> Justin Roberts, Programmer
<b>Presented / Exhibited:</b> Portland Square Building, University of Plymouth.
<b>Published:</b> Speed, C. (2005) Tele-Social Architecture in <i>Ascott, R. (ed) Altered States: Transformation of Perception, Place, and Performance</i> . Liquid Press: University of Plymouth, July 2005. Also presented as part of <i>Locative Media: Urban Landscape and Pervasive Technology Within Art</i> , Art Panel at Siggraph 2006.
<b>Description of Project:</b> <p>The final and most recent project work, not including the Cornwall Culture project and study, was a further attempt to challenge the material qualities of an architectural site through live social activity. Following directly from the Reading Rooms, the author developed software to watch the reception of email communication between offices across the University of Plymouth campus.</p> <p>A three-dimensional model of the Portland Square building was developed and the relevant rooms along the south flank of the building associated with the actual staff who occupied them. The software checks everybody's email 'inbox' and establishes the names of recent people who have sent an email to the recipient. By correlating the sender's name with their geographical location on the campus via the university telephone directory, an office with an image of the appropriate architectural style was then 'flown' into the scene and attached to the recipient's office. The software checked inboxes every minute, so offices could be seen to be 'flying' into Portland Square and being absorbed into the building on a regular basis (Figure 4.11).</p> <p>The resulting image of the buildings was one of collision and construction as individual offices were seen to attach themselves to the exterior of the building in receipt of email. The live display of social activity was made visible to passers by through plasma displays in Atria C. It could also be seen online, providing an insight into the live activity that the building and its business is substantiated upon.</p> <p>The work was very effective at showing the invisible transmissions from around the campus to Portland Square, with many of the recipients watching the plasma screen or the online display. In an attempt to deal with the 'gods eye' projection that the</p>

Reading Rooms project used, the author used an eye-level perspective of Portland Square from the street. This decision was intended to extend the ocular norm that passers-by to Portland Square are used to. In the same way that the homunculus man is an adapted version of an actual human body, a simulated version of Portland Square from street level offered the most accessible starting point from which to adapt what the eye can see. However, this ambitious idea required complex graphic modelling which was difficult to sustain with a model that was transforming live. Subsequently the results were a little disappointing because the work remained clearly computer-generated and less photo-real, as early sketches had envisaged.

However the live reconstruction of the building according to social communications was exciting, and at its busiest Portland Square became a different building as the alternative architectural styles interrupted the steel and glass exterior. There is much work to be done in improving the photo-real imagery to really contest the material nature of the architecture that is seen by the eye, and this project demonstrated the extraordinary detail that will be required to do this. The work was presented in August 2006 at Siggraph as part of the arts panel 'Urban Landscape and Pervasive Technology Within Art' by Mike Salmond of Northern Illinois University, Hasan Elahi of Rutgers University and Mike Phillips of the University of Plymouth, and received positive feedback as an example of live data visualisation.



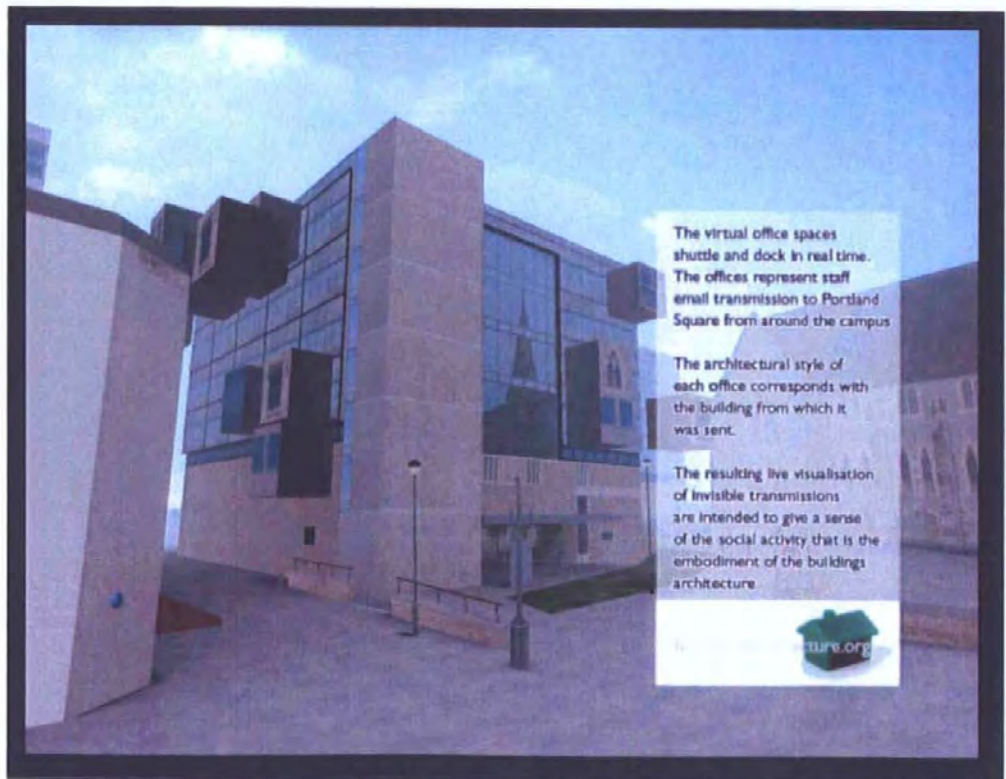


Figure 4.11 Invisible Transmissions.

### **4.3 Reflections upon Practice**

*This section will reflect upon the author's experiences through the eleven presented projects and identify their development toward a simple methodology for the production of social digital architectures. The section begins by tracing Hillier's 'socio-spatial dynamics' in the early conceptual and illustrative works, before identifying Castells' 'social material' as databases began to enable the author to develop live digital architectures. The section describes how, from the live animated works, a methodology for developing social digital architectures emerged and was employed to the subsequent works. The section also identifies the Tag Clouds project as the point at which the author begins to find a solution to Nicholson's de-material crisis within architecture. The section closes with a reflection upon the practice-based art and design projects and how they contributed to supporting the development of the Cornwall Culture project.*

The eleven projects demonstrate the progression toward an art and design based practice that integrates social navigation technology to construct digital architectures. The projects operate as a self-reflexive art-based practice that allowed the author to incrementally extend concepts into illustrations, and finally into demonstrations. However the work requires some analysis to identify how the social and architectural components were integrated, why particular technologies were used and how the work negotiates the Castells' 'social material', Nicholson's 'dematerial architecture' and Hillier's 'socio-spatial dynamics'.

The Raindance project provided the impetus and subsequent research framework for developing the doctoral inquiry. It led directly to the uncovering of social navigation as a discrete research field within HCI and its obvious relationship with architecture. The conceptual work that followed focussed upon the relational dynamic that social navigation establishes with a subject as different users gravitate towards the choices made by others (Höök et al 2003:8). As the content of socially navigated websites, such as MovieLens, transforms according to how people vote, the architectural material of these spaces was also adjusted. Rules for the Production of Space was a direct response to the geometric dynamic that Raindance presented as the movement of people altered the size and inferred value of the websites within its domain. The different sized rulers simply extrapolated the need for dynamic models of value within socially constituted environments if users are to be able to navigate and identify their own sense of place within a shared context.

Habitaculus was an extension of this but was critically different as it introduced a multi-user complexity to one place. Specifically dealing with architecture and the multiplicity of one living room within one house, the dimensional transformations in the four rooms of the balsa wood model contest the assumption that we all understand space in the same way. In his introduction to *Space is the Machine* (1996) Hillier demonstrates the 'relational notions' that any particular building can mean to a wide variety of social groups depending upon the sociological boundaries that position them closer to being 'inside' or 'outside' that space. Habitaculus introduced the complexity of these differing notions, which seem implicit and yet paralysed in the immutability of built architecture, yet able to be manifested with digital spaces. However the work remained inanimate and encouraged the author to conceive of ways in which to begin animating the concepts.

The residential digital video workshop, 'Crossing Over' at FACT in 2001, offered the author the opportunity to produce a short movie that illustrated the different 'forms' of a specific architectural place according to a small selection of users. No more sophisticated than the Habitaculus model, *Places of Difference* added people and an actual place to illustrate the ideas. The use of people and the visually rich spread of shops and stores turned the work from speculatively quantitative vision to a data derived qualitative visualisation. Social navigation wasn't present in the movie as the author was constructing an exposition of difference through each individual interpretation of the same street. *SpaceLapse* and its inclusion of time as well as people and space, extended the dimensions of what could be shown and embodies a social navigation. The adjustment of each shop's rate of time-lapse, according to its social use enables an integrated space that was previously separated in *Places of Difference*. Once together it is possible to suggest that the visual complexity of the shops' different use over time is a result of social navigation since some are more popular than others. In the process of emphasising time as well as space, for the first occasion in all of the works to date, the architecture began to lose some of its permanence. As each shop was disconnected from the temporal framework of the street, a small piece of each building's 'material permanence' was eroded.

The final digital video, *Figures*, compounded this even further as people replaced buildings as social navigation through consumerism, employment and lifestyle was emphasised as constituting a networked architecture. This shift in emphasis suggested that the architecture is merely a means of framing the social relations of people, and that consequently its image could be removed and substituted with the community who use the street. The movie doesn't capitalise on this dematerialisation of architecture, probably because it was

developed at an early point in the development of this thesis. Being the last of the illustrations of concept, Figures indicates the author's motivations to begin developing live socio-spatial visualisations and experiences.

The Random Lift Button (RLB) was developed as a specific response to understanding how it would feel if one user could experience a fellow user's model of the same space. While the button conjures a feeling of uncertainty due to its non-linear navigation, it also allows a user to visit floors that are not part of their familiar 'habitus'. In this way the button is a technology for traversing Bourdieu's models of habitus as users of the lift can relinquish the control of their journey, and allow the lift to take them to places that are part of other people's socio-spatial routines. The experience of pressing the button succeeds, albeit momentarily, in interrupting the linear journey of the user. However, because the author was prevented from having the RLB as the only choice in the lift carriage, the traditional buttons are preferred by regular users, which tends to reduce the project's value to a mere curiosity for visitors. In addition, each floor of Portland Square looks very similar when standing inside the lift. So as the doors open, travellers don't tend to see into the activities of a different floor, but are faced with a white wall with an alternative number painted on it. The intention was always for lift users to have their navigation affected by the social activities that occurred on unexpected floors, but this is inhibited by the white wall that faces the lift door. Despite these problems, the RLB does provide some sense of interruption to the linear experience of a building. However, the author felt it necessary to return to modelling the socio-spatial dynamics of a building from a distance (as opposed to the perspective of a user) in order to express a digital architectural potential.

Reading Rooms was developed during a three month residency at the Unitec School of Design in Auckland, and in many ways was the turning point of integrating social navigation technology with digital architecture. Prior to this, the digital videos could only elude to Castells' concept of a social material through illustration and special effects. His frustration with architecture for being incapable of a "mediated expression of the deeper tendencies of society" (Castells 1996:448) was shared with the author's need to move away from the passive mode of simply illustrating social architectures to a way of demonstrating them live. The Unitec School of Design, being particularly territorial in its use of old psychiatric wards, presented itself as an architectural plan that seemed highly inappropriate at communicating the social relations between its occupants. The site appeared ripe for reorganising and it was simply a means of finding the appropriate currency. Through the classification of people's interests according to the Dewey system,

it became easy to envisage a remodelling of the architecture according to what occupants were reading and studying. The resulting online digital model was able to rearrange people's rooms by moving them to areas that were matched with the subject of their borrowed books, for example; architects were moved to sculpture if they were borrowing a book on Brancusi. Ironically, usually about 50 per cent of the rooms disappeared completely because students and staff are researching subjects that are outside of the School of Design. Typically a great deal of movement could be seen and the ground plan of the spaces was altered, opening up spaces and clustering offices around particular subjects.

The use of a socially manipulated database, library book loans, and the Dewey classification system for categorising space led to the recognition of a method that integrated social navigation with architecture:

1. Identify a digital database resource that is subject to social transformation.
2. Identify a classification mechanism for differentiating between individual architectural spaces (offices).
3. Correlate the two forms of data to allow 1 to express itself within 2.
4. Model the architecture not as a whole but as individual units and allow 3 to inform the reorganisation of them.

In the case of the Reading Rooms project the following elements were used:

1. The library database.
2. The Dewey classification system applied to the different subjects occupying different rooms in the school.
3. Individuals in each room in the school were asked to provide their library card number to find out what they were borrowing. This was correlated with a Dewey number assigned according to the subject that they were studying and within their room in the department.
4. An online animated model used the correlated data to move people's rooms from their assigned base to another space that was assigned with the closest Dewey number for the most recent book that they had borrowed.

The work was exhibited in the Snow White Gallery, part of Unitec School of Design, and led to some interesting reflections upon its effect upon the audience. Less interested in the

general recombination of the buildings, many people were preoccupied with the movement of each of their own offices to an alternative subject, and in how many people gravitated toward their subject. The critical theory staff were particularly proud of the fact that a variety of student studios were moved to their offices, which demonstrated the value of theoretical design studies, a subject that the Dean of the School had been blamed for ignoring and under funding. However peoples' responses tended to suggest that they saw the projection of the space (the god's eye view of the floor plan) as an abstract manipulation of its form, rather than something more profound about how the architecture could be re-interpreted. Despite the breakthrough in terms of developing a methodology for integrating social navigation with architecture, the author's use of the Cartesian coordinate plan undermined the potential to challenge the order of the bricks and mortar that remained firmly organised in their current form.

This minor crisis of representation supported the need for a further live socio-spatial architecture that dealt with this issue of how to further contest the material permanence of architecture as users 'see' it. The Invisible Transmissions project was initiated specifically to deal with this. Following the methodology developed in Auckland the author used email activity as a socially developing database, and the telephone directory as the classification of space;

1. Email 'inboxes' would express social relations and connections.
2. The university telephone directory lists people's names and office locations.
3. Occupants granted access to email accounts for the checking of 'inbox' activity, senders' names were extracted and matched against the university wide phone book that listed the building in which the sender was located.
4. The animated model of Portland Square used the correlated data to place a jpeg image on the face of an office according to the location from which an email message was sent. The office was 'flown' into the animated scene and 'docked' with a specific part of the building that was the exterior of the recipient's office.

