Catalysing Change for Sustainability in Education:

The relationship between sustainable building design and

institutional change

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ABSTRACT

This PhD thesis is concerned with the influence of sustainable design in further education (FE) college buildings on whole institutional change for sustainability. The research focuses on the first decade of the 21st century in England and Wales when increasing engagement with the sustainability agenda in the FE sector included linking sustainability criteria to the funds for new building projects.

The original contribution of the thesis is twofold. Firstly, it reveals the extent to which these new buildings contributed to institutional change for sustainability in the FE sector and identifies ways to maximise future sustainable building projects as a resource for institutional change. Although there was substantial investment in new buildings and a growing interest in sustainability during the period of the study, no evidence exists of research into the links between sustainable design and institutional change in the FE sector.

Secondly, the thesis develops an original research approach, contributing to the multi-disciplinary field of research into sustainability and sustainable development. The thesis adopts a biographical approach from social science research and adapts it to produce narrative accounts of the development of two buildings with recognised sustainability qualities, one in England and one in Wales. These biographies are then analysed for evidence of institutional change for sustainability using the systems perspective that underpins the view of sustainability presented in the thesis.

The thesis establishes two frameworks, one for recognising sustainable design within FE college buildings and one for identifying change for sustainability in FE institutions. The biographies of the buildings were developed using data collected by biographical research methods and the focus of the analyses is on the relationships that existed around each building's development and its physical presence on campus.

The thesis reveals that even colleges with a reputation for sustainability have not fully exploited the introduction of a sustainably designed building onto a campus as a catalyst for institutional change. The outcomes from the research offer key points for maximising the influence of future building projects in terms of achieving institutional change for sustainability and identify areas for further research into the

influence of sustainable design on institutions in the FE and other education sectors. The development of the research approach in this thesis presents an alternative for researching sustainability in education and other fields.

Author's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of this thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in this thesis are those of the author and in no way represent those of the University.

Signed: Date: 20th July 2015

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I want to recognise the good will of the staff that I interviewed from the two colleges selected as examples for the research and thank them for being extremely generous with their time. I am also indebted to various colleagues in schools, colleges and universities who have shown me around their particular sustainable buildings.

Finally, on this PhD learning journey, which has been part of a much longer EfS learning journey, I owe the largest thanks to Mari Strachan. Whatever I may have managed to achieve, it would not have been possible without her immense support.

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Acronyms

AoC	Association of Colleges
ANT	Actor Network Theory
BERR	Business Enterprise and Regulatory Reform (Department of)
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Methodology
CABE	Commission for Architecture and the Built Environment
CFC	Chlorofluorocarbon
CoVE	Centre of Vocational Excellence
DCELLS	Department for Children Education Lifelong Learning and Skills
DELLS	Department for Education Lifelong Learning and Skills
EAUC	Environmental Association of Universities and Colleges
EfS	Education for Sustainability
ESD	Education for Sustainable Development
ESDGC	Education for Sustainable Development and Global Citizenship
ESRC	Economic and Social Research Council
FE	Further Education
FEFC	Further Education Funding Council
FHE	Further and Higher Education
FSC	Forestry Stewardship Council
GNVQ	General National Vocational Education
HE	Higher Education
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institution
ISO	International Organisation for Standardisation
LEA	Local Education Authority
LEED	Leadership in Energy and Environmental Design
LSC	Learning and Skills Council
LSDA	Learning and Skills Development Agency
LSIS	Learning and Skills Improvement Service
NCVQ	National Council for Vocational Qualifications

NUS	National Union of Students
RSPB Cymru	Royal Society for the Protection of Birds Cymru
SD	Sustainable Development
SDEC	Sustainable Development and Environment Committee
SDEG	Sustainable Development and Environment Group
UNCED	United Nations Conference on Environment and Development
UNESCO	United Nations Educational Scientific and Cultural Organisation
UPVC	Unplasticised Polyvinyl Chloride
WAG	Welsh Assembly Government
WG	Welsh Government
WWF	World Wide Fund for Nature

Chapter 1

BACKGROUND AND CONTEXT TO THIS THESIS

'Change denotes process. But the processes are themselves subject to "change". The process may accelerate, it may slow down, or it may undergo other types of change such that we shall say that it is a "different" process.'
(Bateson G, 2000:283, *Steps to an Ecology of Mind*)

1.1 Introduction

Changing the attitudes and practices of people as individuals, or in organised groups such as institutions, has been the subject of research and theorising from early philosophers to modern social scientists (Capra, 1982; Senge,1990; Bateson, 2000; Grober, 2012). Within this broad body of literature change towards sustainability has gained prominence in the latter part of the 20th century and the early part of the 21st century (Senge, 1990 & 2010; Dovers, 2001; Doppelt, 2010; Willard, 2009). In his book *The Necessary Revolution*, Senge explains why institutions are important agents for change *"Today's world is shaped not by individuals alone, but by the networks of businesses and governmental and non-governmental institutions…."* (Senge, 2010:9). It is this potential influence for change which makes institutions important players in achieving a more sustainable future.

Further Education (FE) colleges are institutions with community links to businesses and to civil society placing them in a unique position to contribute to sustainability in their own communities. They are essentially public sector institutions that were taken out of local education authority control in 1993 and incorporated as independent institutions, albeit with the majority of their funding coming from government sources[1]. FE colleges in England and Wales provide the institutional context for this thesis, and the first decade of the 21st century provides the historical context. This was a period when sustainable development was gaining a foothold in government policy in England and Wales (WAG, 2004; DEFRA, 2005; DELLS, 2006; LSC, 2005) and during the same period FE colleges experienced significant levels of capital investment in the form of new buildings, with the

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[1] Prior to 1993 FE colleges were controlled by local education authorities in the UK in a similar fashion to state schools. Since 1993 the majority of their funding has been administered by semi-autonomous government bodies. From 1999 the funding of FE colleges was devolved along with responsibility for education generally to the four UK administrations.

political agenda being set by a Labour Government between 1997 and 2010. The prominence of sustainable development combined with increased capital investment in the FE sector meant that the funding of new buildings included various levels of adherence to sustainability criteria.

This thesis is concerned with the extent to which these new buildings, with their elements of sustainable design, were able to catalyse institutional change for sustainability in FE colleges in England and Wales. The thesis adopts a historical perspective with the aim of drawing out the lessons relating to institutional change for sustainability from the experiences of developing sustainably designed college buildings in the early years of the 21st century. The development of these buildings provided real examples of processes relating to sustainable development such as decision-making and procurement. The actual buildings placed practical examples of sustainability, such as renewable energies, recycled materials and the use of natural light, on many college campuses. However, very little research evidence exists to reveal either the actual or the potential influence of these new buildings as catalysts for change towards sustainability in the FE sector. Indeed, according to Rohwedder (2004) the contribution made by the physical presence of educational environments is something that has been overlooked generally in terms of bringing about change in education institutions.

