

04

A Developing Society in the Digital Age:

+ Stimulating a Culture of Knowledge

Wilson (2004: 310) advocates that in order to construct a culture of knowledge (in developing countries), the first step is to establish awareness; awareness of the growing information system, the positive influences it has on everyday life and the simplicity thereof. The stigma around the complexity of information technologies should be eradicated by expressing a level of transparency. This must be followed by providing points of access. The nature of these environments should spark an interest and encourage a motivation to learn. But access alone is not the answer. In order to ensure that users make use of the *access points*, a second surge of encouragement is necessary. A realisation of the ability to contribute as well as the gratification of an individual's contributions, needs to be fully understood.

The *Age of Participation*, as referred to by many writers and experts (such as Tapscott & Williams (2006), Mitchell (2000) and Castells (1996)), indicates that users are not merely consumers of digital content, but have in fact also become the producers. Don Tapscott, a co-writer of *Wikinomics* (Tapscott & Williams, 2006), has labelled this new 'species' of users as *prosumers*. In the book it is stated that while the *Net Generation's* "parents were passive consumers of media, youth today are active creators of media and hungry for interaction" (*ibid*: 47).

It goes without saying that information spaces (or access points) should be places of participation and collaboration seeing as learners are encouraged by active engagement (Schön *et al* 1999: 161). In contrast to traditional educational systems, where information is transmitted by a teacher and the learner can either choose to accept or decline the knowledge, active participants have a hold over the process of edification (*ibid*: 269). This also creates a sense of responsibility. According to Schön *et al* (1999: 402) it is necessary to cultivate "an ensemble of values, expectations, norms, and incentives that impels more and more individuals to want to create and become active, engaged members in a knowledge society".

The manner in which people innovate, explore and discover with technologies is predominantly influenced by this degree of peer-production or interaction. In essence, the following steps need to be taken in order to achieve a culture of knowledge:

- 01 | Create an awareness that dissolves the stigma
- 02 | Provide access points
- 03 | Stimulate interest among the society
- 04 | Interaction and creative learning

With the aforementioned steps in place the user has the opportunity to continue to an ideal additional two steps:

- 05 | Self-education
- 06 | Innovation and upliftment

These steps need to be reinterpreted in order to be translated to relevant architectural guidelines:

- 01 | An informational building should be transparent and announce its programme
- 02 | Physical access is an important consideration
- 03 | The intervention should intrigue the public (by means of distinctive characteristics i.e. rendering a new spatial typology or form)
- 04 | Encourage interaction