The result was an animated view of Portland Square, whose steel and glass was modified stylistically as many different offices (Georgian, Victorian, concrete, glass and stone) were attaching themselves to it. To deal specifically with the representation of the architecture the author chose to increase the level of graphic detail on the computer model and to orientate its viewpoint to that of a pedestrian. The computer model for Unitec was extremely crude, simply cuboids proportioned together to make up the basic architectural

form of the buildings. Portland Square was modelled and textured with a relatively high level of accuracy and faithfulness to the actual scene. Much improved, and despite much investment of time in developing the details, the effects remain disappointing as it was clear that the image is computer generated. However the pedestrian perspective was effective and goes some way to demonstrating progress toward a more challenging architectural representation. As the work was shown in Portland Square on a plasma screen, participants in the project commented upon the collective amount of email that was being depicted and the variety of locations that it came from. While an interest remained in what their office was receiving, the focus had shifted from individual interests to communal activity centred on the building. This suggested that some progress had been made in the choices of representation.

During the development of Invisible Transmissions the opportunity arose to contribute a piece of work for a small staff exhibition in a building on the campus. Conscious of the battle that the author was waging in attempting to get the computer model to look convincingly like an image of a building seen through a plasma screen, he explored an entirely different method of representing social relations in an architectural context. Given that the exhibition was a spatial experience it could be considered as an architecture, subsequently the author used the now established method but with a different digital model for representing the spaces.

1. The participating artists' use of bookmarks to support their research.
2. Del.icio.us' online tag clouds as a means of classifying website content.
3. Artists exported bookmarks from their browsers, Del.icio.us accounts were generated for each artist, bookmarks were posted to each account that generated individual tag clouds.
4. The tag clouds were collated and organised alongside each other on a large poster as a piece of artwork.

Obviously non-time based in its own form, the poster became a reflexive architectural map of peoples' work, and as visitors view separately each exhibiting artist's work in the gallery, a time base emerges as people reflect upon the map and their art. Rather like carrying around a guide to an exhibition, of which the reading informs how we understand the work in front of us, the poster became a dynamic map or architecture for the entire show. The critical difference between the tag cloud and a gallery guide is that the tag clouds were generated through social definition, and not a single editor. As each bookmark



entry is posted to del.icio.us the majority of them generated tags that other people had used to describe the website. The regularity of these 'signposts' for social navigation provided the maths that allowed the tags within each cloud to become larger or smaller. The subsequent tag clouds that were exhibited became social architectures that described not only each exhibitor but the architecture of the exhibition as a whole.

The use of the tag cloud as a socio-spatial reflexive form represented a further step in demonstrating live, socially navigated digital architectures, and although the exhibition can be construed as a 'tenuous' form of architecture, the work had a critical impact upon the development of the Cornwall Culture project and study (see next chapter). For the first time in all of the works, a non-pictorial architecture had been generated in the Tag Clouds piece. This recalled Gunkel's praise of Nicholson's dematerial approach in establishing a critical practice for architecture: "What's the matter with architecture, therefore, is that it both resists its self-dematerialisation into the digital bits of cyberspace and is, at the same time, unable to solidify its dedication to materiality in opposition to such dissolution." (Gunkel 2001:83). Tag Clouds had begun to demonstrate that it was possible to construct a weak, but nevertheless architectural, framework that encapsulated a socio-spatial system without the use of Cartesian coordinate system based plans. Tag Clouds appeared to overcome architecture's paradox by retaining a material framework in which space is implicit, but which its form dissolves. Although the material framework is the concept of an exhibition which may not be a recognised architectural structure, the work at least intimated a potential for words that are semantically tagged and organised using social connections, to begin to construct an architectural form.

The eleven pieces presented are part of the practice-based component of the thesis, and demonstrate progress toward a methodology for developing digital architectures that use social navigation systems. Aspects of this methodology were used in the development of design solutions for the Cornwall Culture project and the ethnographic study that followed it. The next chapter will review in depth the design process for this particular brief and will demonstrate how methods derived from the authors practice based work influenced the strategies employed for both the Cornwall Culture website and the ethnographic study.

*This section has reflected upon the author's development of a process and methods to support a social digital architecture. The section highlighted the early conceptual and illustrative works that identified the socio-spatial dynamic between people and buildings. It described how the shift to live projects and the emergence of a reflexive four stage*

*method had turned socially-derived data into a form of Castells' social material to support the live recombinant architectures. It identified the dematerial qualities that were in the Tag Clouds work, and suggested that this could resolve Nicholson's material dichotomy within architecture.*

*This chapter has introduced and framed the practical component of the doctoral research that consists of eleven pieces of work that progressively led to live social digital architectures. The first section introduced the three types of work that were developed: formative conceptual models, illustrative applications of concepts, and live demonstrations of principles. It also briefly described how these works sit within a larger research context within the author's department. Section two detailed the eleven projects describing their attributes, development and manifestation, with brief reflections on how each effected the development of the next. Section three reflected upon the entire practice-based programme and identified crucial stages within the work that led to the development of a coherent methodological approach for developing socially dynamic digital architectures.*

## 5.0 Social Navigation within Digital Architecture, an Applied Study

*This chapter focuses upon a particular project that the author was involved in, and is part of the practice-based element of the thesis. The project was used as both a creative opportunity to embed social navigation technologies into an online digital architecture, and also as a context in which the author could study how well it contributed to nurturing a sense of place. Methodological principles for the design solution and study were derived from the art and design projects outlined in the previous chapter. This chapter will explain the project brief, describe the author's conceptual solution and then describe how ethnographic methods were developed to support the nurturing of a socio-spatial dynamic.*

*In December 2005, The Institute of Digital Art and Technology (i-DAT) was approached by the European funded Cornish agency Cornwall Arts Marketing (CAM) to develop a project that would enable them to gather cultural information about the region from its inhabitants. As a member of i-DAT, which is a Centre for Expertise within the University of Plymouth, the author was involved in the creative direction of the proposed solution to CAM's brief. CAM was established as an outreach agency funded to promote cultural activities and centres across Cornwall, and receives Objective 1 funding to achieve this. Launched in 2001, it has used some web technologies to attract visitors to events and locations, and after a successful five years its new project is to campaign for a new Region of Culture designation for Cornwall. The brief for i-DAT was to develop a digital strategy to ask as many people as possible across the region to contribute to the idea of what Cornish culture is. The strategy was that by asking people to define their perception of Cornish culture, and anticipating a broad response, CAM would be both documenting the diversity of the region, and communicating its aspirations to be recognised as a Region of Culture. Due to the geographic specificity of the brief, and the large scale social inclusion that was desired, the project offered the author an opportunity to employ social navigation principles to construct a digital architecture that could embody a reflexive socio-spatial document of culture across the region.*

*The author's activity surrounding the project in applying the theoretical proposition can be broken down into three specific stages: 1. develop a conceptual strategy that answered CAM's brief, 2. carry out an ethnographic study of users to determine its success, and 3. develop a mechanism through which user responses to the study could be fed back into the architecture of the project to demonstrate its reflexivity.*

*Section 5.1 will focus on the first part of these objectives and detail the technical and creative solution that was proposed and implemented. Section 5.2 will explore the ethnographic process employed in parts two and three, making reference to the established techniques that informed the design of the study and the subsequent feedback mechanism. Section 5.3 will provide an insight into the study, and in particular the lengthy discussions with the selected people and how effective the feedback mechanism was at enabling a reflexive communication system to emerge. The last section will reflect upon the entire process and identify the strengths and weaknesses of the applied thesis.*

### **5.1 Conceptual Direction of the Project**

*This section will introduce the client brief and how it relates to the thesis. It will identify attributes in it that offered opportunity for the thesis to be applied and how a conceptual strategy was developed to support it. The section will go on to briefly describe how the project was marketed and how its different aspects contributed to the success of the project from the client's perspective.*

The geographic and social breadth of the project brief was to attempt to reach as many of the half million residents of Cornwall as possible, through a combination of online and physical interventions. Although an online system was part of the prescribed brief, CAM wanted a series of physical 'pods' that could be located at cultural centres across the region to provide access to the online project so it could reach people without an internet connection. CAM's objective was to use local artists as workshop leaders to encourage residents' contributions, while newspaper, television and radio advertising campaigns would persuade people to take part from home or work via their own internet connection. The primary objective of all approaches was to establish the complexity of responses to the single question; 'What is your story of here?' From the answers, CAM hoped to demonstrate both the variety of subjects that constitute Cornish culture, and the difference of opinion that made the region so rich in perspectives.

At briefing stage it was possible to identify the core attributes of the project. These made it appropriate for the author to integrate the conceptual strategy that would lead to a form of digital architecture using social navigation systems. These attributes were as follows;

- i. The question ‘What is your story of here?’ was one that embodied a spatial context.
- ii. The audience was potentially so large that the range of answers would be intentionally diverse, encouraging a social complexity.
- iii. CAM wanted people to ‘see’ other people’s responses to the question to generate a heuristic with regard to better understanding the complexity of Cornwall.

CAM anticipated an online questionnaire / submission process but were unaware that the socio-spatial dynamic that was present between the three attributes lent themselves to the use of social navigation technologies. Consequently the author proposed the following type of solution for a web-based system.

1. A marketing campaign would ask the audience through image complemented with text, whether a particular photograph and keyword represented their story of Cornwall. For example, an image of a fishing boat tagged with the word ‘history’ was intended to provoke a reaction as to whether the fishing industry was part of Cornwall’s future anymore.
2. People would be encouraged to submit a Yes or No vote for this image, along with many other photographs. A variety of technologies would supplement the voting and posting of images including going to a website from home or work, visiting one of the 15 pods that would be located in cultural centres across Cornwall, and the use of SMS (short text message service) and MMS (multimedia picture message service) from mobile phones.
3. A website would be developed that followed Busher and Hughes’ principles for a socially reflexive space: 1. sociability, 2. reciprocity of perspective and 3. Intersubjectivity .
  1. The site should be highly social with details of users and their submissions.
  2. A means of ‘seeing’ everyone’s submissions organised according to the location that they were referring to, the keywords that they were assigned and when they were submitted.
  3. A means of voting for or against other people’s submissions and the ability to add comments regarding each posting.

4. The website will allow the organisation and filtering of content to allow users to see the complexity of difference associated with the wide variety of responses from users.

This method was derived directly from the author's practice-based development of a method for generating digital architectures that use social navigation technologies (see chapter 4). Through the application of this conceptual design the author proposed to CAM that such a system would deliver a dynamic and contested network of ideas about a shared space. In addition, the sense of place would be constituted through images and not structural forms in an attempt to place emphasis on networking and make reference to Castells' networked 'social material'. Consequently any semblance of order in the sense of place would be derived from the way that the audience organised the material. This offered a dematerial framework that was responsive to social activity, but which retained enough order to allow navigation from one subject to another. In this way it was envisaged that the Cornwall Culture site and the sense of place that it contested would be a form of digital architecture. The website's community would define its relative form according to how contributors navigated through the content, responded to posts by voting and posted further images. To demonstrate the nature of the technology, references were made to contemporary 'tagging' systems such as the online photo archiving system Flickr and two interfaces for searching its database; the Flickr Postcard Browser<sup>14</sup> developed by Felix Turner, and the FlickrGraph<sup>15</sup> developed by Marcos Weskamp. In addition the concept of a 'folksonomy' was introduced and argued that what CAM wanted wasn't an independent taxonomy carried out by 'experts' on Cornwall, but a socially mediated 'folksonomy'. The concepts were accepted and i-DAT was awarded the task of developing a system that met these aims.

The final creative contribution made by the author to reinforce the distributed construction of a 'folksonomy' was to propose that the pods to be located at cultural centres across Cornwall should collectively spell the words 'Cornwall Culture' following the URL for the website. Each of the pods, while providing online access to the project through a keyboard, roller ball and screen, also had the ability to capture video. It was envisaged that at the end of the project this audio-visual data - which could be seen at all of the pods - would be displayed at the Eden Project in St. Austell to spell out 'Cornwall Culture'. Although a

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<sup>14</sup> [http://www.airtightinteractive.com/projects/flickr\\_postcard\\_browser/](http://www.airtightinteractive.com/projects/flickr_postcard_browser/)

<sup>15</sup> <http://www.marumushi.com/apps/flickrgraph/>

small graphic gesture, the distributed letters signified the concept of the project and helped to communicate its simplicity.

At this point it is important to state that while the author remained conceptual director on the project, the design and production was carried out by other i-DAT employees, and the resulting look and feel of the site was directed through negotiation with the design director and CAM. The final designs, advertising campaign and video overview can be viewed on the accompanying DVD entitled Cornwall Culture.

The [www.cornwallculture.co.uk](http://www.cornwallculture.co.uk) website and project was launched in May 2006, by which time the advertising campaign had reached regional television networks, radio shows had been primed to discuss the project and local newspapers were running adverts and editorials promoting it. The provocative phrase 'what is your story of here?' had been changed to 'what does Cornwall mean to you?', and a significant amount of residents from the region took part in the project. By the end of May the site had received approximately 40,000 hits from 2,471 unique IP addresses. The site featured two levels of public contribution; the first simply gave the ability to vote for other people's submissions without having to enter personal details, the second allowed voting as well as the opportunity to contribute photographs, tags and stories. Of the total users it is estimated that 90% remained as anonymous voters, whilst 255 signed up to the system and contributed media. Deemed an overall success, the client CAM, were very pleased with the response although criticism remains with the marketing programme for not reaching as many people as intended. Since May the website project continues to be used, although in much less volume and has since been moved behind a new front-end diary that allows people to find out what is happening around Cornwall. This fulfils CAM's primary aim; that of promoting cultural activities in Cornwall (Figures 5.1 to 5.5).