".......the dynamic between the learning community and the places we call school is powerful, purposeful and pedagogic. Treating this relationship lightly, without careful attention and commitment, is a fundamental mistake that is being repeated each and every day in learned institutions all around the world,......" (Rohwedder, 2004:294).

Sustainability is considered to be trans-disciplinary in the sense that it draws on knowledge from across disciplines to address challenges which themselves span disciplinary boundaries, a point noted by Jeffrey Sachs *"The problems just refuse to arrive in the neat categories of academic departments"* (Sachs, 2008:14). Systems thinking, as an approach to engaging with and understanding sustainability, is seen as a means of conceptualising the inter-related nature of the disciplines which are present in sustainability (Senge, 1990). In keeping with the nature of sustainability this research into change for sustainability will draw on several academic disciplines and will be underpinned by a systems approach to conceptualising and analysing change for sustainability. The trans-disciplinary nature of sustainability and of this

study raises questions for the research approach and the inquiry paradigm. Addressing these questions became a critical element of this PhD research and has resulted in the thesis making as much of a new contribution in terms of the research approach as it has in understanding the influence of sustainable design on institutional change. A biographical approach was adopted in order to address the challenges presented by researching the influence of sustainably designed buildings on their respective institution. The rationale for this approach is explored in Chapter 5 of this thesis.

This initial chapter aims to present the focus of the research to the reader and to set out the personal perspective of the author. It will introduce the concepts of sustainability and sustainable development in relation to this thesis; it will review the need for this research, present the research questions and recognise the philosophical influences and the assumptions upon which the research is based. The chapter will outline the main themes that are present in the thesis and the original contribution that this thesis makes in terms of knowledge and research approach. Finally, it will provide a route map for the chapters in the remainder of the thesis.

1.2 Sustainable Development and Sustainability

The terms sustainability and sustainable development have been, and continue to be, the subject of much debate. The two terms are discussed here with the purpose of establishing how they will be used in this thesis. The entry for 'sustainable' in the 1998 reprint of the ninth edition of *The Concise Oxford Dictionary* (Thompson, 1998) is quoted in full below. This particular edition of the Dictionary is referenced here because of its relevance to the period being studied in this thesis. This definition was published when the two terms were gaining traction in national and international arenas; for example, the first UK strategy for sustainable development was published in 1994 following the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 (UK Government, 1994).

"**Sustainable** */adj*. **1** *ecology*. (especially of development) which conserves an ecological balance by avoiding depletion of natural resources. **2** that can be sustained. **Sustainably** *adv. Ecology*. **Sustainability** *n. ecology*." (Thompson, 1998:1405)

The definition in this 1998 edition shows a marked shift in emphasis compared to earlier editions. For example, the eighth edition of *The Concise Oxford*

Dictionary (Allen, 1990) has no separate entry for 'sustainable', it only appears at the end of the entry for 'sustain' as the adjective relating to the verb 'to sustain'. The entry for sustain records nine meanings, none of which relate to ecology or natural resources. There is a step change in the 1998 edition with a link to ecology strongly established and placed before the more general definition *'that can be sustained'*, and the adjective 'sustainable' is also linked to the noun 'development'. Atkinson, also writing in 1998, referred to sustainability as an *'ideal end state'* and a *'lofty goal'* the perfect realisation of which will always elude us (Atkinson, 1998). From this perspective sustainability is something to work towards and sustainable development can be seen as a process which contributes to achieving the goal of sustainability.

Since the mid-1990s a number of terms have emerged in relation to processes or activities that include the words 'for sustainability', for example, 'education for sustainability' or 'institutional change for sustainability'. These terms describe concepts and processes that result in a movement towards sustainability and can be seen as congruent with sustainable development. The two terms are therefore sometimes seen as interchangeable and that is how they are used in this thesis.

In using the term sustainable development in this way, this thesis rejects the criticism made by some that the word 'development' refers solely to the economic development of western capitalism, including the economic growth which has led to 'unsustainability' as discussed by Jucker (2002:9). A summary of this perspective is also given in Tilbury and Cooke (2005:3).

Corcoran and Wals (2004), among many others, have referred to the bewildering number of attempts at providing definitions for sustainability and sustainable development. They have also emphasised the paucity of an approach based on a simple, single definition, *"We have taken the position that the multiple meanings of sustainability are not a weakness but a strength."* (Corcoran and Wals, 2004:91) While defining sustainability remains a challenge, there is more of a consensus around the principles behind the concept. Tilbury and Cooke (2005) point out that a review of international literature reveals *"agreement that we must strive for a better quality of life which does not place our natural environment and ecosystem services at risk"* (Tilbury and Cooke, 2005:2). The main elements that emerge in most descriptions of sustainability are the relationships between the ecological, the economic and the social, as well as the need for a systems perspective required to appreciate these relationships (Blewitt, 2008), an area that is discussed in more detail

in Chapter 2. The nature of the relationships and the extent to which other elements such as 'the cultural' should be incorporated into an understanding of sustainable development are areas that contribute to the diversity of the debate on defining sustainability and sustainable development.
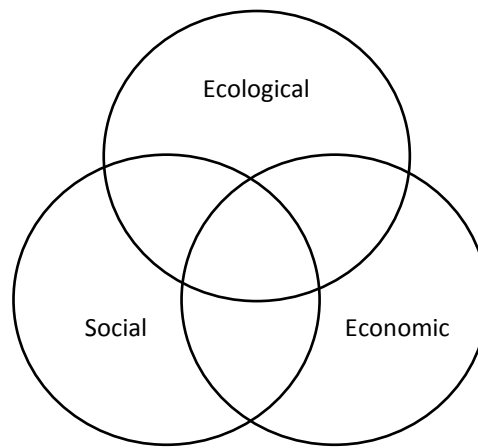
Figure 1.2.1a: Sustainability as a Venn diagram

Diagrammatic representations of sustainability are one way of extending the limitations of a verbal definition. The two most common representations are presented in Figure 1.2.1a and Figure 1.2.1b. These diagrams are open to interpretation as discussed in Strachan (2009). Figure 1.2.1a suggests equality between the ecological, the social and the economic; and it implies that 'sustainability' occurs where all three circles overlap. This model has been heavily criticised by Webster (2004) and Jucker (2014) due to the fact that the model 'floats' unconstrained allowing, for example, for *"the economy to grow and grow without limits"* (Webster, 2004:40). Jucker points out that so much of this model is outside sustainability that it *"is not just useless, but scientifically wrong."* (Jucker, 2014:21).