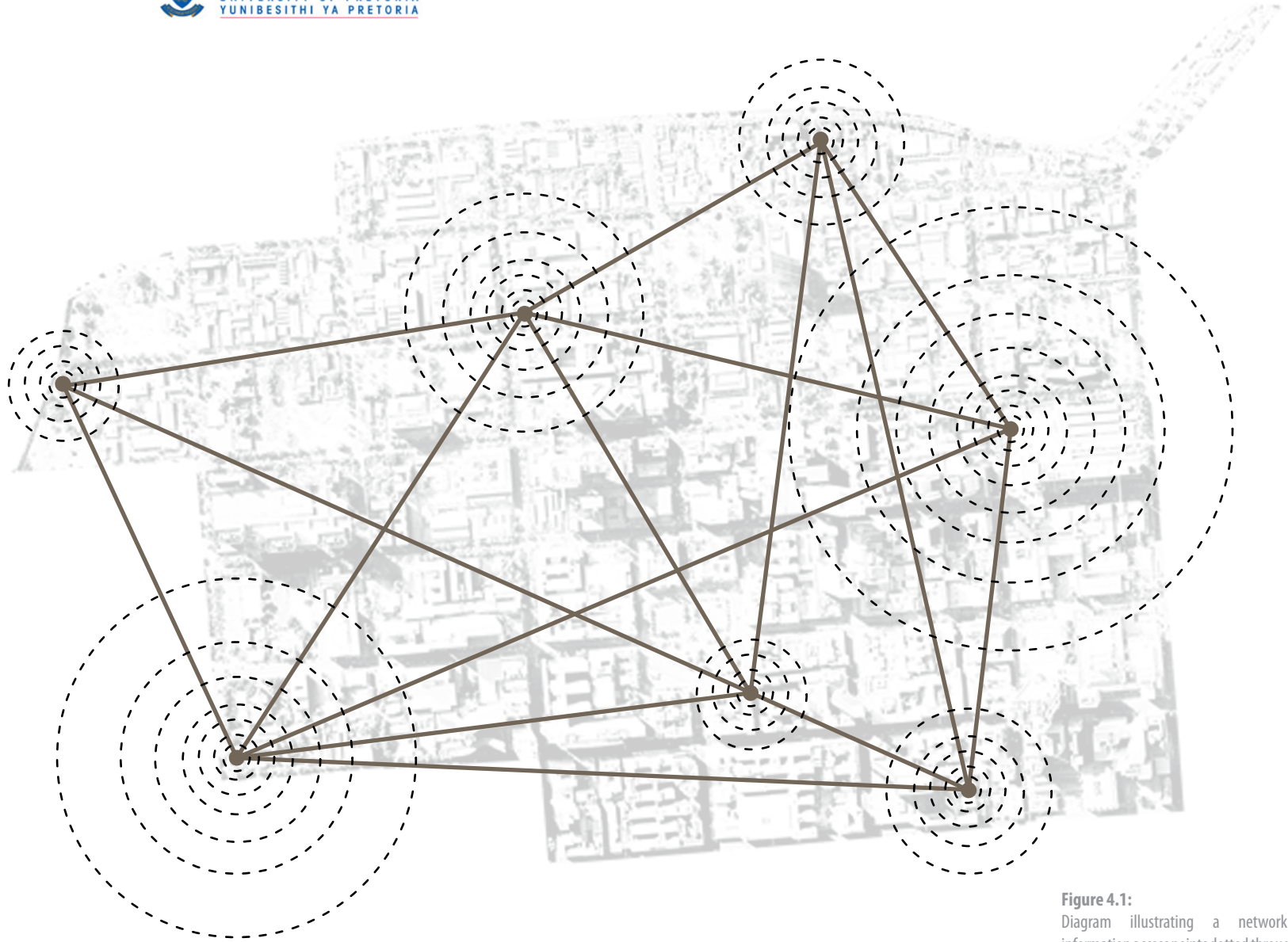


Figure 4.1:
Diagram illustrating a network of information access points dotted throughout the urban landscape (Author, 2011)

Architecture in the Digital Age:

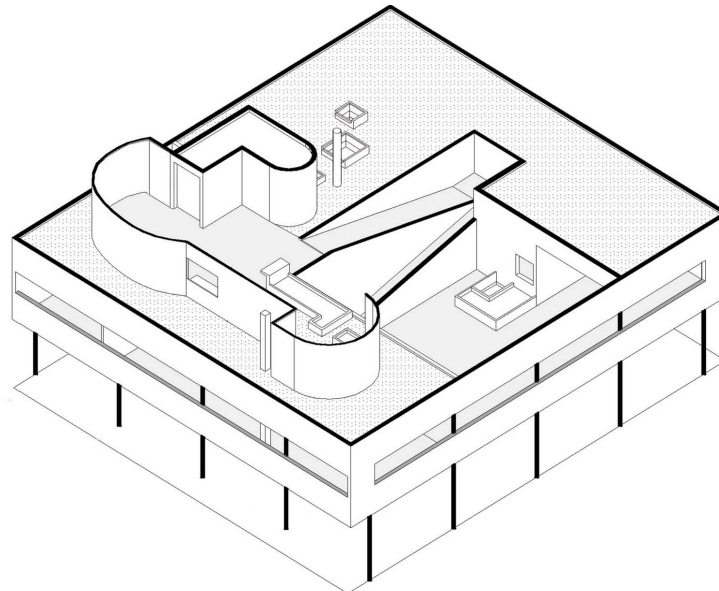
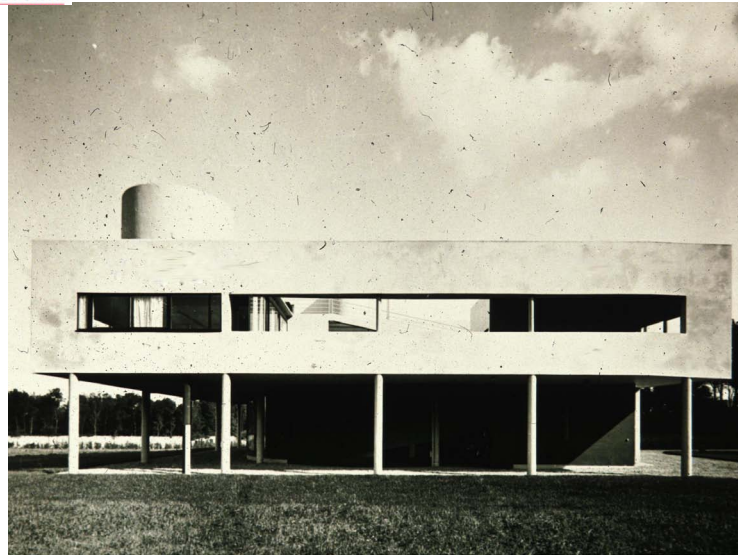
+ A Paradigm Shift

With the increasingly evident impact of digital technologies on architecture, the design, manufacturing methodology and construction process is becoming dependent on and reconditioned by it. As representational tools change “[a]rchitecture’s definitive boundaries [also] transform” (Norman & Tilder, c2003: 5). Digital technologies are redefining conventional ideas of place, space and time, which raises the question: how will architecture be redefined?

In *Differences: Topographies of Contemporary Architecture* (1997: 117), Ignasi de Sola Morales puts forth that:

“Having abandoned the discourse of style, the architecture of modern times is characterized by its capacity to take advantage of the specific achievements of that same modernity: the innovations offered it by present-day science and technology. The relationship between new technology and new architecture even comprises a fundamental datum of what are referred to as avant-garde architectures, so fundamental as to constitute a dominant albeit diffuse motif in the figuration of new architectures.”

Even though computer-aided design (CAD) has supported the field of architecture since the 1980s, only in the last decade has it induced a significant paradigm shift within architectural thinking. It is unlocking formal and construction possibilities that has, until recently, been financially unfeasible and problematic to construct using traditional building technologies.



01. Denoting the system of geometry based on the five postulates of Euclid. The five postulates are:
 - a. Any two points can be joined by a straight line.
 - b. Any straight line segment can be extended indefinitely in a straight line.
 - c. Given any straight line segment, a circle can be drawn having the line segment as radius and an endpoint as centre.
 - d. All right angles are congruent.
 - e. The parallel postulate- If two lines are drawn that intersect a third in such a way that the sum of inner angles on one side is less than the sum of two right triangles, then the two lines will intersect each other on that side if the lines are extended far enough. (Barnhart, 1988)
02. Relating to any of several modern geometries that are based on a set of postulates other than the set proposed by Euclid. (Barnhart, 1988)
03. Mass customization is the use of flexible computer-aided manufacturing systems to produce custom output. Those systems combine the low unit costs of mass production processes with the flexibility of individual customization. Kaplan, Schoder and Haenlein (2007:102) describes it as the process of creating “... customized products with production cost and monetary price similar to those of mass-produced products”.