*This section introduced the brief for the Cornwall Culture project, and described the author's conceptual response to it in line with his thesis. It highlighted the socio-spatial dynamics that were present in the brief and detailed how his solution capitalised upon this to construct a solution that met with Busher and Hughes' principles for a socially reflexive space. The section further described the relative success of the project in terms of the client's needs. The next section will describe the ethnographic process that was designed to reveal the extent to which the conceptual strategy had supported a sense of place, or digital architecture.*



## **5.2 Ethnographic process**

*This section will describe the development of the ethnographic methodology used to study the project. It will begin by introducing the concepts of deductive and inductive research and explain how these methods are best used in conjunction with each other to allow reflexivity between a predefined theory and the data that is being uncovered. The section identifies a 'sophisticated grounded theory' approach as possessing the appropriate processes to enable the researcher to retain a direction of inquiry, and also to ensure a flexibility regarding its evolution according to what is found. Different types of interviewing technique are introduced and, by referencing Fontana and Frey's methodological elements for unstructured interviews, the author describes the development of his ethnographic strategy. Care is taken to describe each stage of the ethnographic study so as to demonstrate the reflexive qualities which reinforce the socio-spatial dynamic the thesis seeks to demonstrate.*

Having contributed significantly to a large scale project that consisted of socially navigated media about a particular place, the author felt it necessary to employ an ethnographic process to identify the extent to which it had contributed to a reflexive sense of place. Ethnography offers access to the unmediated views of individuals, avoiding the distortion of an imposed positivistic lens of a questionnaire or other structured techniques for sampling opinions. The processes employed were decided upon through researching a variety of ethnographic approaches, and the consideration of the context in which they could be employed. By the time the author had committed to an ethnographic study the project, which involved thousands of people, was already underway. Consequently, the techniques that could be employed were immediately constrained to being theory-led because research could only be carried out after people had posted to the project site. Investigations that involve a predefined theoretical model that is to be tested or proven must, it has been argued (Ezzy 2002:8), be constructed in such a manner that enables as much potential transformation of the original theory as possible. Ethnographic studies prior to the mid-1960s predominantly used methods that simply aimed to test or falsify the truth of a given hypothesis. Known as a 'deductive' model, this became highly criticised due to its inability to 'learn' anything about the context in which the study was carried out. As a reaction to this approach 'grounded theory' was introduced as a means of developing theory in response to a given situation. This 'inductive' theory was the antithesis of the

deductive model. In stark contrast to using a predetermined theory, inductive theory simply located the ethnographer in the midst of a particular context, and encourages theories to emerge according to the 'data' that is available (Glaser 1978:3).

The polarity between the two models since the 1960s has relaxed as post-modernism has questioned the ability for an inductive researcher to be able to adopt a 'tabula rasa' in order to interpret situations with complete naivety (Fontana and Frey 2003:68). In addition there was concern that an overemphasis on inductive theory may prevent any practical theories from emerging which could be associated with other models of experience. Consequently a 'sophisticated model of grounded theory' has emerged that draws on both inductive and reductive methods. The basic method within this approach is to "allow deductions from pre-existing theory to suggest research problems and foci, but the researcher must not allow this preexisting theory to constrain what is noticed" (Ezzy 2002:12). Accordingly any investigation should start with a predefined theory, understand its interpretation within the context that it will be studied. The investigator will be immersed in the context, and finally the theory will be redeveloped according to the data gathered.

With the Cornwall Culture project underway, it became important to identify a method that would support not only an inquiry into how sophisticated people's sense of place through using the system was, but one which used a reflexive approach that ultimately involved other people to ensure a redevelopment of any assumptions that the author had about the project's success. Consequently the study had to declare its interests at an early stage and use a method that acknowledged its deductive approach, while allowing the interactions with users of the websites to be as deep as possible. The distributed audience, the manner in which people interacted with the site through logging on, and the temporal circumstances of the project meant that the author could only realistically meet with people after they had interacted with the project. Involvement with any member of the public as they followed the site through advertising, and being there as they logged on was simply not possible. And as 90 per cent of users merely voted and didn't leave contact details, the only way to establish contact was to go through the online database identifying people who had used the site in different ways.

The circumstances informed the type of ethnographic research that was possible, it had to involve meeting a range of participants and thereby suggesting a form of interview. Throughout ethnographic practice, the historical development of interviewing has changed considerably due to the critical development of how audience and interviewer are

understood. Fontana and Frey presents the two primary forms of approach to interviewing; structured and unstructured, although there is vast scope for any combination of the two. The former is recognised as a largely deductive technique that has an implicit inability to guarantee a respondent's ability to not want to please the interviewer. While the interviewer should remain objective and stick to the set of previously determined questions, the interviewee can often attempt to aim to answer the questions as he/she assumes them to be best answered. In addition the wording of the questions may pre-empt particular answers. Lastly of course the interviewer may be incapable of retaining a consistent mode of asking questions to guarantee consistency across subjects (Fontana and Frey 2003:69). Unstructured interviewing offers more scope for eliciting a wider range of responses through an inductive relationship with the respondents, who are far more aware of the interviewer's involvement in the process. While it may retain elements of deductive strategy in order to direct the discussion, other aspects were considered; 1. gaining access to a group, 2. understanding the language and culture of the respondents, 3. interviewer presentation, 4. gaining trust, 5. establishing rapport and 6. how to collect the material (Fontana and Frey 2003:78). By becoming aware of the responsibilities for making contact and establishing good communication with each respondent, unstructured interviewing should enable a framework in which the material gathered not only has a high level of integrity, but is explicit about the ethnographer's presence and involvement (Ezzy 2002:13).

Having established that a 'sophisticated grounded theory' approach using predominantly unstructured interviewing was an appropriate method, the author developed a strategy that embodied the delicate dynamic between deductive and inductive practice. This was arrived at through consideration of Fontana and Frey's six aspects which should be considered in the development of an unstructured interview process, and additional strategies to retain a reflexive effect upon any predefined theories.

The following process outlines the development of a strategy;

### **1. Use of blog to retain open reflection upon the development of the theory**

Feminist practice within ethnographic research highlights the value of including the personal experiences of the researcher within the study. Declaring thoughts, interests and motivations are a means of preventing the research from becoming wholly deductive and led by a predefined thesis. Ezzy describes the value of such practice;

“Reflexively including the researcher in the research may involve all aspects of the research process. Personal experience provides data, ideas for theories, contacts for research subjects, it shapes the methodology, conduct of fieldwork and data analysis, and can be an important part of the research report.” (2002:154).

This reflexive aspect of an overall method offered a potentially constructive means of developing the entire strategy for the study, from questions and choice of people, to the feedback mechanisms for returning data back to the subjects for discussion. Contemporary mediums for reflection include weblogs or blogs<sup>16</sup> that allow individuals to make searchable entries which are organised by date. Their use within ethnography is growing and they provide a concise space for documenting the development of a research process.

“researchers argue that the value of the blog is in the exposure, to arguably a wider public, of the process of doing research: the blog’s diversions, asides, and connections show the complexity, creativity and difficulty of the research process.” (Beaulieu 2004:152)

Beaulieu’s study on the potential for blogs to support ethnographic practice points out the many constructive attributes that the technology has for exposing an awareness of both the researcher’s predefined theories and their thoughts and impressions during the study. Consequently the author set up a blog to support the development of the research programme (see appendix 1.0). The blog was used at the outset of the study to define the nature of the questions and features white board activity from meetings with fellow researchers to establish the nature of the interview structure. The blog entries describe the reflection process that the author underwent as progress was made toward the final questions, and later in identifying a method to allow the respondents to amend the interpretation of the data gathered.

## **2. Development of closed and open questions**

The development of an approach to the questions was based upon an understanding of the coding process that the author would have to employ to identify themes within the responses, so as to develop, adapt and extend theories (see section 8). The design of the questions was done with the strategy of moving from a structured to an unstructured form. A decision was made to work towards an unstructured conversation that would encourage each respondent to talk freely around a subject. In order to achieve this level of trust and rapport, the questions were developed in four stages moving from closed to open;

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<sup>16</sup> Blog is derived from the term ‘web log’, a form of webpage that through date stamping is often used to organise personal ideas with connections to other websites.

1. Context: Closed questions specific to the respondent's relationship with Cornwall.
2. Personal Focus: Mixture of closed to open questions that explore how the respondent contributed to the project.
3. Social Focus: Open questions that explored the effect of other people's use of the project on the respondent.
4. Meta: Open and highly reflexive questions about the experience of interacting with the project.

The direction of the questions was intended to establish an unstructured conversation that revealed insights into the respondent's models of place, and whether the site had contributed towards extending this. Rather than attempting to identify the success of the interface or the technology used, what was more important for the thesis was the level of complexity of each respondent's model for place that the social computing approach contributed to. Consequently, while closed questions asked "How much did you annotate other people's contributions?", open questions were as discursive as; "How has your 'image' of Cornwall changed since using the resource?". The 16 questions in total lasted for approximately 45 minutes, and their varying reflexive nature were written with the hope that a conversation would develop. The length of these conversations, it was hoped, would provide a depth of discussion rich enough to identify a delicacy in the different perspectives upon the subject of Cornwall. It was estimated that 45-minute conversations would produce approximately 10,000 words of material to transcribe, and it was estimated that eight respondents would provide a rich enough range of data to work from (Liamputtong and Ezzy 2005:49).

### **3. Gaining access to the group (after Fontana and Frey) through the database**

The only available access to respondents was through the database that stored user information. The database stores a range of information including: username, email address and location, the amount of stories submitted, tags created, votes made and images uploaded. The decision process used to identify the eight subjects was explored through the blog, and identified as being "based on level of activity and contribution". By sifting through hundreds of users, the objective was to identify the highest contributors and meet with the people who had used the project to its fullest. The blog recorded the initial

selection, and emails were sent to the available addresses. At this point the gender was considered, in order to gather a range of male and female respondents, however this wasn't always easy to identify as usernames and email addresses masked some of this information. After receiving an approximately 50 per cent positive response from each set of emails sent, a process of identifying the next most active users was used to send further emails out. After five waves of emails, eight users had volunteered to take part.

#### **4. Understanding the language and culture of the respondents, and interviewer presentation (after Fontana and Frey)**

The communication to each of the users was consistent and was arrived at through discussion with Cornwall Arts Marketing in order to be sensitive to people's suspicions about being contacted from the secure database, and to foster a sense of trust about the project's legitimacy. Subsequently the email was constructed in five short paragraphs that highlighted the following:

1. The author's academic identity as a post graduate *student*, and not a member of *staff*, in order to reduce any perception of power associated with the type of knowledge that was being sought.
2. The author's relationship with CAM and having their permission in contacting the user.
3. Explaining the desire to meet at a time and location of their choice for a chat, to heighten the user's sense of control over the situation.
4. A clear statement about data protection and the confidential integrity of the study.
5. A closing statement including the author's email address, personal mobile phone number to emphasise the openness of the communication, and a note that they will not be contacted again should they not respond.

From this initial email, further email communication remained chatty and highly open, to nurture a relaxed and transparent relationship. Replies were fast and often included the author's telephone number to encourage people to feel that they could communicate in any manner.

#### **5. Gaining trust, and establishing rapport (after Fontana and Frey)**

Having negotiated a time and place for meeting each individual based upon their choice of location, relaxed conversations were established without recording devices to nurture a sense of trust. The author would typically describe their role in the project as a whole, explain his background and often social circumstances that led up to the study. Locations such as pubs, cafes and living rooms were encouraged in order to place each participant in

a position of comfort and familiarity. The author's dress code was relaxed and at all times an accessible, positive appearance was given to encourage a positive and unthreatening rapport.

#### **6. Collecting the material (after Fontana and Frey) using audio recordings**

The transcription of all interviews was necessary to identify evidence of complex models of place. Consequently audio recordings of each interview were required. This was declared within the early emails, and a MiniDisc recorder with microphone was used introduced at the beginning of the meetings. The small device required no adjustment once running and supported up to 80 minutes of recording time.

#### **7. Coding of material using thematic analysis**

Coding refers to the process of identifying meaning within blocks of text, which can be used to identify theoretical attributes (Ryan and Bernard 2003:274). As with the gathering of ethnographic material there are two distinct opposing approaches; deductive and inductive. Content analysis is associated with the deductive, and is often used to test and confirm theories. It requires that predefined categories are searched for within the text, and that the occurrences are counted to support a particular theory (Ezzy 2002:85). Grounded theory is less inclined to use content analysis because it anticipates the emergence of theory through coding itself. Consequently processes such as thematic analysis are used to identify 'fuzzy' or abstract constructs that can be identified before, during and after data collection (Ryan and Bernard 2003:275). "Thematic analysis aims to identify themes within the data" (Ezzy 2002:88) and from this approach categories are induced from the texts to not only support predetermined assumptions, but to reveal the areas from which it is possible to formulate theories.

The use of thematic analysis was planned for the coding of the interview transcripts and while specific categories were expected to emerge through the coding process, the author anticipated particular themes within the development of the questions. These themes were identified through the whiteboard sessions and posted to the blog (see appendix), and they anticipated: people's motivations for defending or criticising Cornwall, their tolerances of its social complexity, and the transformative attributes of a sense of place.

#### **8. Use of a wiki as a reflexive publication medium**

Following the identification of themes within the transcripts, it was anticipated that these would enable the author to construct a series of statements about aspects of the sense of



place derived from the collection of interviews. At the outset of planning the study, it was decided through conversation with colleagues, and evidenced in the blog, that to a reflexive model that affected any conclusions drawn from the transcripts should be sought. Such a mechanism should be iterative, and repeated as many types as possible, so it would follow the guidelines for a grounded theory model that repeatedly questioned the theoretical outcomes of the study. Subsequently the use of a wiki<sup>17</sup> (Figures 4.7 to 4.9) (<http://cornwallculture.f-dat.org>) was identified as an appropriate collaborative editing technology through which the author could publish his interpretation of the respondent's perspectives upon the eventual themes, and then allow them to alter and correct them. This process not only met with the grounded theory principles of a reflexive exchange between deductive and inductive data, but it supported the development of a collaboratively constituted model of space. As each respondent logged in and read the statements, adjusted them and posted them back, a collaborative process of social exchange should emerge which has many attributes of social navigation.