Figure 1.2.1b suggests a hierarchical relationship with the ecological element providing the limiting parameters for sustainability. Webster (2004) favours this model, but recognises the challenge that this implies for change in society and in the economy. Jucker also favours this model, referring to it as a *"Strong Sustainability Model"* (Jucker, 2014:6). One aspect that neither diagram captures is the futures perspective of sustainability linked to longer term consequences and intergenerational equity.
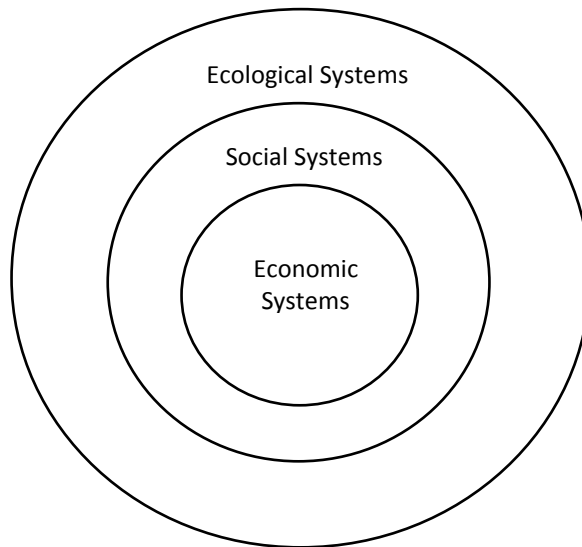
Figure 1.2.1b: Sustainability represented by concentric circles

As indicated earlier, sustainable development was becoming increasingly prominent in UK government policy at the turn of the 21st century. The UK government had to face the challenge of providing a clear representation of sustainable development in order for public sector institutions, which range from government ministries to local authority schools, to be able to respond to policy initiatives. In 2005 the UK Government published *Securing the Future: A Strategy for Sustainable Development* (DEFRA, 2005) that included a representation of sustainable development using a combination of diagram and words as shown in Figure 1.2.2. Following the 2010 general election and a change of government the relevance of this document has declined in spite of the current government's pronounced on-going commitment to sustainability. Nevertheless, Figure 1.2.2 remains the clearest representation of sustainable development to emerge from the official channels of the UK Government and has yet to be superseded. Figure 1.2.2 is also relevant to this research as it was this model of sustainable development that government departments adopted during the period which is the focus of this thesis, including the departments responsible for the FE sector in England.
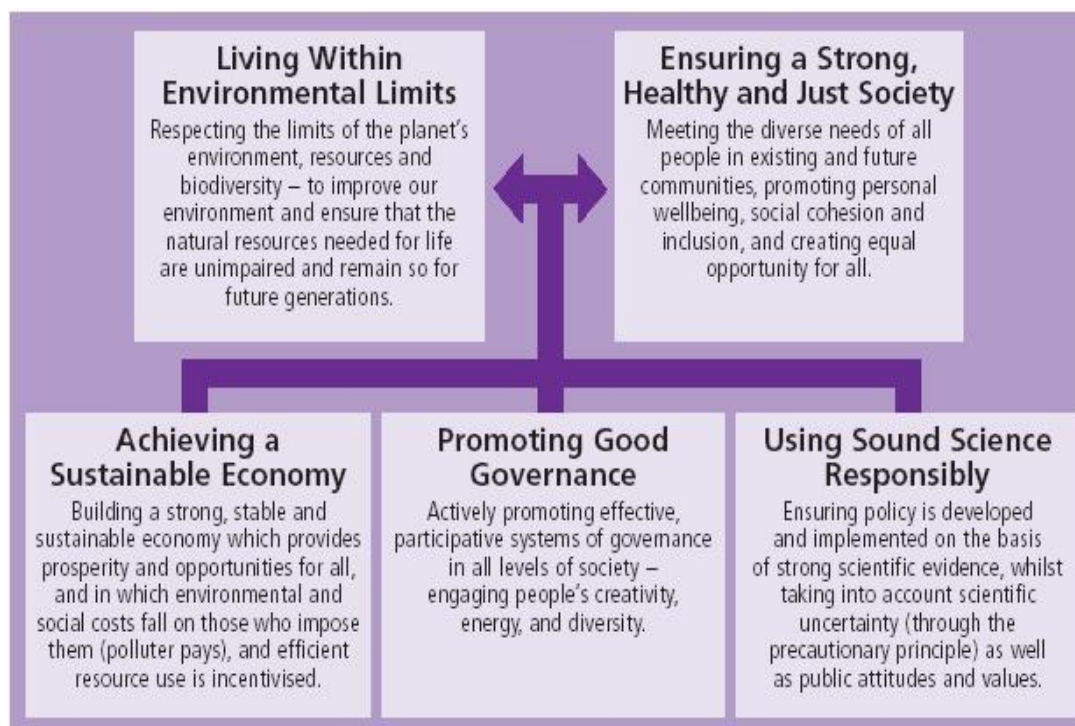
Figure 1.2.2: Sustainable development as presented in *Securing the Future* (DEFRA, 2005:16)

The responsibility for all sectors of education in Wales was devolved to the Welsh Assembly Government (WAG) in 1999 (known simply as the Welsh Government from 2011). The WAG added to the UK Government's definition with a contextual definition for Wales as presented in Box 1.2.1, and embedded sustainable development as an organising principle in its constitution (WAG, 2009). The contextual aspect of sustainable development is important because it can influence what might be judged to be sustainable in a particular case or scenario. However, the general principles which underpin sustainability remain the same.

Sustainable Development in Wales

In Wales, sustainable development means enhancing the economic, social and environmental wellbeing of people and communities, achieving a better quality of life for our own and future generations:
- In ways which promote social justice and equality of opportunity; and
- In ways which enhance the natural and cultural environment and respect its limits using only our fair share of the earth's resources and sustaining our cultural legacy.

Sustainable development is the process by which we reach the goal of sustainability.

Box 1.2.1: Sustainable development according to the Welsh Assembly Government (WAG, 2009:8)

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1.2.1 A systems view of sustainability