Top to bottom |

Illustration 4.1: Euclidean geometry: Photograph of Villa Savoye by Le Corbusier (1887-1965), Poissy, France, 1931 (CCSF, 2011)

Figure 4.2: Euclidean geometry: Axonometric view of Villa Savoye (Hruszeczy, 2011)

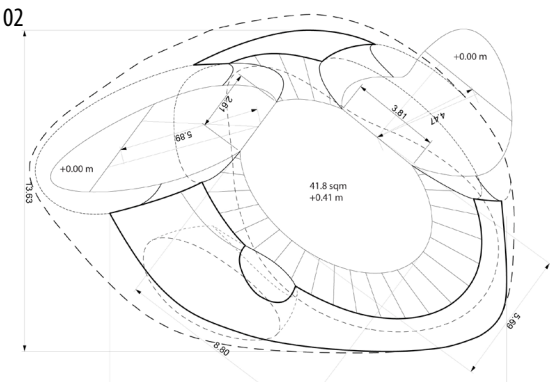


Illustration 4.2 (1): Non-Euclidean geometry: Photograph of Burnham Pavilion by Zaha Hadid Architects, Millennium Park, Chicago, 2009 (Litvin, 2009)

Figure 4.3 (2): Non-Euclidean geometry: Non-Euclidean geometry: Plan of Burnham Pavilion (Litvin, 2009)

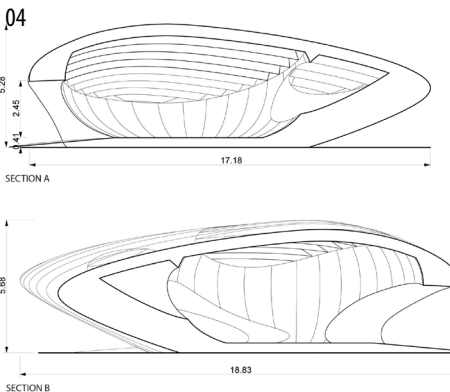


Illustration 4.3 (3): Non-Euclidean geometry: Photograph of Burnham Pavilion by Zaha Hadid Architects, Millennium Park, Chicago, 2009 (Litvin, 2009)

Figure 4.4 (4): Non-Euclidean geometry: Sections of Burnham Pavilion (Litvin, 2009)

According to Kolarevic (2001: 117), the transformations should be profound due to new digitally driven design, fabrication - and construction processes contesting the historic architecture-construction relationship. He suggests that a direct link exists between the traditional drawing apparatus used, i.e. the T-square, ruler, and drawing compass, and the rectilinear structures of the past. When William Mitchell (2001: 358), the authority on the digital age, described the influence of the traditional architect's tools on the building, he noted that architects drew what they could build and built what they could draw. With the advancement in CAD technologies, "digitally-driven design processes, characterised by dynamic, open-ended and unpredictable but consistent transformations of three-dimensional structures, are giving rise to new architectonic possibilities" (Kolarevic, 2003: 3). These 'possibilities' resulted in a new *genre* in architecture namely, *digital architecture*. It refers to architecture created *via* digitally enabled design processes, allowing complex calculations and forms that delimit architects to be created with great ease.

Computers and CAD technologies offer the three-dimensional freedom which motivate digitally generated forms that discard the conventional discourse of *style*. This technological *means* uncovers what other historic architectural tools have previously concealed – "the architectonics of architecture" (Mahalingam, c2003: 3). *Non-Euclidean*¹ (topological, curvilinear and irregular) geometries are produced as effortlessly as *Euclidean*² geometries. The plan is no longer the dominant design generator, while sections take on merely an investigative role. The validity of repetition and symmetry is negated as unlimited variability becomes as feasible as modularity and as *mass customization*³ replaces mass production (Kolarevic, 2001: 123). This technological progress in combination with the global energy debate has brought about the concept of 'intelligent buildings' that are energy efficient and environmentally responsible.

+ Intelligent Architecture

The modernist hypothesis of building as a *machine for living* has not yet been successfully reinterpreted into a 21st Century rendition where the dwelling is rather viewed as a *living machine* (Hunt, 1997: 30). Cybernetician, Gordon Pask (1969), has been endorsing the symbiotic relationship of man and machine since the late 1960s. He believes that there needs to exist intimate interaction between *cybernetics*¹ and architecture in order to facilitate new psychological and physical environments.