With the subject of the discussion being that of a place, it also suggested that the wiki itself could become a form of architecture as it reflected the thoughts of the small social group who were contributing to it. This recalled Hillier comment that “[buildings] are maps of the social genotypes of human interaction.” (Hillier and Hanson 1996:403). The socio-spatial dynamic, albeit within text, began to offer many of the attributes that the thesis itself argued for as a form of digital architecture. Subsequently a strategy emerged to use the wiki not only as a limited discourse about the place of Cornwall between the eight respondents, but at a much wider societal level by linking it through the Cornwall Arts Marketing project; Cornwall Culture.

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<sup>17</sup> A WIKI is a type of website that allows multiple editors to edit a body of texts. Visitors to the site can easily add, remove, change the available content and often without registration.

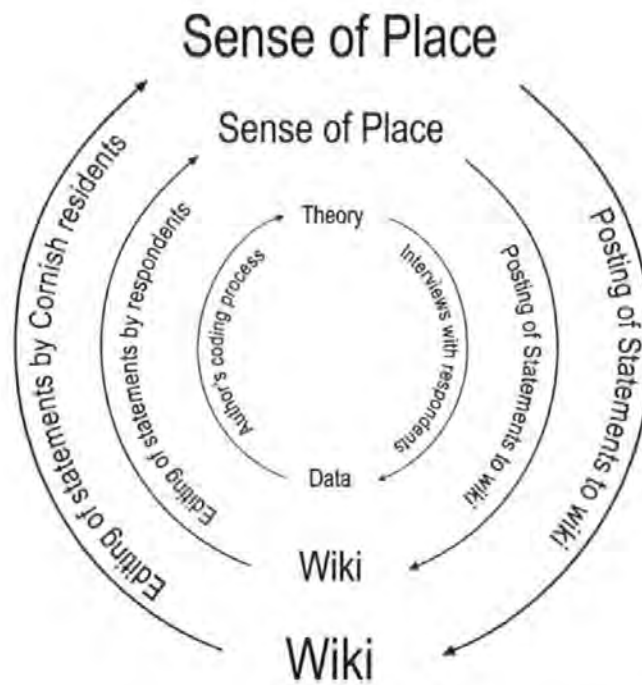


Fig 5.1: Extended 'sophisticated grounded theory' model of schema for study.

The strategy to allow wide scale access to the wiki as the final stage in the reflexive construction of a 'sense of place' for Cornwall, followed Ezzy's model (2002:13) for a sophisticated grounded theory approach (Fig 5.1). As each stage of the cycle from 1. interviewing the respondents to coding the transcripts, 2. posting interpretations of the conversations to the wiki, 3. allowing the respondents to adjust and add to the statements, and 4. finally linking the wiki to the Cornwall Culture site, it was anticipated that a sound reflexive strategy would reveal socially mediated responses to what Cornwall means to a wide audience. This process also followed Busher and Hughes' principles for a socially reflexive space allowing sociability through the wiki, the generation of a reciprocal perspective and intersubjectivity based upon the respondents different backgrounds and the ability to edit the shared text.

*This section has described the development of the ethnographic process. It introduced the concepts of inductive and deductive research and used their differences to identify the use of a 'sophisticated grounded theory' approach. The section looked at structured and unstructured interview techniques and found that the latter was more suited to a reflexive research method. Fontana and Frey's elements of unstructured interviewing were then used to complement the description of an eight-stage ethnographic programme that built on Ezzy's grounded theory approach;*

1. Use of blog to retain open reflection upon the development of the theory.

2. *The development of closed and open questions.*
3. *Gaining access to the group through the database.*
4. *Understanding the language and culture of the respondents, and interviewer presentation.*
5. *Gaining trust and establishing rapport.*
6. *Collecting the material using audio recordings.*
7. *Coding of material using thematic analysis.*
8. *Use of a wiki as a reflexive publication medium.*

*The strategic method was illustrated as a cyclical process that allowed the sense of place that was being studied to emerge with as much open negotiation with each scale of participant involvement as possible. From the one to one interview, to the coding and compilation of statements, to the respondents' amendment via the wiki to its publication to the Cornwall Culture website.*

### **5.3 The Study**

*This section will describe how the study was implemented and how the process was transformed through the meeting of people and the development of the wiki. It will cite examples of the conversations to exemplify how complex people's understanding of place is, and it will demonstrate how the coding process identified key themes within the transcripts. The section will go on to show how the wiki statements were constructed from different respondents' ideas, and it will illustrate how these statements were later modified by some of them through the wiki. It will close with the final involvement with CAM that resulted in them granting regional access to the wiki through the Cornwall Culture website.*

Following the strategy established in the previous section, the study was carried out over four weeks from late June to late July 2006. Seven people were involved after one participant chose not to turn up at the prearranged location. The conversations (which can be found in the appendix 2.0) all involved a complex range of discussions to a lesser or greater extent with many of them lasting for over 40 minutes, and resulted in vast amounts of material from which to code. Each participant differed greatly in their background and

relationship with Cornwall, and consequently their response to questions demonstrated a wide variety of emphasises on what Cornwall meant to them.

The coding process took a series of iterations, used thematic analysis and identified particular subjects within the conversation. The first analysis highlighted the following 12 subjects; value, negative images, sentimental images, poor image, being Cornish, external perceptions, personal images, problems, social and collaborative, political, change, sense of place.

For the purpose of demonstrating the author's approach to thematic analysis, the following example is used that codes a part of the conversation with respondent Sarah according to a 'sense of place' and 'being Cornish'.

Sarah: Because the poster, the picture I posted was of my daughter and her dog on um, Porthcothan beach.

CS: Right.

Sarah: [Sense of Place] And it just struck me that there's huge difference between things like pace of life, quality of like um, style of life and things like that. Um, and. This sounds really weird but there's um, there's some element of this is her birthright actually. There's, you know she has a right to have this kind of culture because of who she is, okay.

CS: Go on. Can you take that, that sounds fascinating. I don't really understand.

Sarah: Hmm. Right well if she were from, you know London...

CS: Yeah.

Sarah: [Sense of Place] ...she were a Londoner, and that was her identity. Then it would be only right for her to, you know, walk along Waterloo Bridge in the sunset with her boyfriend.

CS: Oh I see. Right.

Sarah: [Sense of Place] And that that would be something she would be able to take some pride in and say yes this is mine I have a connection to this.

CS: Right.

Sarah: This is important.

CS: Yeah.

Sarah: [Sense of Place] My daughter's being, you know being Cornish, being, being a person from Cornwall as well. Um. What her heritage is all about, is something very very different from the rest of the UK. [Being Cornish] We're, you know, predominantly tin mining and fishing, you know society in the beginning. And that's led to a very very different way of doing things to say Manchester, which was founded on the Industrial Revolution.

CS: Yeah, sure.

Sarah: [Being Cornish] Um, so it's, it's kind of, it's very important for me, for her to sort of notice the connection to nature and things like that. And being from West Cornwall everyone out there is weird and half of them are Pagan.

Sarah's responses to the questions "How did you contribute to the site?" and "Why did you contribute?" revealed a complex series of reflections on how her image represented the

difference in the 'sense of place' to that of being from London. This quickly evolved into a contextualising the Cornish 'sense of place' with that of 'being Cornish' which involved subjects of social practice and identity rather than a personal attachment through geographic attributes. Sarah's statements exemplify the complexity of much of the transcripts, and how subtle the coding had to be in order to develop qualitative interpretations. While many aspects of the transcripts are part of the exchange of question and answer, there is a depth in how people extended ideas, embellished their reasons for why they contributed, and how the site impacted upon their model of place. In discussing whether the project's website demonstrated the complexity of Cornish culture, respondent Will described a highly personal and negative anecdote to describe how complicated the Cornish cultural identity was.

Will: [Negative] No one has a problem with Asian dance company. I don't know, whatever.

That's all we need, we need now, and I think it's probably coming, we need a Cornish film collective, You know we need Cornish theatre company, we need, er. It's the only bloody way cause otherwise all the time. I've been in situations. I mean, there was big debate recently, this is education now. The Cornish Bacallaureate...

CS: Oh right, okay.

Will: I was sat in a room with 20 head teachers, and er, deputy head teachers from Cornwall.

CS: Right.

Will: [Negative] I was the only Cornish person in the room.

CS: Wow.

Will: [Negative] And they were debating whether to call it the Cornish Bacallaureate, or the Cornwall Bacallaureate. And they were really worried that Cornish Bacallaureate has certain connotations, they couldn't, they couldn't articulate them. But it worried them somehow, and they wanted to call it Cornwall Bacallaureate. Now I managed to (*thump the tub*), and it's called the Cornish Bacallaureate, and we have become involved and I think it's a wonderfully positive proactive thing that we've come up with. I'm very proud of it, and we'll see, it's been piloted in September.

CS: Great.

Will: Um, but that's an example of um, the people who are making the decisions are not being aware of the issues and, and being a little bit uncomfortable about them. Er and so.

CS: What is it, yes. Uncomfortableness, do you think? Is it?

Will: [Negative] Well because, yeah, if, if, you don't want to be told you're a white settler, do you. You don't want to be, you don't want to be told you're an outsider.

CS: Right.

Will: You know. And er, if you aren't allowed, you're not allowed to be Cornish.

CS: But, but there's, by working for Cornish school, you're not going to (...)

Will: [Negative] The deputy headteacher of Newquay said, we're not a Cornish school. She told me, we're a school in Cornwall, we're not a Cornish school, we're a school in Cornwall. I was told that by a secondary school deputy head.

CS: What does that mean? What is she trying to say?

- Will: [Negative] It means I'm not part of your weird little fascist, xenophobic, backward looking, er, flag waving, um , harp-harping after some golden nostalgic age which never was. Um, we're about the future. Whereas I think -
- CS: Which is English, I presume cause she's saying it.
- Will: No cause she's neutral, she's not English. She happens to come from England, speak English, all her colleagues are English, er.
- CS: But she said she's not Cornish then?
- Will: No.

After the initial reading of the transcripts, statements were collated in individual documents according to the themes. This enabled statements to be read alongside each other in the context of the themes. Following this analysis, the 12 initial themes were recompiled into five; Being Cornish, External Views of Cornwall, Negative Ideas about Cornwall, Personal Images of Cornwall, and The Politics of Cornwall. The recompilation was intended to have two purposes; to find broader and more descriptive categories within which groups of statements could be housed which would allow some overlap, and to begin placing them within categories that could easily be understood when fed back to them.

Consequently initial themes such as 'value', became redundant as the statements that were coded with the term had too many possible meanings. Thus, during the second analysis, statements coded with 'value' were sorted according to the broader categories. At this point the deconstruction of the transcripts and the respondents' conversations began to develop into the construction of the author's interpretations that would be posted to the wiki. This critical stage required the reading across the respondent's testimonies to construct summarising declarations that embodied what the subjects had felt. It is possible to identify within each declaration the respondent as source of its formulation, for example:

*People who are Cornish have had to work for it. Whether by ancestry or by allegiance, the Cornish have endured a Cornwall that is tough as well as beautiful. Being Cornish is about living through the 12 months of the year when the tourists go home and when the seasons turn the seaside beaches back into smugglers' coves.*

The above statement is the author's original interpretation that was developed from the coding process, and can be traced from a series of comments from the respondents that include the following:

Raine, a student from London whose family had recently moved to the St. Ives area after spending holidays in Cornwall, discussed the different levels of seasonal commitment that Cornwall demands:

Raine: I mean the people we work for are really Cornish and um, and they've lived here their whole lives and they've, you know, carved out, you know, a living for themselves which is great but um, they are very protective of, of their place as well. Which is interesting you say they haven't, there's not many Cornish people been on the site, and that doesn't surprised me really because...

CS: Go on why?

Raine: Well, because, they're just kind of, although they like the business and they like the people to come down they also like it for themselves and, they, you know, they don't like all the tourists and all this kind of stuff but I guess you have to make the most of what you've got and that kind of thing.

CS: Yeah.

Raine: I don't know my, my view is obviously very centred on St. Ives, this is where I spend a lot of time and this place is very seasonal, I don't know. I think a lot of other places must be, but I think not to this extent. I think Padstow is a bit more year round, I get the impression, and Rock and that kind of thing.

Sarah, a single mother, who lived on an airbase outside Newquay was very passionate about a connection to the land and her daughter's ancestral links through Sarah's divorced husband.

Sarah: Um, so it's, it's kind of, it's very important for me, for her to sort of notice the connection to nature and things like that. And being from West Cornwall everyone out there is weird and half of them are Pagan.

CS: [Laugh]

Sarah: So you know things, things...

CS: You said that not me.

Sarah: You know. It's who she is. So. And she's got quite an interesting ancestry because um, her father's family were a noted mining family. As in mine captains, and their names are all over the town, and they owned everything. So she's got that, you know, that very interesting kind of link on her personal history. Um, and I don't know, I just think it's important for people to have a sense of place and I think we do have that here. I think we undervalue it as well. I think we ought to be a little bit more proud of what we've got, you know. I grew up when being Cornish wasn't fashionable and we used to, us, us nasty people with the Home Counties accents used to be quite cruel to the (county's) children at school. But when you sort of grow up a little you realise that actually they're the guys who have got it made.

Will, a writer, musician and educational consultant who was very outspoken about defending Cornish identity, had formulated a more complex framework for 'being Cornish':

Will: I do, I consider there to be at least four ways of being Cornish.



CS: Oh right.

Will: You can be born and bred Cornish.

CS: Right.

Will: You can be Cornish through your family, in other words you may actually come from Australia or America. There are six million people worldwide that say they are Cornish. And some of whom, many of whom never set foot in the place.

CS: Right.

Will: Um, you can be Cornish by conviction, meaning that you've done your time, you've lived here long enough, and that you've thought things through, and you've made that, I often say to people: I was English by accident and I'm Cornish on purpose.

CS: Right, great.

Will: And the fourth one is simply you can be Cornish by allegiance. People who would never say 'I am Cornish' but they actually embrace the issues, er and, care about the kind of aspirations of Cornish people.