This thesis has adapted a model of sustainability that is essentially based on Figure 1.2.1b. This is a systems view of sustainability that places the systems created by humans within the boundaries of the natural systems. It recognises the interconnected nature of both natural systems and human generated systems and it acknowledges the importance of the temporal dynamic including short term and long term change. This model of sustainability is represented diagrammatically in Figure 1.2.3.
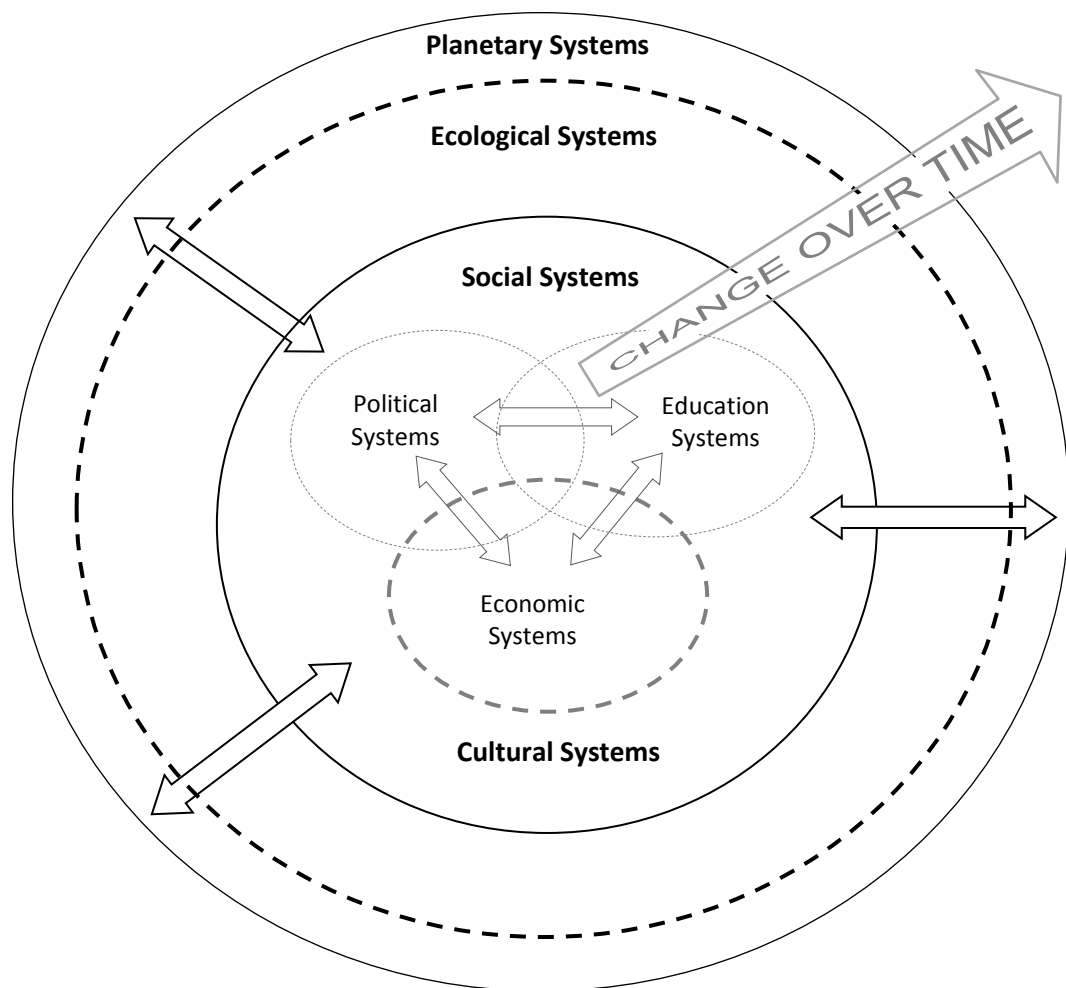
Figure 1.2.3: A representation of sustainability emphasising the interconnectedness of the systems and the temporal dynamic of change

First and foremost this view of sustainability establishes the limiting factors of the physical planet and the ecological systems upon which all life ultimately depends. The ecological systems are closely linked to, and limited by, the physical systems including the amount of solar radiation the planet receives, the seasonal

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change resulting from the Earth's orbit and the 23 degrees tilt on its axis, and physical characteristics of the troposphere brought about by the system of plate tectonics amongst other things. The ecological systems limit the total carrying capacity of all life on the planet including the human population, although the population of one species may expand at the expense of another.

The social and cultural systems constructed by people encompass a wide range of subsystems; political systems, education systems and economic systems are examples of these. The more pronounced representation of the economic systems in Figure 1.2.3 indicates the dominance that these systems often have over other social and cultural systems in terms of decision-making in current society. The dominance of economics is reflected in the term 'the bottom line' and in the debates on the need to shift to a 'triple bottom line' to include social and environmental factors. The diagram in Figure 1.2.3 portrays the interconnected relationships between all of the systems including the influence of social systems on the ecological systems. The concept of anthropogenic climate change[2] is a good example of this interconnectedness, with the changes in the natural climatic systems linked to the activities of people.

In this model of sustainability the social systems should be contributing to the key sustainability principle of achieving a better quality of life, but they must do so within the boundaries of the ecological systems as presented in Tilbury and Cooke (2005). It is also important to recognise the interconnectedness within, as well as between, the ecological, social and economic systems as shown in figure 1.2.3.

Systems are not static; they are subject to change as a result of natural processes and as a result of human intervention and a change to a single part of a systems means the system has changed as a whole (Meadows, 2009). These changes have consequences and any model of sustainability has to recognise this dynamic and consider a futures perspective.

When a system becomes a part of a larger system, which itself may be part of an even larger system, this hierarchical arrangement is referred to as 'nested systems' (Sterling, 2003). By adopting the concept of nested systems it is possible to locate FE colleges in Figure 1.2.3. The FE sector would be a subsystem of the education

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[2] The concept of anthropogenic climate change recognises the causal inter-relationships between human activities and the changes in the climatic systems. Although the concept is still disputed by some, a growing body of scientific evidence, including from the IPCC, supports its existence. (IPCC, 2014).

system, and FE colleges would be located within this subsystem. While they are rooted in the education system, FE colleges are connected to, and influenced by, other social systems and the wider ecological and planetary systems. Chapter 2 of this thesis expands on the concept of nested systems and on the systems associated with FE colleges in relation to institutional change for sustainability.

1.3 The Need for the Research

Despite the strategies and initiatives for implementing sustainability and the significant investment in sustainable buildings during the first decade of the 21st century, reports on sustainability in the FE sector in England and Wales indicate less progress than might be expected (Estyn, 2006a; DCELLS, 2008b; LSC, 2010). These reports capture individual examples of good practice in terms of leadership, estates management and curriculum development, rather than a major shift towards sustainability in individual colleges or the sector as a whole. Evidence for this can be found in reports from the Learning and Skills Development Agency (LSDA), which conducted a baseline survey of sustainable development in the sector in 2004 (Martin et al, 2004). This was followed up with case studies from Centres of Vocational Excellence in 2005 (Baines et al, 2005) and case studies of Education for Sustainable Development and Global Citizenship (ESDGC) in the sector in Wales in 2008 (DCELLS, 2008b).

While research exists into the general impact of the new buildings on the FE sector, this researcher could find no evidence of research into how this significant investment of capital, which includes tangible elements of sustainable development, has impacted on the journey towards sustainability of individual FE institutions. From 2001 to 2008 4.5 billion pounds was invested in 632 capital projects in the FE sector in England (LSC, 2008:2). From 2006 to 2009, seventy-four million pounds was invested in new builds and refurbishment in the FE sector in Wales (Estyn, 2010:4).