According to Sherbini & Krawczyk (2004:137), the idea of *intelligent buildings* was conceived shortly after an increasing interest in *automated building systems* arose. These systems communicate and exchange information in order to ensure a building's optimal performance in terms of economy and comfort. *Building Management Systems* (BMS) has the ability to regulate indoor air temperature, ventilation, illumination, security and other aspects that need constant control;

*“...responding to the demands of the physical...
[while] interacting with the digital.”*

(Gausa, Guallart, Müller, Soriano, Porras, & Morales, 2003: 345)

+ Smart vs. Intelligent

Academics have defined *intelligent* building as a structure in which some or all of its services are automated or utilises the most up-to-date technology (Hunt, 1997: 30; Sherbini & Krawczyk, 2004: 139). Their computerized and mechanical processes are preset and definite, responding only according to set parameters within a specified margin of calculated actions. Subsequently, it does not embody the ability to anticipate our shifting individual requirements or the capacity to communicate with its users in, what Hunt (1997: 30) calls, “a relational context”. This not-so-critical adoption of the term *intelligent* building leads to a general confusion. In the words of Droege (1997: 359), there is nothing about “roboticness that entails mindfulness”. The aforementioned definition should rather be applied to *smart* buildings.

Modern-day computers have the ability to assimilate and transfer information, correspond with other technology and calculate a response. Essentially, it can *think*. When this abstract characteristic is incorporated into the physical realm, the man-made world would gain the aptitude of *thought*. Architecture becomes *intelligent* in the moment of the acquisition of a *thinking ability* (Sherbini & Krawczyk, 2004: 138).

Sherbini & Krawczyk (2004: 140) have listed the following criteria for a building to be rendered *intelligent*:

- 01 | An input system that assimilates information by means of data receiver
- 02 | The capacity to process and analyse information
- 03 | An output system that reacts to the input (responsiveness)
- 04 | Timely responses
- 05 | The ability to learn

One of Mitchell's premises in *City of Bits* (1997) is that not only *intelligent* architecture, but *intelligent* public spaces should be decidedly receptive and responsive to the individual requirements of its users: an *e-topia* (Mitchell, 2000) of physical and virtual organisms. The primary precedent of this new discipline should be the evolutionary and interactive capacity of ecological systems and biological organisms. This could introduce an autonomous, holistic philosophy and systemic approach to the urban environment. The scientist, Richard Gardiner, believes that the answer lies in the "way that our synthetic world will be guided by the same philosophy as our natural world" (Hunt, 1997: 30).

In an architectural dictionary pertaining to this emerging paradigm, Gausa *et al* (2003) refer to this type of system as *advanced architecture*. It is "to the digital society what modern architecture was to the industrial society: an architecture bound up with interchange and information. With the capacity for displacement and modification" (Gausa *et al*, 2003: 36). It translates the ever-changing mutation of processes, context and situation into its associated spatial form; an architecture capable of conveying its own *thoughts* and *movements*, while concurrently exposing the agents that mould it. This creates a dynamic *ecosystem* that interacts with its biological, physical or virtual *ecology*; simultaneously "reinforcing...and recycling it" (Gausa *et al*, 2003: 36). This progressive nature demands qualitative change. Such environments are not limited by its complexity, but is rather given the opportunity to surpass all expectation by embracing *waiting* possibilities.

In John Frazer's (1995: 10) writings on *cybernetic*¹ architecture, he explains that:

"It will conserve information while using the processes of autopoiesis²...to generate new forms and structures...Not a static picture of being, but a dynamic picture of becoming and unfolding - a direct analogy with a description of the natural world."