Graham, a local businessman and a member of Liskeard's town council, specifically used the term smugglers in a largely derogative context:

Graham: Um. There's almost a standing joke that er, when they were testing DNA they came down to Cornwall, and they decided it wouldn't work because everyone had the same DNA.

CS: [Laugh] That's interesting.

Graham: Um. I think in reality the Cornish would really love to be fisherman and smugglers still.

Through reflecting upon each of the categories and the conversations with the respondents, five short documents were written as an interpretation of the Cornish sense of place. These statements were posted on to the wiki and each participant was invited to visit the website, and amend or extend the documents according to what they felt was 'right' or 'wrong' from their perspective. The respondents were also sent a link to a copy of the transcripts that were made, to assist them in recollecting the conversations.

Response to the wiki was mixed, with some very positive comments, and small changes being made by three of respondents, while others appeared uninterested in it. Of all of the respondents who did contribute, Will was the most active in adjusting terms, with particular focus upon the author's use of the term county, in order to reinforce its distinction from being a part of England.

*The Cornish ~~Young Cornish~~ people are continually told that they will never be financially rich viable people unless they ~~leave the county~~ leave. Poor planning projects have provided them with bad social housing which exaggerate the sense of value when compared to the pretty second homes that are being purchased by people outside of the region. A lot of people are making money from saving Cornwall - but the Cornish aren't making it themselves, in particular European money seems to prime projects that are led by the non-Cornish but never have any lasting affect on the communities.*

And, to deal with the xenophobia that he often finds is associated with Cornish political acts:

People from the outside try to 'save' Cornwall by marketing the things that they want to receive for themselves; the beaches, the food and drink. They aren't too interested in cultivating history or language or things of Cornish Identity. The Cornish identity frightens them a little because ~~it uses unorganised methods to voice itself~~. because they assume it is about xenophobia and exclusivity. We are determined that celebrating the Cornish identity is about outward looking inclusivity.

Bob and Graham both made changes to the wiki, but concentrated upon the grammar and spelling, which suggests that either they subscribed to the posted ideas or that they did not understand the reciprocal objectives in returning the statements to them. However, through email conversation Bob was very positive and suggested that his interaction with the wiki was constructive and that he was supportive of the author's reconstruction.

I had a quick look when I first got your email and was really quite impressed that you seemed to have merged several people's views into a document I felt OK with. Reading it I thought I could see bits that came from me, bits where other people had overlapped me and bits that came from the others but that I wouldn't argue with. (email from Bob, 25<sup>th</sup> August 2006)

By this point Bob was also keen to allow other people to see the wiki and possibly contribute to it. He was particularly keen that Dick Cole, the leader of Mebyon Kernow, the Cornish political party should be involved and asked to respond to the statements.

The final stage of the study's research cycle was the publication of the wiki's address on CAM's Cornwall Culture website to reach a broader community and be subject to their changes. The addition to the project site was welcomed by CAM since it provided progressive clarity to the initial project that had received so many differing responses to the question; "What does Cornwall mean to you?" By hosting access to the wiki, CAM could use the evolving statements as 'quotes' that had been mediated by the Cornish, whether from the small research project from which statements were made, or by residents who amended the declarations that were now in the public domain.

At the point of writing this thesis, a link to the wiki had been published at the project site of Cornwall Culture; [www.cornwallculture.co.uk/culture-projects.php](http://www.cornwallculture.co.uk/culture-projects.php) and the wiki is now open to public editing. The ethnographic process at that point was now finished and the subsequent transformation of the wiki has become part of a perpetual iterative process to

support the development of a shared commentary upon how people understand Cornwall as a place.

*This section demonstrated how the study was implemented and used examples from the transcripts to demonstrate the complexity of the sense of place that the participants articulated. It also illustrated how the coding process identified themes within the transcripts and how these became more focussed toward the development of five core themes for the wiki. It gave an example of how a part of one of the statements was based upon the conversations with the respondents before they were posted on to the wiki. The section also illustrated how some of the participants had amended the wiki statements and how positive their support was for the author's mediation of their ideas. It finished with the launch of the wiki on to the Cornwall Culture website, so that it was open for people to edit, amend and extend.*

#### **5.4 Reflections upon the Project and Study**

*This section will reflect upon the project and study and consider how successful both the theoretical and the technological approach were. It will briefly review the nature of the project and the ethnographic study to illustrate how both demonstrated features of a social-spatial complexity. It will reflect upon whether the techniques used can be considered as a form of Castells' social material and to what extent the project sustained an 'architecture' that could be considered dematerial. The section will then discuss whether a socio-spatial dynamic was generated between the architecture and its small society and whether this is adequate to be considered a form of digital architecture. In closing the section will reflect upon how the Cornwall Culture projects have been informed by the practice-based work described in the previous chapter.*

The project and study were both intended to demonstrate how social navigation technologies are able to contribute towards a construction of a sense of place that can also be understood to be a form of digital architecture. The conceptual direction of the project was particularly explicit in doing this through the use of collaborative filtering, tagging and voting. However, the study demonstrated these traits in a more complicated and implicit manner. The sense of place that became the digital architecture based on Hillier's supposition that "[buildings] are maps of the social genotypes of human interaction"

(Hillier and Hanson 1996:403), was easy to identify in the interactive online space that the project resulted in because it was made up of people's photographs of Cornwall, and were located on screen within the subtle outline of the Cornish peninsula. The study however is more complicated because there were no images or visual representation of space. The generation of the statements between the author and the respondents, it is argued, is the architecture. The iterative process from meeting the seven people, coding the transcripts, posting to the wiki, respondents amending them, and the final publication of the wiki on to the Cornwall Culture site, suggests an effective construction of a sense of place using a socially navigated method. What is more, the mediums used moved sensitively from spoken word to text, both entirely dematerial systems closer to Nicholson's narrative of the runner bean as an architectural system (Nicholson, in *Reflexive Architecture* 2002, p.13).

At the outset of involvement with CAM, and the intention to contribute the development of a project site and then study its success, the author always intended for the project to remain the primary example of a socially navigated digital architecture. However, through understanding established ethnographic methods it became clear that if the study itself was to follow Ezzy and Fontana and Frey's models for a 'sophisticated grounded theory' that wasn't theoretically predetermined, then it would have to be reflexive. This reflexivity between theory and subject, through the use of inductive and deductive methods in unstructured interviewing that was extended cyclically through the use of the wiki, demonstrated social navigation toward a mediated sense of place. The author has used Castells' proposition that social / technological networks had contributed toward a new social material (Castells 1996:502), to argue the case for social navigation technologies supporting the construction of digital architectures. The methodology of the study and its resulting transcripts offers a rich individual depth of reflection on the subject of what is the culture and place of Cornwall, while the wiki simply networked it. The subsequent iterations that the summaries have already undergone and will continue to go through should build allegiance and commonality. Bob's email and Will's careful editing demonstrate a subscription to a subject of space, despite them never having met.

The social navigation employed through the project is far more noticeable than within the study. The project proved relatively successful in constructing a space for the different responses to the question; "What does Cornwall mean to you?". The range of contributions scattered across the interface allows many possible routes of exploration for visitors, and provides a limited ability to summarise them. Although the user can organise the thousands of images according to location, keyword and date created, the user is still left to sort

through the images according to their own interests and motivations. This obviously results in a high level of indirect social navigation as people construct their own interpretation of the 'sense of place' that is generated, and it also has the potential to remain a very loose or open form of architectural system.

The study's use of social navigation is embedded in the cyclical process that led toward the initial wiki statements being constructed. The thematic analysis used to support the construction of the statements was a very direct form of social navigation, because the author's editorial process was extended literally from the meeting and interactions with the respondents. The subsequent editing of the statements in the wiki becomes less direct and shifted gradually to the indirect. For the respondents, editing the wiki is partially indirect as they do not know each other, although they can identify their own thoughts within the texts. This is also partially direct, but by the time the wiki reached the wider public it is obviously highly indirect. This slow transition from direct to indirect enables the sense of place to retain a much tighter or closed socio-spatial dynamic, which suggests a more specific form or architecture. Obviously over time this is liable to decay depending upon the widespread use of the wiki due to its 'openness', which will allow anybody to potentially corrupt, erase and imbalance the statements. Both projects had made specific reference to Busher and Hughes' principles for a socially reflexive space in their formulation and largely succeed in sustaining these imperatives throughout the experience of the works. However due to the majority of indirect social navigation, the sociability of the works was weak compared to that of the traditional CVEs from which the principles were derived. Busher and Hughes use Whyte's proposition that "what attracts people most...is other people" to support the need for synchronous interaction with people (Busher and Hughes 2003:102). Both the project and study resulted in an asynchronous community in which it is difficult to see people live in either the project website or the wiki. This should not be interpreted as a flaw, but represents the critical difference between the material form of CVEs that to date have used Cartesian geometries to construct worlds that exist in the same time base as actuality, and the characteristics of a dematerial digital architecture in which the integrity of a social material is more important than visual identification with fellow users. Both the project website and the wiki allowed users to interact indirectly with other users because they were interested in what they were saying and the 'footprints' that they were leaving which it is suggested it a richer form of knowledge than simply the watching of other people. The other two components of Busher and Hughes' principles - reciprocity of perspective and intersubjectivity - are heightened due to the dematerial frameworks of both project and study. The reciprocity of perspective

is not limited to Alberti's (see chapter 1) guidelines for architectural compositions suggested in the synchronous context of CVEs, but engages with Habermass' broader use of the phrase in discussing the potential for a condition in which participants within a social system "must be willing to revise their descriptions of themselves and others" (Habermass 1998:42).

Intersubjectivity is present in the project site for Cornwall Culture, and the use of photographs as the primary interface is based upon common sense and a familiar metaphor. The use of text in the wiki to constitute a dematerial 'landscape' is highly accessible, although it is noted that English as the spoken and presented language limits its widespread accessibility and politicises its articulation of a Cornish culture which has its own language. In reflection both the project and ethnographic study demonstrate the potential for a socially constituted, dematerial architecture with strengths and weaknesses present in either strategy.

The Cornwall Culture brief was rare because it demanded an enquiry into a space that is too large for individuals to 'see', making it beyond material. The opportunity to use social navigation tools within this brief was therefore easier to build a reflexive project and study to encapsulate it. Many of the technologies that the site used are not new, but their deployment in the complex subject of space makes them operate most effectively.

Flickr and del.icio.us have established a reputation for constructing 'folksonomies', and are highly successful because they operate beyond geographical boundaries. The sharing of photos and media is not limited to physical communities, but the semantic network that links them. Frappr<sup>18</sup> and projects such as Urban Tapestries<sup>19</sup> use geographical base maps alongside 'tagging' technologies to describe space, and construct many complicated social networks, but the Cartesian map remains present in each and the material space remains dominant. The Cornwall Culture project and study situated under the single, large well-marketed guise of Cornwall Arts Marketing now operate as socio-spatial digital architectures. They qualify not because they simply ask questions about a spatial region, or because they are made up of people's answers to the questions, but because they are both,

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<sup>18</sup> Frappr is a social mapping tool that uses Google maps to allow people to 'tag' places and coordinates with stories or information. By setting up a Frappr map the user can invite other people to associate other tags to a particular map.

<sup>19</sup> Urban Tapestries is an open source software project for mapping public knowledge. It uses mobile technologies to allow people to build relationships between places and to associate stories, information, pictures, sounds and videos with them.

and they continue to be mediated through a reflexive method. While Hillier's socio-spatial dynamic for explaining architecture's relationship with society is handicapped by the inability for buildings to transform in time, the temporal dynamic of socially navigated digital architectures has the potential to overcome this.

*"The material form of society at any moment of time is not that society, it is the means by which that society is transmitted into the future. The material form of a society and certainly not its structure, but, by being a realisation of the underlying genotypes of society, the material form is the means by which the society as an abstraction is realised in space-time and then reproduced. Society is not in itself its material form, but even so exists through its material form. This curious double-take is why all social practice take the form of abstract structures, like the grammars of languages, which are never seen as part of any material reality, but nevertheless dominate that reality by structuring what can happen in it, and by creating the real space-time events through which those structures are themselves perpetuated."* (Hillier 1996:403)

Reflecting upon the methods that emerged from the author's explorative practice described in the previous chapter, and the response to the Cornwall Culture project brief, there are evidently variations in the specific strategies employed for different contexts. On the one hand the author was operating as an artist / designer aiming to make digital architecture, on the other his aims for CAM were to develop a heuristic experience that led to an understanding of the complexity of culture in Cornwall. However, the method employed for the Cornwall Culture project was greatly informed by the simple four-step method that emerged in the development of the Reading Rooms project and which became consolidated through Invisible Transmissions and Tag Clouds (see previous chapter).

The following matrix demonstrates the stages of the Cornwall Culture project against the one that was developed through the practice-based projects:

<b>Practice-based methodology</b>	<b>Cornwall Culture Project Website</b>
Identify a digital /social database	People's digital photos as database
Identify a classification system	Voting and tagging by people
Correlate the two forms of data	Correlated in social website
Model the architecture to allow change	Different filtering allows multiple views

The Cornwall Culture brief involved the use of a social community as the database in their devising of the question "What does Cornwall mean to you?". However, the author used the submission of photographs as the digital components. Voting and tagging the photographs became the classification system to differentiate people, while the social



interface to the website enabled a correlation between the tags and the photos. Different filtering enabled the photographs to be rearranged according to place, date, and tag word.

Through its implementation in the Cornwall Culture project, this formative method developed through the author's artistic practice, had evolved toward becoming a design method to support the creation of digital social architectures for an industrial context. Reflecting upon how the method altered between initial development and industrial application we can begin to see how it offers a robust framework for integrating a social dimension into digital architectures.

Part 1 of the method ("Identify a digital database resource that is subject to social transformation") remains a critical starting point for the method's employment within a design task. For the Reading Rooms project, the library borrowing database presented itself as an existing unemotional resource that was subject to transformation by people. Whereas Cornwall Culture required the author to invent a database that had similar properties. The suggested use of images as the primary element within the database provided a resource that individual contributors would 'care' about. Triggered by the question "What does Cornwall mean to you?", the database was predisposed to grow with resources that would relate to the spatial context that was the focus of the project. Upon reflection on the importance of this characteristic, the language of the first part of the method can be extended to ensure that the resource of the database is connected to the spatial context that is being examined. In each of the artistic projects that followed the method (Invisible Architectures and Tag Clouds) there was an implicit connection between the database and the spatial context. Such an amendment confirms the need for a designer to locate or develop a resource that binds a social community to a spatial context through elements that can be easily stored in a database.