The earlier quote from Rohwedder (2004) highlights the fact that education institutions have overlooked the importance that the physical environment can have on teaching and learning. The influence of buildings generally, and education buildings in particular, has been recognised by Orr (2002). He argues that buildings and their settings can have a pedagogy and as such they can be a curriculum resource and an influence on staff and student development in the broadest sense. In the

context of sustainability in education this view has particular resonance, because implementing sustainability in education institutions is recognised by many to require a whole-institutional approach, where the policies and practices for managing the institution are in line with the messages delivered in the content of the curriculum (WWF, 2004b; LSC, 2005; DELLS, 2006). Exploiting the relationship between the building and the learning community to support a shift towards sustainability in education institutions appears to have been largely overlooked, which emphasises the point being made by Rohwedder (2004).

This thesis will explore the relationship between the building and the learning community, and identify ways in which leaders in the education institutions can maximize the potential of sustainable design as a catalyst for institutional change for sustainability. The thesis will also investigate the relationships between the designers of the buildings and the stakeholders in the institutions.

It is the intention of the author of this thesis that the academic research that forms the basis for the thesis will generate practical outcomes as well as new knowledge frameworks. The overall aim of the research is to add to the understanding of how a sustainable design provided by an architect can contribute to individual and institutional learning and promote institutional change for sustainability in the context of an FE college. The purpose of the research is to produce outcomes that have the potential to inform future capital developments in FE colleges (and possibly other education sectors) on how to maximise the benefits from sustainable building design.

To achieve the aims and purpose of the thesis the following research questions were used to guide the research enquiry.

1. How is sustainable building design being used to influence management practices and pedagogy?
2. How can leaders in an education institution use sustainable building design to influence institutional change towards sustainability?
3. How can mapping the relationship between the sustainable building design and institutional change inform the work of building designers and educators?

These research questions have clear objectives that revolve around the influence of sustainable elements of design within the context of FE colleges. The first two research questions cover key aspects of a whole institutional approach as identified in implementation guidance documents for sustainable development in the

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sector including LSIS (2011) and DELLS (2006). These key aspects are: the core business of teaching and learning including the pedagogical approach; the management for the college estate; and the role of leadership. These key aspects are discussed fully in Chapter 2, section 2.4. The third research question is concerned with relationships and with employing a systems perspective to contribute to an understanding of the influence of sustainable design on change for sustainability in colleges.

The approach employed in addressing these research questions raises philosophical issues in the fields of epistemology and ontology. Not least in relation to the perspective of the researcher with regard to the nature of knowledge; how the researcher perceives other people gain an understanding of the world; and how the researcher perceives what is real in the world. The influence of the researcher on this research and the philosophical assumptions on which the thesis is based are discussed in the next section.

1.4 My Position in the Research and Philosophical Assumptions
1.4.1 Personal influences

"Once we admit that, as researchers, we hold values that affect the research that we do, we have to find ways to scrutinise our actions and our motives more closely." (Schratz and Walker, 1995:5)

I[3] concur strongly with the sentiment in this quotation from Schratz and Walker and in doing so I present myself with the challenge of examining my own epistemological assumptions and my ontological perspective. In writing this thesis at a point where I have already had a long and varied career my response to this challenge requires considerable reflection. While many of the assumptions that underpin this research result from relatively recent research projects and academic writings on sustainability, my own perspective on the key epistemological and ontological questions are influenced as much by early experiences as they are by later experiences.

I was initially the product of a traditional grammar school education. When I left that system in 1970 to work in agriculture, I attempted to add a more holistic

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[3] This thesis is written and presented in the third person with the exception of this section, section 1.4, where the author discusses the influences on his own worldview and the perspective he brings to this research. Section 1.4 is written in the first person.

perspective to the reductionist approach of the education system, although I was only aware of this in hindsight. Consciously developing a holistic perspective through adopting a systems thinking approach became possible when I re-entered full time education to study philosophy and sociology in the late 1970s and as a result I engaged with the work of Ervin Laszlo. In his slim volume *A Systems View of the World* (Laszlo, 1972), he raises the key issues that have remained pertinent to a systems view of sustainability through to contemporary debates. In respect of disciplinary silos he states: *"The unfortunate consequence of such speciality barriers is that knowledge, instead of being pursued in depth and integrated in breadth, is pursued in depth in relative isolation. Instead of getting a continuous and coherent picture, we are getting fragments – remarkably detailed but isolated patterns."* (Laszlo, 1972:4)

Laszlo goes on to discuss nesting systems, connectivity and complexity as follows *"A system in one perspective is a subsystem in another. But the systems view always treats systems as integrated wholes of their subsidiary components and never as a mechanistic aggregate of parts in isolable causal isolation. The systems view is the emerging contemporary view of organised complexity…."* (Laszlo, 1972:15) With regard to the relationship between economic growth and 'one planet living' Laszlo states, *"Not only can we not increase per capita production indefinitely, but we cannot even duplicate its present rate in America and Western Europe for the rest of the world. All the people of the world cannot live as westerners do today….."* (Laszlo, 1972:103)

Following what can accurately be described as a 'multi-disciplinary' degree in Development Studies in the 1980s my school teaching career was heavily influenced by the then current debates in environmental education[4] and by my involvement in professional development courses in global education with David Selby and others[5]. As the school curriculum became significantly more prescriptive and reductionist in the late 1980s and early 1990s with the introduction of the National Curriculum, I moved into the FE sector where there was still a more open curricula context and greater pedagogical opportunities. My FE experience is of

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[4] In particular the debate around the different conceptualisations of environmental education; i. e. education about, through and for the environment.
[5] The Centre for Global Education University of York, and the book *Global Teacher, Global Learner*, Pike and Selby, 1988.

particular relevance to this thesis, especially as I developed the first sustainable development policy adopted by an FE college in the UK (WWF, 1997:6).

In spite of later influences, when I have been confronted by questions and issues relating to education in the late 20th and early 21st centuries, I have consistently found myself returning to several key philosophical debates which I first encountered in the 1970s. Not surprisingly for someone operating in the western academic tradition philosophical debates from the Age of Reason underpin my current perspectives on knowledge and reality. In particular I have been influenced by the protracted debate between Locke and Leibniz in the late 17th and early 18th centuries. This clash between empiricism and rationalism has direct relevance to research conducted within an interpretive-constructivist approach today. Although there was a dichotomy between these schools of thought they have both contributed to theories on how we have knowledge of, and understand the world. Locke emphasised the importance of perception as *"...the inlet of the knowledge. Perception then being the first step towards knowledge."* (Woozley, 1964:122). Leibniz contributed to the debate with regard to how the individual interprets the perceived knowledge. For Leibniz, the individual brought with them innate ideas. The echoes of this debate are present in the analysis of qualitative research by Schratz and Walker (1995), when they recognise that what researchers perceive is not objective truth.