01. *Cybernetics is the science of communications and automatic control systems in both machines and living things.*
02. *The term autopoiesis refers to "auto(self)-creation" and was introduced in 1972 by Chilean biologists Francisco Varela and Humberto Maturana. From the Greek: auto (αὐτο) for self- and poiesis (ποίησις) for creation or production. An autopoietic system is self-governing and self-maintaining. It embodies the ability of component producing. In other words, the spontaneous generation of living systems.*



+ Augmented Space

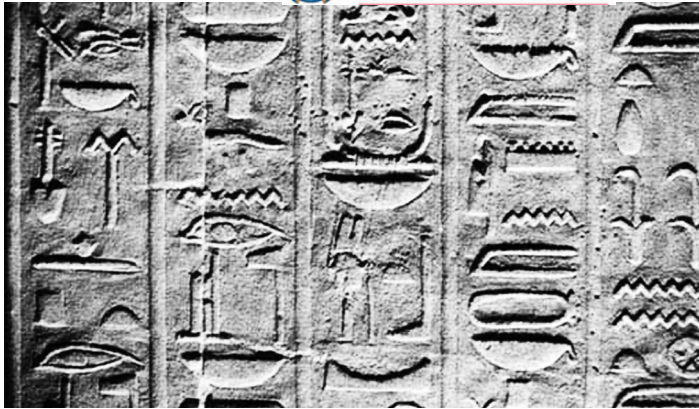
With the emergence of the Internet as an integral and ubiquitous part of daily life during the 1990s, the focus was turned to the virtual realm. This sphere was first perceived as ominous due to its underlying potential, but it soon became domesticated as an *electronic suburb* (as coined by Norman Klein). Recently, this focus has shifted back to the physical; the real world filled with virtual data and visual information. A new *augmented reality* (Manovich, 2011) is occupying the space where we once found the traditional city. This term refers to the overlaying of dynamic information over the physical layer of urban surfaces and spaces. This layer of digital media is no longer confined to flat static surfaces.

This virtual-real relationship transforms physical space into data-space (*ibid*) by extracting information from the physical, reacting to it in the virtual and finally augmenting the real with a digital layer of information.

A complex multicity is created: a multitude of digital cities within the physical metropolis, creating a *metapolis*. Gausa *et al* (2003: 37) defines this in *The Metapolis Dictionary of Advanced Architecture* as “[a] city of cities conceived as a *hyperplace*: a place of places... A metapolis that would unfold on the territory as a flexible mesh of diverse landscape of spaces and interspaces. Grids, matrixes, topographies or fabrics.”

Electronic billboards and screens stand in contrast to this new breed of *augmented space* as it strictly occupies a predefined part of the physical realm (as in the tradition of *Alberti's window*¹ and the television screen) and is not overlaid in a three dimensional manner. Historic architecture has always incorporated information and symbolism if we consider ornament, iconography and visual narratives (such as ancient Egyptian hieroglyphics, Medieval cathedral windows, Gothic narrative sculptures and Ndebele patterns). Robert Venturi, the advocate of Post Modernism, suggested to George Legrady in a conversation (Manovich, c2006: 232), that architecture should return to its traditional definition of iconography where architecture should become *information surfaces* once more.

01. *'Alberti's window'* was a conceptual method for Renaissance artists to understand perspective. Leon Battista Alberti (1404-1472) wrote in his book, *De Pictura* (1435): “On the surface on which I am going to paint, I draw a rectangle of whatever size I want, which I regard as an open window through which the subject to be painted is seen” (Albetri 1991: 54). Here, it refers to the idea that information occupies a predetermined space within the physical world.



01



02

Opposite |

Illustration 4.4:

An illustration of the concept of augmented space in a literal manner - the city (Matsuda, 2010: 13)

This page |

Illustration 4.5 (1):

Photograph of ancient Egyptian hieroglyphics (Crystalinks, [2004])

Illustration 4.6 (2):

Photograph of Ndebele patterns on a hut façade (Author, 2011)

Illustration 4.7 (3):

An illustration of the concept of augmented space in a literal manner - the kitchen (Matsuda, 2010: 3)



03