The role of Part 2 ("Identify a classification mechanism for differentiating between individual architectural spaces") is intended to provide attributes that will contribute to the correlating of Part 1's collection of social data with the spatial context. The Dewey system offered this for the Reading Rooms because it encapsulated the breadth of subjects that could feasibly be studied by students within the spatial context (the School of Art and Design). The telephone directory performed the same function for Invisible Transmissions because it contained every internal member of staff who could send somebody an email within the campus boundary. For Cornwall Culture, a classification system had to be developed which would involve everyone who had submitted an image to the database.

The author applied the established Web2.0 practice of applying tags and votes to the images to construct the classification system. In doing so, the initial question of “What does Cornwall mean to you?” - which could have resulted in a large database of unmediated images - was surreptitiously replaced by a process in which users became involved in answering the inherently spatial question “Is this what Cornwall means to you?” Through tagging and voting as a form of classification the socio/spatial dynamic was fulfilled as people agreed and disagreed with other participants. Part 2 was originally written in anticipation of small scale architectural environments, and due to its ability to operate for the substantially larger spatial context of the Cornwall Culture brief, this aspect of the method should anticipate a broader spatial context.

Correlating the social elements within the database with a spatial parameter that allows the designer to provide the basis of a socio/spatial dynamic is central to Part 3, (“Correlate the two forms of data to allow 1 to express itself within 2”). For Reading Rooms, occupants of the rooms across the School of Art and Design were asked for a specific subject that they were studying to which a Dewey number could be assigned, thus linking a person’s elements within the database with a space. For Invisible Transmissions, matching a sender’s email identity with their building location on campus allowed people and space to be linked. The correlation within Cornwall Culture occurred in the interaction with the images, stories and process of voting on the website. Cornwall Culture was significantly different to the former projects because it was interactive, but it still followed the methodology because the user acted as the point of correlation as he/she categorised other people’s contributions with their own sense of place. Choosing to look at specific images and vote for them according to the question “Is this what Cornwall means to you?” provided the feedback within the method between Part 1 (images provided in response to the question “What does Cornwall mean to you?”) and Part 2 (the user’s engagement in voting and tagging).

Part 4, (“Model the architecture not as a whole but as individual units and allow 3 to inform the reorganisation of them”) represented the synthesis of the previous parts of the method, and required the use of graphic visualisations in order to present a digital architecture. Whether animated live (Reading Rooms, Invisible Transmissions), statically (Tag Clouds) or through a user interface (Cornwall Culture) the method indicated that any resulting ‘image’ should be made up of individual units to allow for the reorganisation of an architecture. Cornwall Culture’s graphic user interface (which contained the photos), sustained this aspect of the method by allowing users to organise photographs by

keywords, chronologically, or spatially according to which part of Cornwall they had been submitted from. Visually, the outline of Cornwall was always present in the display, and operated as a 'holding graphic' for all of the photos and content that substantiated the socio/spatial digital architecture for the region.

Part 4 of the method was the graphic synthesis of social and spatial data to create the digital architecture, and required the terms 'individual' and 'reorganise' in order to identify the capacity for small social components to transform the image of an architectural context. Following the Cornwall Culture it is evident that this use of language was important to retain as it identified the importance of the method to allow social activity to alter or determine an architecture's constitution. The term 'model' was also important to retain, as it made explicit reference to the architectural design community in the representation of a space. However it was felt that the term 'unit' alone diminished the people-centred processes, and that this should be replaced with the term 'social elements'.

As a result of this critical evaluation of the method through its use in the Cornwall Culture project the four step process can be rewritten as follows:

1. Identify a digital database resource that is connected to the spatial context and that is subject to social transformation.
2. Identify a classification mechanism for spatially differentiating between individual database entries.
3. Correlate the two forms of data to allow 1 to express itself within 2.
4. Model the architecture not as a whole but as individual social elements and allow 3 to inform the reorganisation of them.

These reflections upon the effectiveness of the method through its application in the Cornwall Culture project demonstrate its success in both demonstrating a procedure toward the production of digital architectures that represent social dimensions. Upon considering the breadth of application to date - from the small arts-based projects to the substantial Cornwall Culture project - minor adjustments to the language of the method are intended to provide a more robust series of statements for wider future application.

Although the practice-based development of a method for designing social digital architecture operated successfully in the Cornwall Culture project's website, it is less transparent in the ethnographic study. This is simply due to the different objectives that the

study adopted at its outset and the integrity of the study that followed the guidelines of Ezzy and Fontana and Frey. However, the reflexive processes evident in the correlation and remodelling of the socio-spatial architectures are present in the use of the wiki as the reflexive tool to extend the editing of Cornwall's sense of place.

*This section has identified the differences between the project and the ethnographic study in achieving a socio-spatial dynamic which, it has been argued, is a form of digital architecture. It identified the dematerial qualities of the study compared with the highly socially navigable but geographically suggestive, project website. It also proposed that the study was a form of Castells' 'social material' due to its reflexive and networked attributes, and it discussed the potential for it to construct new social formations. The use of social navigation was identified in the project and study, and the use of indirect and direct techniques was discussed according to how they contributed to varying degrees of open or closed architectural systems. Busher and Hughes' principles for a socially reflexive space were recalled to reflect upon the adherence to them in the project and study, and through a brief analysis the projects dematerial qualities were compared to that of CVEs. The section reflected upon the difference that both Cornwall Culture projects have when compared to the more widespread use of social navigation systems. It highlighted how both the project and study stand out from other systems because they use a more complex form of place that is embedded within the construction of a social space. The section finished with a reflection upon how the methodology derived from the practice-based work had informed the Cornwall Culture project, and how, in turn, the language of the methodology was modified to account for broader contexts.*

*This chapter has concentrated upon one particular aspect of the project work that supports this thesis. The Cornwall Culture project was introduced as an industrial brief that the author used to employ social navigation technologies to construct a form of digital architecture. Section one introduced the brief from the client and the author's response to it, which involved the use of social navigation technologies according to Busher and Hughes' method. Section two focused upon the ethnographic process that was developed to identify the potential of social navigation technologies to construct a sense of place and therefore a digital architecture. The section detailed how the author had used established ethnographic research methods in formulating an approach that would support a reflexive process. It went on to describe each stage of the study's programme and describe how stages would meet the aims of developing a sophisticated grounded theory approach to the*

*research. Section three looked at the effectiveness of the study, using parts of the transcripts, the coding process and use of the wiki to demonstrate how it had built a reflexive expression about a sense of place. The final section reflected upon the entire process, and referenced both Hillier's and Castells' socio-spatial dynamics that informed objectives for the proposed new form of digital architecture. It differentiated between the project and the study's architectural system due to the different use of social navigation technologies, but proposed that both had successfully constructed a dematerial form of place that was constituted through the use of a socially reflexive method.*

## Illustrations

The screenshot shows a web browser window with the URL <http://www.cornwallculture.com/culture-projects.php>. The page features a header with the title "Cornwall Culture" and a navigation menu with buttons for "Guide", "Region of Culture Campaign", "About CAM", "News", "About the Campaign", "Participating Venues", and "Launch the Project". A speech bubble on the right asks "What does Cornwall mean to you?". The main content area is titled "About the Campaign" and includes a text block explaining the project's goal to propose Cornwall as Europe's first Region of Culture in 2010. A large graphic reads "CORNWALL Europe's 1st region for CULTURE". A call-to-action says "We need YOU to make it happen". On the right, there is a "Quick Search..." section with dropdown menus for "I am looking for..." (set to "Any") and "based in..." (set to "Anywhere"), and a "Search" button. Below that is a "My Culture - Sign in" section with a login form for "Username:" and "Password:", and a "Login" button. A blue circular badge says "Take me to the project". The IXTW logo is at the bottom left.

Figure 5.2 Cornwall Culture Project welcome page





Figure 5.3 Project website with photographs arranged by location



Figure 5.4 Project website with one photograph chosen





Figure 5.5 Project website reverse of photograph showing feedback.



Figure 5.6 Project website photographs organised by keyword



Figure 5.7 Wiki homepage



Figure 5.8 Wiki statement page





Figure 5.9 Wiki 'See Changes' to statement page

## **6.0 Conclusion**

*This chapter will close the thesis with a summary of the theoretical narrative and the development of the practice-based components that support a method for the recovery of digital architecture. The second part of the chapter will provide closing remarks that reflect upon the value of the thesis and briefly place it into a wider context.*

### **6.1 Compressed Summary of the Theoretical Narrative**

*This section provides a compressed summary of the theoretical narrative used to propose how social navigation technologies can be used to recover a method for the development of digital architectures.*

As internet technologies and cultural ideas converged in the late 1980s, digital architecture emerged as an exciting extension to mainstream architecture. With the naming of 'cyberspace' and the population of the internet, CAD technology matured to allow architects to begin representing forms of an alternate virtual reality. In the ten years since the publication of *Architects in Cyberspace* - which consolidated the practice and writing of a series of artists, designers and thinkers who were excited by the possibilities of the new digital space - the field has slowed and turned to other forms of describing itself, and has lost sight of what detailed its original aspirations. Chapter one introduced the work of a wide variety of digital architects in order to categorise the focus of their practices into five areas:

1. Surface and image, new forms of architectural shelter.
2. Post-Cartesian forms and structures.
3. Genetic and biological computing models offer an integrated framework beyond split time and space.
4. Augmented digital architectures will support our experiences in actual space.
5. Cyberspace as offering 'new' properties that offer different challenges for architectural method.

Despite the blurs between the subjects, the categories were used to identify the graphic styles and theoretical concepts that emerged within the field. The collection of illustrations

and analyses of particular architects' work were used to support the claim that the style of imagery had become repetitive and stylistic, and in many cases the practice of individuals had dried up. Perrella's energy in defining 'hypersurface' over two books and numerous articles dissipated as he struggled to escape the Cartesian nature of the software packages to overcome the dualism that fuelled his earlier motivations. The chapter traced Novak's work and his decision to work with stereolithography, rapid proto-typing and ultimately audio as an attempt to reconcile an audience's inability to understand the complexity of his 'liquid architectures' when presented in print or on screen. The dilemmas were at the core of a critical dilemma for digital architecture; how to represent post-Cartesian spaces using Cartesian coordinate based drawing packages. Biological systems were used as methods of transferring the act of design from the architect to computer code, but in the case of Chu's work subsequent digital forms tended to remain adhered to a mannerism of slick organic shapes.

Of the five areas, the first three had not only apparently failed in the development of a sustainable synthesis between theory and practice for post-Cartesian digital architecture, they had contributed toward an orthodoxy of style. This led to a banal series of design approaches to using CAD packages in print, television and advertising. Augmented digital architectures and the work of Dunne and Raby had always insisted on working in the threshold between digital and real, and on retaining a foot firmly grounded within actuality. This foothold provided them with an escape route as they began to distance themselves from the mannerism emerging within digital architecture. Cyberspace was turning out to be less of a virtual reality to which we could escape, and more of a series of social tools to support our life in actual space. Now associated with the analogue manifestations of the field of interactive architecture, it was argued that Bullivant's description of their processes for "treating digital space as physical matter" demonstrated digital architecture's failure to escape the inertia of Cartesian dualist systems. Finally, Spiller et al were introduced as the most sophisticated decision makers in their choice to use architectural drawing as a means representing digital potentials. While the use of drawings can operate as a safe haven from which to develop a digital discourse within architecture, however, it may only remain representational and not experiential.

Through this analysis of digital architecture, chapter one argued that the field had been let down by the limited tools that it had adopted at an early stage to articulate its visions. The use of Cartesian drawing systems compromised architecture's ability to overcome historical and theoretical paradoxes, and ultimately to offer new forms of structures for

digital spaces. From this analysis the research question was presented, along with how its aims would be investigated through the subsequent chapters. The narrative direction of the chapters offered an analysis of the problem, leading toward the practical work and the development of a design solution for Cornwall that offers digital architecture with the theoretical and applied methods for incorporating a social dimension.

Chapter two explored how digital architecture could find itself in such an inert position, and traced the roots of its failures to mainstream architecture's commitment to use Cartesian dualist methodologies. Using a historical exploration of the commodification of time and space as a precursor to the Enlightenment and Descartes' development of his coordinate system, section one demonstrated how modernism and the international movement within architecture were predisposed to using a split model of time and space to allow their 'machines for living' to succeed. Despite the development of Einstein's theories of relativity that synthesised time and space, Fordism and Taylorism perpetuated the use of time and space as discrete systems in order to develop modern models of production. The same principles were identified within the development of architectural drawing packages, and contemporary examples were used to illustrate how the Cartesian system had been extended to engulf time within an entire teleological production system. The critical path method was used to demonstrate how split time and space were capitalised upon in order to develop engineering and architectural programmes. Le Corbusier's successful involvement with science was used to show how Cartesian systems were central to the development of the large scale buildings that defined the modern era.

However, a crisis was presented as architectural discourse matured in line with cultural theory of the late 20th century, and proponents of postmodernism such as Lyotard questioned blind faith in science. As Jencks identified the death of modernism with the dynamiting of the Pruitt-Igoe housing complex in Missouri, architecture's relationship with science was called into question and the development of systems that led to the suspension of post-Cartesian architectural methods. The blame that was heaped upon Pruitt-Igoe and modern architecture paralysed its relationship with science and development of emerging architectural approaches. The Eames' film 'Powers of Ten' was used as an example of how flawed the scientific model had become in architecture. The breakdown of modernism was explored in some depth to describe the extreme distortions and shift in value of time and space that contributed to the economic crisis of the early 1970s. Postmodern cultural and economic strategies emerged with new and more flexible forms of accumulating wealth. Jameson's use of architecture as a barometer for the 'aesthetic production' and his analysis



of post-modernism, is used as evidence to demonstrate architecture's emerging dialogue with itself through images rather than technologies. This shift in priorities from 'form follows function' to function being subservient to form, compounded a climate in which the value of science to support new forms of engineering was diminished. It is this ostracising of science from architecture that the author suggests contributes to the lack of development in the tools that mainstream architecture uses to develop buildings:

AutoCAD. According to Newtonian physics, these tools work effectively in drawing spaces, but they later become highly problematic as digital architects aspire to generate post-Cartesian spaces. By this point the thesis has demonstrated that the methods that underpinned digital architecture were flawed. The use of Cartesian drawing systems prevented the field from articulating models in which time and space were synthesised.