Leibniz, like other philosophers from previous eras, recognised the interconnected nature of the world and the limitations of the human mind to engage with the vast array of knowledge and data that exists in the world. *"It is also seen that our sense-perceptions, even when they are clear, must necessarily contain some confused sensation. For as all bodies in the universe are in sympathy, our own receives the impression of all the others, and although our senses are related to everything, it is not possible for our soul to be able to attend to everything in particular."* (Parkinson, 1973:43). Leibniz's early recognition of challenges to the capacity of human understanding links to the challenges of complexity and the use of systems thinking as a theoretical lens explored in Chapter 2 of this thesis.

The view of our knowledge of the world as limited and emerging is crystalised for me in the work of the 20th century philosopher Karl Popper, who addressed the philosophical problem of induction (i.e. the inference of a general law from particular instances) with his theory of 'falsifiability', which states that no

statement or theory can be proven absolutely, but they all have the potential to be shown to be false (Popper, 1963). Popper's epistemological approach of 'critical rationalism' is of particular relevance to debates relating to sustainability, where emerging knowledge challenges existing knowledge and practices, and where decision-making is linked to knowledge that repeatedly stands the test of falsification. The climate change debate is a prominent case in point.

One other major ontological influence on me as an individual and a researcher comes from the work of Carlos Castenada. While I accept his work is justifiably criticised as being ethnographically incorrect (De Mille, 1976), it did emphasise for me that all individuals have a unique worldview. This is an important factor for researchers to take into account whenever they use first or second hand reports from participants. This ontological influence and the earlier epistemological influences are relevant to this research in so much as they indicate where I reside as a researcher in relation to inquiry paradigms. This point is taken up in section 5.6 in Chapter 5 of this thesis.

Figure 1.4.1: The Conference Centre at the Earth Centre, Doncaster in 2001, designed by Bill Dunster

The influences that brought me to the subject of this thesis were a combination of real world experience and literature. Between 1998 and 2002 I worked on the Earth Centre Millennium Project with architects who were to become

some of the best known for sustainable design in the UK. These included Peter Clegg[6], Will Alsop[7] and Bill Dunster[8]. It was reading about the concept of the pedagogy of buildings in Orr's (2002) *The Nature of Design,* after working in Dunster's state of the art conference centre (Figure 1.4.1) constructed with a substantial percentage of recycled materials that alerted me to the potential of buildings as agents of change. The agency of a building is a key element of the research approach discussed in Chapter 5.

1.4.2. Assumptions

The contribution that this thesis can be deemed to make to a greater understanding of the influence of sustainable design on institutional change for sustainability rests firmly on assumptions that are drawn from the philosophical influences set out above. Foremost among these is the concept of knowledge as emerging over time. The conclusions presented at the end of this thesis are relevant in the context of available knowledge at this time and it is accepted that, in line with Popper's view of truth, any apparent truths presented here may be revealed as false at some point in the future.

Secondly, this thesis assumes that change towards sustainability, as conceived within the context of existing knowledge and presented in section 1.2, is a positive development for the future of humankind. There has been a great deal of commentary and debate over the years in relation to this broad assumption, but a series of international reports involving academics, politicians and other professionals support this view including *The Limits to Growth* (Meadows et al, 1972), *North-South: A Programme for Survival* (Brandt et al, 1980) and *Our Common Future* (WCED, 1987). This assumption refers to sustainability in all fields including design, education, and organisational change. In relation to this is the assumption that systems thinking is an essential, although not exclusive, perspective to understand sustainability, and that systems thinking can reveal things that may not be seen through reductionist thinking alone (Sterling, 2003; Meadows, 2009).

Thirdly, the perspective on FE colleges presented in this thesis assumes that they are dynamic institutions and that they will change and continue to change

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[6] A founding partner of Fielden Clegg Bradley Studios.
[7] Will Alsop OBE now leads ALL Design, London, Chongqing and Edinburgh.
[8] Founder of the ZEDFactory and architect of BedZED, Sutton, London.

regardless of whether a new building is added to the institution. However, the addition of a new building is by definition a change to the institution, and the design of the building can affect the nature of the change.

Fourthly, in line with Bateson (2000:283) this thesis accepts the assumption that 'learning' and 'change' are linked to the extent that whenever learning occurs some form of change will take place.

Finally, the process and the outcomes of this research rest on the assumption that the role and influence of the researcher has to be accounted for. The implications of this assumption are addressed in Chapters 5 and 6 of this thesis.

1.5 Main Themes and the Original Contribution of the Research

In a reflection of the way in which sustainability bridges subject boundaries, this thesis draws on approaches and knowledge from several disciplines in order to address the research questions. The contributions from these disciplines are connected by themes which are linked to sustainability. In this section the pervasive themes that connect the diverse elements in this thesis and the original contribution which the thesis seeks to make, both in terms of the research approach and in terms of the research outcomes, will be identified.

1.5.1 Pervasive themes

Change for sustainability is the key theme linking all aspects of the thesis. Change which moves theory and practice in a particular field towards a greater respect for ecological limits while contributing to improving the quality of life of people now and in the future, is what distinguishes change for sustainability from other changes which are taking place. Change for sustainability links the three areas of building design, education, and institutional change, which come together in this thesis to address the research questions. As with sustainability generally, the debates around changing to more sustainable practices in all three of these areas are on-going. Changes in architecture that lead to more sustainable practices emerge from a range of debates on design including mimicking naturally occurring design and the selection and use of materials. The potential contribution of education towards achieving sustainability was documented in Chapter 36 of Agenda 21 (UNCED, 1992). However, since the publication of Chapter 36 of Agenda 21 there has been a great deal of debate over what it means to implement change towards a new

paradigm for education based on sustainability principles (Senge, 2000; Sterling, 2001; Corcoran and Wals, 2004; Webster, 2004; Jucker, 2014). With regard to institutional change, according to Senge (2010) institutions are influential vehicles for changing practices in many areas of human activity. The challenge of focusing the changes on sustainability has led to diverse theories of change management. The literature associated with all three of these areas is examined in this thesis.

Achieving change for sustainability in all of these areas requires individuals and institutions to break established boundaries and engage with new ideas and practices. Leadership has an important role to play in this, as identified by Dunphy et al (2007). Leadership emerges as an associated theme in this thesis and a key element of change for sustainability. It is examined in relation to the learning experiences and practices of leaders across the FE colleges studied in the research and draws on the work of Fullan (2005), Doppelt (2010), Scott et al (2012) and the Learning and Skills Improvement Service (LSIS, 2011) among others.

A further theme in this thesis is the use of narratives to identify and investigate change. To identify change it is necessary to have an account of the move from an existing situation to a new situation. In metaphoric terms it reports the 'distance' travelled and the 'terrain' covered by the change. This narrative concept features strongly in Education for Sustainable Development (ESD) in terms of seeing education as a learning journey (Strachan, 2012). In this thesis the narrative account is of particular significance in relation to investigating the development of new buildings and their impact on the people and institutions that are closely related to them. The biographical form of the narrative account is central to the methods employed in this research. The narrative account is a theme that links buildings, institutions and individuals in this research through the concept of biography.