It is within Jameson however, that chapter two locates the traces of an opportunity to recover digital architecture's potential to work with a conception of spaces in which time and space are no longer split. Jameson identifies a redundancy for the Cartesian form of mapping in hyperspace and introduces the concept of a cognitive map that emphasises a personal and social relationship with environments. Jameson's shift toward a post-Cartesian social space allows the author to focus upon the development of human geography as post-modernism encourages its use as a more relevant study of the development of landscapes to that of its sister subject physical geography. The work of Bourdieu, Certeau and Lefebvre are all used to illustrate the social complexity that space was imbued with toward the end of the 20<sup>th</sup> century as a digital culture was emerging. Lefebvre's threefold dialectic of spatial practices, representations of space, and spaces of representation was used to demonstrate the complexity of human geography's contemporary framework for understanding a conjoined model of space and time in which social agency is complicit in its production.

In order to understand how this model of space can support digital architecture, the final section of the second chapter introduced the work of Nicholson. His relationship with digital architecture resulted in a de-materialisation which sought to overcome the dilemma of Cartesian dualistic representation. Nicholson's strategy is informed by his interpretation of cyberspace, not as Gibsonsque physical structures, but as hypertextual networks. Although not explicitly social, the basis for his architectural and theoretical work allows him to slip past the trap that many digital architects fell into with their adoption of the structural and aesthetic forms of cyberspace that subsequently led them to use Cartesian drawing systems. The manifestation of the internet as it subsequently emerged - with its

commerce websites, archive systems, search engines and email - is one that generally lacks visual spatial references. Rheingold and Mitchell's work are both used to demonstrate the web's architecture of social networking, and allow the author to suggest that the attributes of a recovery for digital architecture will be found in social systems and the disposal of a material language for describing space. Wellman's declaration that "we find community in networks, not groups" is particularly useful in understanding the shift from a community that is tied through geographic and spatial relations, to one that is substantiated upon social relations. At this point the thesis offered a recovery for digital architecture's method through the proposition that cyberspace had been misinterpreted as having spatial priorities when in fact it emerged with a social fabric.

Chapter three built on the fact that the internet had not materialised in a spatially dimensional form and that social computing was at the centre of its architecture and sense of place. Hillier was introduced to describe the complicity that built architecture has with society. His work in developing a 'space syntax' required the development of a socio-spatial model in which people and architecture are intrinsically linked. Hillier identified a 'disability' in architecture as it struggles to talk about its impact upon people. Architectural theory has developed a means of avoiding talking about a building's sociological impact because it concentrates upon a specific building by removing it from the social and environmental context in which it is situated. Hillier posits a far more complex and socially dynamic relationship between people and buildings in which neither can be separated. Castells is used to further critique this exclusive ability within architectural discourse to separate a building from its social context. Castells envisions that unless addressed it will result in a form of 'schizophrenic' life within parallel universes due to architecture's inability to respond better to society. His faith in networks leads him to the identification of the potential of a 'social material' within networks. The author uses this as a stepping stone to propose that social computing techniques could be used to recover digital architecture.

Social navigation was introduced as a computing field within HCI and comparisons are drawn between the definitions of how it works with Hillier's socio-spatial dynamics. Social navigation is then described in detail with particular attention paid to the historical context of the field, the techniques of collaborative filtering and recommender systems, technologies for evidencing social interactivity and collaborative virtual environments. Collectively the technical attributes of social navigation demonstrate how they are able to

reconstruct a method for digital architecture that makes use of the dynamic between social interaction and the form of space in which they are contained.

The final section of chapter three focuses upon demonstrating the already established links that the field has with architecture which allows the author to propose social navigation as a recovery technology for digital architecture. Whyte's studies on people and urban places are often cited by social navigation theorists to add 'real world' credence to their software systems. His research demonstrated how people's movement through space is deeply affected by other people and contributes to turning dull architectural spaces in to thriving social areas. Harrison and Dourish use Whyte's studies of people and his phrase "what attracts people most, is other people", to delineate between space and place, and assert that social practices are a critical element in making a place. Both Whyte's and Hillier's social architectural dynamics are correlated with the work of social navigation developers, while Busher and Hughes' principles for successful socio-spatial environments are identified as having the specific qualities to support digital architecture.

Chapter four introduced the art and design practice of the author which represents 50 per cent of the doctoral submission. Eleven pieces of work that mapped the trajectory of the thesis from its inception were described in detail. The work was categorised in three stages: formative conceptual work, illustrative applications of concepts, and live demonstrations of principles. Descriptions of each project progressively saw the adoption of social navigation techniques and moved from inanimate illustrations of ideas, through the use of offline digital video, to live digital animations in social-spatial contexts.

The work led to a simple methodology for the development of digital architectures that involved the integration of social databases with socio-spatial classification systems. The final pieces, 'Reading Rooms' and 'Invisible Transmissions', exercised this method through the use of the Dewey library cataloguing system and a university telephone directory. Both of these databases embody socio-spatial properties that allow the individual, time-based activity of people to be synthesised with the transformation of the spatial characteristics of architecture. The related works demonstrate forms of digital architecture that exist only in a frame in which time and space are intrinsically connected. Indeed, they only have absolute value when watched live. The digital documents provided on DVD are not nearly as powerful or as meaningful as watching people who are involved in the spatial representations studying the movement or adaptation of their own spaces. The chapter also reflects upon how the eleven practice-based pieces contributed to the

development of the Cornwall Culture project and study, how the use of text in 'Tag Clouds' led to a further dematerialisation of visual form, and the recognition of the wiki as a social architecture. The author recognised that although the live animated pieces were substantial in their development, they struggled to escape the inertia of a visual representation of space.

Chapter five focussed upon a particular project and subsequent ethnographic study carried out by the author to demonstrate the potential for social navigation systems to construct a method for the development of digital architectures. The chapter introduced the Cornwall Culture project through the client brief and how the author's response corresponded with Castells' ideas of a networked social material, as well as embodying aspects of Nicholson's de-material architecture of a space. The project highlighted the construction of a 'socio-spatial dynamic which would become implicit in the resulting 'folksonomy' that was generated in response to the question 'What does Cornwall mean to you?'

While the conceptual development of the project's website initiated a social digital architecture, the development of an ethnographic method for demonstrating the integrity of the 'social architecture' was required. The programme for the study was developed in line with a sophisticated grounded theory approach to ethnographic research. The reflexive dynamic between the community and the project from which the author hoped would generate a form of digital architecture became similar to the reflexive model of adapting deductive theories through inductive research that grounded theory demanded. Through research into Fontana and Frey's principles for structured and unstructured interviewing, and Ezzy's model for a sophisticated grounded theory approach, the author established a programme of study that retained a reflexive system which progressively allowed the emergence of a shared understanding of space.

The eight-step study led to the sense of place being developed in three cyclical phases: 1. through one-to-one interviews with seven respondents, 2. the respondents' editing of the statements on the wiki, and 3. the publication of the wiki onto the Cornwall Culture website for widespread editing. Through this highly reflexive process, a sophisticated series of statements was derived that were the result of a carefully mediated process between the author, the participants of the study, and visitors to the Cornwall Culture website.

Although not intended to be a form of digital architecture, the subsequent wiki and its process of construction began to demonstrate the qualities of a socially navigated digital architecture. Implicitly dealing with questions surrounding space and place, its construction and development led to a complex form of social material, that had no apparent architectural materiality. The chapter ended with a reflection upon the success of both the project and study, referring to Castells, Nicholson and Hillier to find evidence of socio-spatial dynamics without material visual architectures. Busher and Hughes were also referred to in order to understand how social navigation had operated and how closely their principles had been followed without the use of the architectures based on the Cartesian coordinate system for which they were developed. At this point the project had exercised methods toward the development of social digital architectures. Although different in form, both approaches demonstrated that social navigation technologies could support the manifestation of socio-spatial dynamics.

Finally, chapter five closes with a comparison of how the method that was evolved through the eleven practical pieces was applied to the Cornwall Culture project and study.

Although the context of the industrial brief brought with it different audiences, applications and development processes to that of the author's personal art and design practice, the methodology operated with success. The conceptual direction of the project's website recognised people and their knowledge as the database and used their choice of photographs as the currency of expression, while tagging and voting became the classification system. The organisation of the database through the interface then enabled users to correlate the two forms of data (image and tag) to form a social digital architecture. The use of the Wiki to nurture a text-based social perspective upon Cornwall with a progressively larger audience demonstrated how a digital architecture could be constructed without the use of walls and ceilings that operated as divisions between spaces and times.

The narrative sequence of the chapters addressed the research question by analysing how digital architecture had positioned itself without a social agenda through its adoption of a split model for time and space. It went on to discuss the way in which human geography, through an identification of social agency in the production of space, has demonstrated how a combined approach supports many new models for understanding experience. It introduced social navigation as a contemporary form of social computing that offers the methodological techniques for supporting the construction of digital architecture. The author's own art and design practice was reflected upon, as it was through this that a

methodology was developed and applied to the large-scale design project, and evaluated through a substantial ethnographic study.

The thesis has been based upon the apparent struggle for architecture to sustain a form of itself that engages with an entirely digital culture. A series of problems was identified within architectural processes that appear to have become part of its industrial and theoretical programme. From the use of Cartesian based drawing systems that go largely unquestioned in their use of Newtonian physics, as well as their Fordist and Taylorist economising of time and space, to the inability within architectural criticism to study buildings as part of a social system, architecture evidently had problems before cyberspace emerged. With these characteristics it is perhaps not surprising that when a 'consensual hallucination' for a parallel reality is introduced, the clamour to propose what it may be like was always going to be problematic. However, to discard the endeavour of architects such as Novak and his liquid strategies, or Perrella's struggle with representation, is to shy away from architecture's inherent flaws that were identified by Castells and Hillier. The emergence of interactive architecture is a direction that does not engage with the subject's Cartesian baggage, but instead returns architectural practice back to the scientific and engineering enquiries of the late 1960s and early 70s, before it was arrested by post-modernism. Perhaps mainstream architecture has to explore interactive architecture in order to work through its problems before reattempting to approach an entirely digital form of itself. If this is the case, then the strategies of Spiller and Nicholson will remain in the wings, ready to recover the theoretical discourse initiated by Architects in Cyberspace, and redevelop the methodologies that recognise the social nature of the internet, and which are prepared to dismantle the defence of an image for architecture.

## **6.2 Proposal for Future Work**

*The section closes the thesis by reflecting upon the method, indicating how it is affecting current work, and how it might be best used by others. The first part begins with a reflection on the characteristics of the methodology that emerged through the thesis, and highlights the need for a social dimension to be prioritised in any project for it to be of benefit. Attention is drawn to the emerging use of software such as Google Maps and the increase in the wide variety of 'push' media, such as RSS feeds, which are used to correlate new ways of seeing information. The author uses this cultural trend as a means*

*of demonstrating the potential for his research beyond the 'God's eye' maps which, at present, tend only to show quantitative data.*

*Part two focuses on a series of current and near future projects through which the author is extending his research and applying his method. The Arch-OS project, work with the Centre for Sustainable Futures, and an international project that supports the collaborative mapping of sound, all demonstrate a breadth of audience and socio-spatial context that will challenge the author to modify his thesis and methods over the forthcoming months and years.*

*The final part of the section identifies how the research can be applied to different industrial and research based contexts. Examples include the potential for augmented video systems that could use the methodology to integrate live vistas of social spaces, and the potential to extend the use of Second Life as a platform for reinventing collaborative virtual environments (CVEs) that offer visualisations of complex social scenarios, as well as an opportunity for architects and engineers to develop modelling software that allows their clients to see how architectural spaces can affect social relationships. The section closes with a reminder of the potential that the research has for offering architecture a non-teleological method for designing reflexive digital spaces, and references Habermass's concept of 'reciprocal perspective' as a potential benefit for coupling social navigation technologies with digital architectural practice.*

### **6.2.1 Critical Reflection on Thesis**

This thesis has introduced a social dimension to digital architecture through a very particular overview of the literature, which prepares a space for the creative intervention of artists and proceeds from the authors insights gained from Raindance. A series of problems was identified within architectural processes which appear to have become part of its industrial and theoretical programme. From the use of Cartesian drawing systems that go largely unquestioned in their use of Newtonian physics, and their Fordist and Taylorist economising of time and space, to the inability within architectural criticism to study its own buildings as part of a social system, architecture evidently had problems before cyberspace came along.

The author's practice, which has led to a methodological approach for introducing a social dimension to digital architectures, has been carried out with the explicit knowledge that the



online 'building site' that is the internet is one that is largely socially constituted. Through understanding the social complicity in our environment by reading human geographers and watching skateboarders exercise Lefebvre's trilectic for the production of space, the author has attempted to bring such a model to digital architecture through the following four step method:

1. Identifying a digital database resource that is connected to the spatial context and that is subject to social transformation.
2. Identifying a classification mechanism for spatially differentiating between individual database entries.
3. Correlating the two forms of data to allow 1 to express itself within 2.
4. Modelling the architecture not as a whole, but as individual social elements, and allow 3 to inform their reorganisation.

Formulated through the practice-based art and design works, and employed and modified following its use in the Cornwall Culture project, the method offers a straightforward and robust process for integrating a social dimension into digital architectures.

The design contexts in which it is anticipated that the method could be used will remain specific to certain conditions. The designer must be motivated to want to integrate a social dimension into a visualisation of a physical place and be prepared to use unexpected data sources to support it. Anticipating such a need is not necessarily commonplace, as three-dimensional visualisations of environments are usually constructed as a metaphor for a place and operate as an index or map to allow communication, meetings and game-play, as demonstrated in Collaborative Virtual Environments (see 3.2.5). However, these architectural environments remain dumb and are not able to express a social dynamic through the construction and adaptation of their form or structures.

As the internet has developed however, more forms of 'push' media such as RSS feeds have appeared, which display in desktop or mobile readers (contrary to the familiar 'pull' use of the internet in which users draw down information for themselves). The breadth of different types of data available to visualise economic, social and electronic activity is ever increasing. Subsequently, visualisation systems are appearing which express more and more forms of information. To support this, large internet content providers such as Yahoo! and Google offer Application Programming Interfaces (APIs) which allow developers to integrate different forms of data from the growing range of products and

databases that they offer - from search engines and photo archives to mapping systems. A good example of how different databases can be used to correlate new visualisations is the current predilection for mapping sex offenders across America. Sites such as [www.us-sex-offenders.com](http://www.us-sex-offenders.com) uses the Google Maps API to allow people to search areas on a detailed map of the US and identify the addresses of convicted sex offenders. By clicking on a person on the map, data from a specific state's Justice Department is downloaded and allows a user to browse an offender's criminal record. If more detailed virtual three-dimensional spaces are required to support the integration of data sets, Second Life offers a fully navigable environment that can receive streaming video, RSS feeds and a wide variety of internet data.

However, as Yahoo! and Google APIs become the standard for mapping space, and Second Life becomes the standard for visualising navigable three-dimensional places, so the opportunity to dismantle the Cartesian coordinate based projections of environments diminishes and digital architecture will further lose its opportunity to construct new spaces that aren't built upon these Cartesian systems. The social priority within the author's methodology demands the construction of digital architectures which respond to the activities of people, and anticipates that maps, buildings and offices will be subject to movement, manipulation and dissolution in order to express a socio-spatial dynamic.

By prioritising the social dimension in the author's four part method, it is possible to anticipate a richer integration of qualitative with quantitative data, which computer science and digital systems have often struggled to bring together. The anomalies within the voting and tagging of images across image databases such as Cornwall Culture and Flickr support the generation of folksonomies which in turn, provides support for a community centred classification of subjects, and thus offers an appropriate type of qualitative data for digital architects to begin constructing spaces that express the complex social dynamics which make workplaces, homes and city streets exciting places to be.

### **6.2.2 Current and Future Work**

The implications of this thesis are broad and it is anticipated that it will stimulate designers and artists to factor in the social dimension to their work. For the author, extending the use of the research and methodology is associated with three large scale projects; (1) the Arch-

OS project, (2) social and ecological visualisations for the Centre for Sustainable Futures, and (3) development for the acoustic geographies and collaborative mapping project known as The Silence.

1. Arch-OS remains a core creative research project within the Institute of Digital Art and Technology at the School of Computing, Communications and Electronics. Centred at present around a suite of technologies that pull data from the Portland Square building at the University of Plymouth, it is the intention of the project team to apply the principles of correlating different forms of data from architectural contexts to develop systems for artistic, commercial and domestic use. With a commission already in progress on the Curtin University campus in Perth, Australia, opportunities are beginning to arise in which architectural and environmental stakeholders would like to communicate information back to users of their buildings, estates and woodlands.

The Tamar Valley is a designated Area of Outstanding Natural Beauty (AONB) and is located on the border of Devon and Cornwall. The AONB covers around 75 square miles and contains several villages and hamlets with a population of 17,000 people. The valley has seen its use change dramatically over the last few centuries as farming, forestry, horticulture and mining have all shaped the land, but as these industries have declined or ceased, the area has been bypassed by modern development. Recently recognised as a World Heritage site, local initiatives are emerging to support the development of the area to support more public access in the form of interpretation centres, preservation of the industrial architectures, mountain biking courses and educational programmes. The Tamar Valley AONB is interested in using Arch-OS technologies to support an interpretation strategy for the site. Using mobile and locative media such as handheld computers, GPS devices and visitors' phones, the Arch-OS team is entering a design process to consider how to complement walking and cycling experiences with information and knowledge. The author is specifically interested in application of his methodology to describe the social and industrial activities that have led to the transformation of the environment, and to implicate the user in the further development of the site through live, location-based visualisations.

East-Thames describes itself as an innovative housing association working in East London and Essex who develop and manage residential housing projects. The Arch-OS team are beginning conversations with East-Thames to explore how the technology can be used to develop visualisations of social and ecological activity across their housing estates. The

organisation faces challenging requirements to ensure that their communities become increasingly more sustainable, and take more responsibility for managing their ecological footprint. Through early conversations, East-Thames has identified Arch-OS as an appropriate technology from which to begin designing systems for homes that communicate resource use to the owners and occupants of houses, as well as placing this individual use into a community context through the use of a social visualisation system. Through an application to the DTI for funding for the project, it is anticipated that the author's methodology will contribute to the design process of a visualisation system that will encourage residents to not see the boundaries and territories that define a housing estate, but to understand the benefit of seeing the community as an organism that shares the same resources.

2. In connection with his work on Arch-OS's ecological mapping potential, the author has been appointed as a research fellow for the Centre for Sustainable Futures (CSF) which is a Higher Education Funding Council for England (HEFCE) funded Centre for Excellence in Teaching and Learning. Working closely with members of the Arch-OS team, he has secured funding for a 50m<sup>2</sup> LED screen which is to be installed in the atria window of the Portland Square building during April 2007. The LED matrix will operate as a public, student and staff interface for communicating live information about the consumption of resources from the University of Plymouth campus. Similar to the research project with East-Thames, the author has proposed that in order for the CSF to reach its audience it has to sustain a message of transparency about the social, ecological and academic activities of the university. Through the live monitoring of resources such as food consumption, software is being developed using the author's methodology to visualise the social and ecological footprint of the campus. By sustaining communication about the use of resources over a substantial period of time, and using images and text to show how individuals have an effect on an ecological footprint, it has been postulated that the users of the campus may change their behaviour. The author references the work of David Orr of Oberlin College, Ohio, who has overseen the installation of a digital system that feeds back energy and carbon use in the form of meters and gauges, and argues that if such data is to be transformed into knowledge and action, then it is critical to bind it to social practice through images and narrative.

3. The author is also closely involved in the development of a collaborative mapping system that uses audio gathered from the environment. The Silence is a web-based project which promotes a model for a virtual museum that encourages the active and constructive

role of local communities in natural heritage interpretation, conservation, and renewal. The process of capturing sounds and collating them on a shared website enables participants to annotate the soundscape of wild and urban natural environments. It is designed to allow a community of people to use sounds rather than words to express and share in a more intimate way their experience of the natural heritage to be protected and managed. After recording ambient sounds with the use of a personal digital assistant (PDA) with global positioning system (GPS) technology that can record the exact location of the user, sounds are transferred to an online database and made available on a web application through which participants can create and share acoustic cartographies and use them as conversation pieces to support a social dialogue on natural quiet. The project supports participants in accessing and describing their own sounds and the composition of them in personal soundscapes that reflect their individual embedded knowledge, daily practices, and their needs and concerns. The same application allows a community to collaborate on a shared understanding of natural heritage by sustaining the interplay among participants' personal experiences, interpretations and values. Working with Elisa Giaccardi (University of Boulder), Daniela Fogli (University of Brescia), Gianluca Sabena (Fondazione Fitzcarraldo, Turin), and Ilaria Gelsomini and Francesca Pedrazzi (students at University of Brescia), the author is developing social aspects of how the audio files and collaborative processes can adapt the underlying map. In current versions, the Google Maps API is being used, and the author is interested in developing alternative representations to this in which to locate the sound files as the social discourse develops to offer a richer meaning than a Google basemap.

These range of research projects all require the use, extension and development of the author's methodology. With the breadth of audiences, subject matters, and local and global contexts the author anticipates a thorough use of the method to sustain its use in supporting socially and spatially reflexive visualisations. Many of the projects do not express a specific digital architecture as an outcome, but instead identify the digital architecture within the socio-spatial visualisations that will be generated according to each project's circumstances. It is anticipated that projects such as these will contribute to digital architectures ability to respond to social contexts and in doing so lead to theoretical and practical methods that overcome the reliance upon a split model for time and space.

### **6.2.3 Potential Applications for Research**

As well as supporting the author's own future research, it is anticipated that others will benefit from the method that has been presented in this thesis in the construction of socio-spatial digital architectures. As the development of social navigation technologies continues, and our experience of Web 2.0 extends onto mobile and locative media devices, the need for graphic interfaces that describe social and geographic experiences will grow. The traditional methods of representing space through section, plan and perspective will come under increasing stress, as multiple time bases and social activities demand more than three axes. Just as tag cloud technology has been adopted as a relational map of subjects, so we can expect alternative and complementary visualisations of spaces that allow us to 'see' how they are undergoing social transformations.

While the author has struggled with visual representations of digital architectures, specifically in the Invisible Architectures project that aspired to use computer generated models to look as 'real' as possible, the potential to work with camera phone technology presents a great opportunity for digital architects. By overlaying the feed from a video camera onto a mobile phone with live animation that is stimulated according to data from social activity within that spatial context, the author expects a wealth of potential for being able to 'see' more about a space through an augmented reality. At present, screens which present geographies and architectural visualisations do not use camera technology, (in-car satellite navigation systems use dedicated screens with 'God's eye' views of maps). As screen technology develops and integrates with cameras to provide live augmented perspectives on the world that we can 'see', there is a vivid potential for using graphic visualisations to transform these visions. As this thesis has argued, our engagement with the environment is socially mediated, and subsequently we can anticipate a complementary eye that identifies socio-spatial tensions to inform the way that we navigate.

As Second Life continues to develop as a CVE and becomes adopted as a place for people to gather for meetings and social events, we can expect its APIs to be expanded to support more complex modelling. At present the APIs tend to support Second Life's use in external applications, but if it is to sustain its social characteristics then we can expect people to begin using it as a visualisation tool for social data. In this instance the methodology developed through the practice-based aspects of this thesis provides a strong starting point for the development of socially dynamic environments. In the same way that Google Earth and Google / Yahoo Map APIs have been adopted to display regional data on a traditional

map, Second Life has the potential to offer collaborative social digital architectures that are informed by the correlation of multiple databases and live feeds.

In addition, Second Life represents one of many platforms that could be developed using the author's methodology to support the development of models, or visualisations for clients of future buildings and environments. At present, clients who are employing architects and engineers can expect to receive differing models of what they should expect to receive for their money. Balsa wood models, rendered perspectives and virtual flythroughs are commonplace, but software such as IES Virtual Environment is increasingly being used to model complex environmental and social situations. Using datasets for heating, lighting, carbon emissions and evacuation emergencies, the software renders 'what if' illustrations to describe how architectures will look, feel and cope with a wide range of environmental and social circumstances. Architects and their clients use these visualisations to adapt design processes and inform decision making. At present these visualisations are based on libraries of information stored on a local hard disk, but as they become live from actual data available from the internet, the potential for developing more accurate speculative visions develops.

More importantly for this thesis, while IES Virtual Environments currently concentrate on standard building information, we can envisage clients being interested in 'seeing' the more unusual social effects of a new building upon its occupants. For example, would a University be interested to see how a building's design could support a richer research culture through the arrangement of walls, surfaces and places for serendipitous meetings? Could a local council be interested in seeing how an architectural design for a residential estate encourages neighbours to work together to take responsibility for the cleanliness and health of their surroundings? These examples indicate an industrial potential for using the author's method to correlate socially informed data with classifications systems that will tell stories about the socio-spatial dynamic of a place.

The inclusion of a social dimension into digital architecture embeds a time base into spaces that are otherwise detached from temporality. The method that has emerged from the practice and theoretical narrative within this thesis presents digital architecture with a framework for engaging in a sustainable discourse with a community and a spatial context. Due to the cyclical dynamic established between the stream of social information and the adaptation of a space, we can speculate how live visualisations of environments can support a sustained perception of a subject that provides the feedback that users can



respond to. Non-teleological, the reflexive rhythm of change according to social circumstances encourages architects to relinquish an architectural programme that finishes when a building is complete.

However, whether architecture is ready to absorb the criticism and experiment with the methods offered may be unlikely. Nicholson and Hillier both operate on the periphery of mainstream architecture because neither of them build buildings. Nicholson prefers to question the material objectives of the discipline and Hillier identifies the subject's disability in engaging with a sociology of itself. Once interactive architecture has worked through its treatment of "digital space as physical matter" and it has modified its science and technologies then we may anticipate the embrace of de-material socio-spatial systems.

Social navigation has remained as a specific field within Human-Computer Interaction (HCI), and has consolidated a significant amount of technologies and methodologies which go largely unacknowledged in the development of what has been called Web 2.0. Much of the Web 2.0 discussion remains within a cultural zeitgeist and despite a general excitement that tagging technologies and relational databases support 'folksonomies', there is little academic literature that demonstrates why it is valuable. Social navigation offers a rich resource for such research, and carries with it an implicit relationship with space. While it is hoped that digital architectural methods will adapt through the use of social navigation technologies, it is also hoped that social navigation can broaden digital architecture's audience by engaging with other forms of architecture. One concern might be that the research that established social navigation will be overlooked as Web 2.0 technologies continue to support social infrastructures and de-material forms of architecture. It is hoped that, within the author's work, there are opportunities for both fields to support each other's development.

In a broader context it is also hoped that Habermass's concept of 'reciprocal perspective' - which constitutes the roots of Buscher and Hughes' principles for socially reflexive spaces - can be further developed in the practical context of digital architectures. With the emergence of shared authoring systems which acknowledge visitor presence through visible footprints (such as wikis and socially navigated spaces), we will be able to 'see' ourselves within a relational context. As the temporal and spatial fabric of these places is interwoven, the value of a single point perspective will be rendered redundant. According to the complexity of each situation, our actions in time and space will be highly relative according to what other people are doing in the same time and space. The potential for

digital systems to enable us to situate ourselves within this relative dynamic should allow a clarity that supports a 'reciprocal perspective' in which we can understand our complicity and social responsibility in questions of design and technology practice.

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