Relationships become an important theme as a result of the thesis adopting a systems perspective. The relationships between the different fields of study employed in the thesis contribute to increased understanding by combining different disciplinary perspectives. The main analytical tool in the thesis is a framework of relationships which is used to reveal how internal and external relationships around two examples of new buildings, which have been developed in two FE colleges, influence change for sustainability in their respective institutions.

1.5.2 The original contribution of the research

This thesis offers an original contribution in two areas. The first relates to the research approach and the methods used to present and analyse data. The second area concerns the understanding and the recommendations relating to key relationships that could contribute to institutional change for sustainability within a college context and which have not previously been researched and analysed.

The decision was taken to adopt a biographical research approach to understanding the development of relationships and changes occurring as a result of a new build. This proved a significant decision as biographical research is almost exclusively applied to the narratives of people. There is no precedent for applying biographical research methods to the development of a building, but biographical research does have an established tradition. It first gained a foothold in social science in the Chicago School of the 1920s and 1930s, it was further developed in the 1970s in the Frankfurt School and since then it has gained a significant profile in social science research (Merrill and West, 2009). There are precedents for the creation of biographies about buildings, for example, the recently published biography of the Sainsbury Centre at the University of East Anglia (Rybczynski, 2011). This thesis has attempted to combine the concept of a biography of a building with biographical research methods; no other examples of this approach have been identified.

The purpose of this approach was to facilitate the analysis of the relationships associated with the development of a new building on a college campus. Between 2004 and 2008 there were over 200 new build projects in England in the learning and skills sector, the vast majority on FE college campuses (LSC, 2008). Case studies exist describing some of these new builds, most notably on the Environmental Association of Universities and Colleges (EAUC) website[9], but no examples could be found of a systematic analysis of how a new building that was recognised as sustainable could become a catalyst for change for sustainability across the college of which it became a part.

The final section of this chapter sets out the way in which this thesis unfolds in terms of the literature reviews, the research approach and the collection and analysis of data.

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[9] The EAUC website has a section on case studies which is updated
http://www.eauc.org.uk/rb_casestudy accessed 12 November 2014.

1.6 Summary and Route Map Through the Thesis

The chapters in this thesis can be broadly grouped into four parts. Chapters 1 and 2 set out the aims and purpose of the research along with the underlying assumptions and the perspective of the researcher. Systems thinking emerges in Chapter 2 as a theoretical lens and it provides a conceptual framework that is applied in subsequent chapters. Chapter 2 also documents the emergence of sustainability; its relationship with education; and provides a historical analysis of sustainability in the FE sector in England and Wales.

Chapters 3 and 4 form the next group, which covers the literature reviews from two fields of study. Chapter 3 focuses on debates around sustainable design in architecture and the influence of ecological design in establishing sustainable practices in mainstream architecture and construction. Chapter 4 reviews the substantial volume of literature on organisational and institutional change with the purpose of exploring the concept of institutional change for sustainability.

The next group, Chapters 5 to 8, covers the methodological approach, the data collection methods and the analytical process of the research. Chapter 5 introduces the biographical research approach and explains how it is being adapted for the purposes of this research. It reviews the research approach in terms of locating it in an inquiry paradigm and it sets the framework for the data collection and analytical methods discussed in Chapter 6. Chapter 7 presents the biographies of the two buildings selected as examples for this research and Chapter 8 provides the analysis of these two biographies.

The final part of the thesis, chapter 9, is concerned with the conclusions drawn from the analysis of the biographies. It discusses the outcomes from the research that can inform changes in practice around future building projects in FE colleges. The focus is on changes that can increase the influence of these projects in promoting and embedding sustainability in the institution. Finally, Chapter 9 will critically reflect on the research approach employed in the thesis and its contribution to the field of sustainability research.

Chapter 2

THE CONCEPTUAL AND SECTORAL LOCATION OF THE RESEARCH

"The systems view is a mode of organising existing findings in reference to the concept of systems, systemic properties and relationships." (Laszlo, E. 1972:19, *The Systems View of the World)*

2.1 Introduction

The perspective on sustainability and sustainable development presented in the previous chapter recognises, and incorporates, the complexity and interconnected nature of the world. A key element within this perspective for framing and interpreting this complexity is systems thinking. This chapter will explore the relationship between sustainability and education. Central to this relationship is the potential role of systems thinking in developing understanding in relation to sustainability. The importance of systems thinking is supported by a significant section of the literature on sustainability and education in terms of conceptualising and implementing ESD (Senge, 2000; Sterling, 2001; Jucker, 2002; Tilbury and Cooke, 2005; Blewitt, 2008; Strachan, 2012).

The theoretical lens offered by systems thinking underpins each element of this thesis and therefore this chapter will locate this theoretical lens within the broader field of systems theory. The perspective offered by this lens will be used to review not only sustainability in education, but in subsequent chapters it will be used to review sustainable design, institutional change and, critically for this research, it will be used in the mapping and analysis of relationships that contribute to change for sustainability associated with the buildings selected for study.

The latter part of this chapter reviews the context of this research in more detail, by providing a historical analysis of sustainability in the FE sector in England and Wales.

2.2 Why Educate for Sustainability?

The case for people to engage with sustainability is often made by emphasising the global crises that appear to threaten the natural world and the future of mankind. As Webster (2004) puts it *"To understand what we mean by sustainable*

development we have to know what it is about our world that is truly unsustainable." (Webster, 2004:5). There are various accounts, citing numerous indicators that present an assessment of the world highlighting global unsustainability. One example emanates from the Worldwatch Institute which has reported on the 'state of the world' annually since 1984; the sub-title of the 2013 edition emphasises the perceived urgency of the global situation - *The State of the World 2013: Is Sustainability Still Possible?* (Worldwatch Institute, 2013). The causes of challenges like climate change, degrading of ecosystems and species loss, which pose threats to a sustainable future for human life, are increasingly linked to the activities of people. The magnitude of the changes brought about by the activities of people has led the Dutch scientist Paul Crutzen to suggest that we are living in a new geological epoch, which he refers to as the 'Anthropocene' (Crutzen, 2006). Crutzen defines the Anthropocene on the basis that people, rather than geological forces, are the dominant force shaping the Planet by degrading and changing the ecological systems, with anthropogenic climate change being a primary example (Kolbert, 2007:183). However, the corollary of Crutzen's position is that people can influence the Planet in ways that make a positive contribution to the future sustainability of systems that support life.

Education has been seen as a mechanism for bringing about change in both individuals and institutions. However, different forms of education are underpinned by different values leading to different outcomes. Kemmis et al (1983) developed a typology for educational ideology which had the following three categories: 'vocational/neoclassical'; 'liberal/progressive'; and 'socially critical' (Kemmis et al, 1983:11). This typology identifies differences in a range of characteristics associated with education including theories of knowledge; pedagogy; and learner outcomes. For example, the vocational/neo-classical education is characterised by a view of knowledge that is objective with an emphasis on factual information; it has a behaviourist approach to teaching based on a transfer of knowledge between teacher and learner and the outcome is related to preparing the student for established career roles. Knowledge in liberal/progressive education is subjective and constructed within the context of the culture of the learner, the pedagogical approach is one of facilitation and the outcomes are focused purely on the development of the individual. Socially critical education accommodates emerging knowledge and is characterised by a participative and transformative approach to learning with the aim

of developing active citizens who contribute to their communities. These broad categories demonstrate the diversity that exists in education, and the myriad examples of education that exist in the world may fall predominantly within one of these categories or, more likely, they will combine characteristics from different categories.

These different approaches to education suggest significant differences in the nature of the resulting learning and as Bateson points out *"learning undoubtedly denotes change of some kind. To say what kind of change is a delicate matter."* (Bateson, 2000:283). This link between education and achieving change is one of the reasons why the role of education has become so significant in relation to sustainability. The type of education that has become linked to sustainability and is seen as contributing to change towards sustainability is discussed below.

In his book *Our Common Illiteracy*, Jucker (2002) reviews a series of treaties and reports relating to sustainable development and arrives at the following conclusion *"...whenever the discussion focuses on sustainable development, there also seems to be unanimous agreement that education plays a crucial part in achieving this transition"* (Jucker, 2002:29). Tilbury and Cooke (2005) highlight the importance of education to sustainability with reference to documents relating to landmark developments such as the Rio Earth Summit in 1992, the Johannesburg Summit in 2002 and the UNESCO Decade for ESD which started in 2004. Indeed, the UNESCO Decade and other ESD initiatives kept education firmly on the sustainability agenda for the Rio +20 Summit in 2012. Tilbury and Cooke (2005) shine a light on the learning aspect of education to reveal that the relationship between education and sustainability is so close that sustainable development can be seen as an ongoing learning process.

Change is a key concept linking education and sustainability. As referenced earlier, Bateson (2000) sees education and change as inextricably linked. Change is implicit in the notion of moving towards, or achieving, sustainability in respect of making informed choices about what sustainability might mean, and how to get there. In addressing the question 'Why educate for sustainability?' education clearly has a role to play in bringing about change for sustainability. But underpinning that role is the question of the type of education and the changes that might need to be brought to education systems in order to achieve change for sustainability.

Sterling (2001) presents the case for re-visioning the dominant model of education in western culture in order to develop a model of education that is capable of achieving a more sustainable future. He identifies that a key facet of the links between education and sustainability is the way in which we perceive and interpret the world, which is an ontological question. Systems thinking is central to resolving this question as Sterling (2001) sees systems thinking as an important element of the conceptual understanding of both the wider world and of sustainability, although he does emphasise the need to use ecological intelligence in conjunction with systems thinking (Sterling, 2009).

Juxtaposed with systems thinking is reductionist thinking, which has dominated education systems in the UK and in the West generally with disciplines being compartmentalised into timetabled slots in schools. This reductionist approach has tended to persist in the majority of professions as individuals specialise in terms of knowledge and skills and operate in their own professional silos. Meadows (2009) in *Thinking in Systems* starts by making a key point that there is a need for both reductionist thinking and systems thinking, *"I don't think the systems way of seeing is better than the reductionist way of thinking."* (Meadows, 2009:6). The emphasis on systems thinking in the ESD discourse arises from the fact that while it is seen as an important element in understanding sustainability it has been largely missing from formal education at all levels including the FE sector.

> - Thinking systemically requires several shifts in perception, which in turn lead to different ways of teaching, and different ways to organise society.
> - Systems are integrated wholes whose properties cannot be reduced to those of smaller parts.
> - The 'objects' of study become the networks of relationships within a community.
> - A shift from analytical thinking to contextual thinking. This allows a focus on project-based rather than subject based learning and encourages educators to be facilitators rather than 'experts' dispensing knowledge.
> - Focus on the learners developing an understanding of the processes of change and transformation, rather than on learners obtaining the 'right' answer.
> - Focus on the pattern within systems or communities rather than on individual constituents.
>
> (Capra, 1975 and 1996 in Tilbury and Cooke, 2005.)

Box 2.2.1: The shift in education required for sustainability

The prominence of systems thinking in the approach to education that would support a shift towards sustainability is captured in the work of Fritjof Capra as presented by Tilbury and Cooke (2005) in Box 2.2.1.

In February 2012 WWF-UK published a professional development framework for 'learning for sustainability'[10] based on an analysis of twenty-eight existing frameworks, reports and guidance documents (Strachan, 2012). The WWF-UK framework was a synthesis of the common elements from these documents in which systems thinking is a prominent skill for teachers to have and to teach. In the list of skills for professional practice for teachers in the WWF-UK framework, systems thinking features as follows: *"devise and facilitate learning that encourages systems thinking, creative thinking and critical thinking"* (Strachan, 2012:17).

In *Our Common Illiteracy*, a review of the contemporary levels of understanding of sustainability in 2002, Jucker points out *"… sustainability cannot be properly understood, let alone achieved unless we grasp it in its full complexity and multidimensional nature."* (Jucker, 2002:269). The notion that systems thinking can help conceptualise and bring understanding to complexity has placed it firmly in the debates on the role of education in sustainability. The next section of this chapter locates systems thinking in the broader field of systems theory.

2.3 Systems Thinking: Finding Patterns in a Kaleidoscope

A systems thinking perspective provides the theoretical lens through which both the examples and the research challenges of this thesis are approached. At a basic level systems are composed of three parts: elements, interconnections and purpose (Meadows, 2009:9). Systems thinking highlights the importance of the interconnections in terms of their contribution to understanding the purposeful whole. The interconnections are often overlooked in a reductionist approach which tends to focus on individual elements, even though relationships and connectivity have featured in the writings of philosophers and scientists going back through the centuries (Laszlo K, 1998). This includes the influence of Hegel on general systems theory as recorded in Ison's diagram in Figure 2.3.1. However, it is not until the early twentieth century that a coherent framework of thought came into existence that could be identified as a systems approach. In the 1920s a handful of scientists from

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[10] WWF-UK uses the term 'learning for sustainability' rather than the term ESD.

different fields became aware of the potential for developing a general theory of organised complexity (Lazslo E, 1972). This interdisciplinary approach to engaging with, and bringing a degree of understanding to, complex issues has relevance not only for sustainability, but also for many other areas of theoretical study and practical application. The interdisciplinary origins and nature of systems and systems thinking mean that there are multiple lines of thought and research contributing to systems approaches. Consequently, there is a diverse range of theories, models and applications emerging from the systems approach as shown in Figure 2.3.1. Not all of the contemporary strands of thinking identified in Figure 2.3.1 are relevant to sustainable development in the particular context of this thesis. I will highlight here the main influences that contribute to the systems approach applied in the analysis presented later in this thesis.
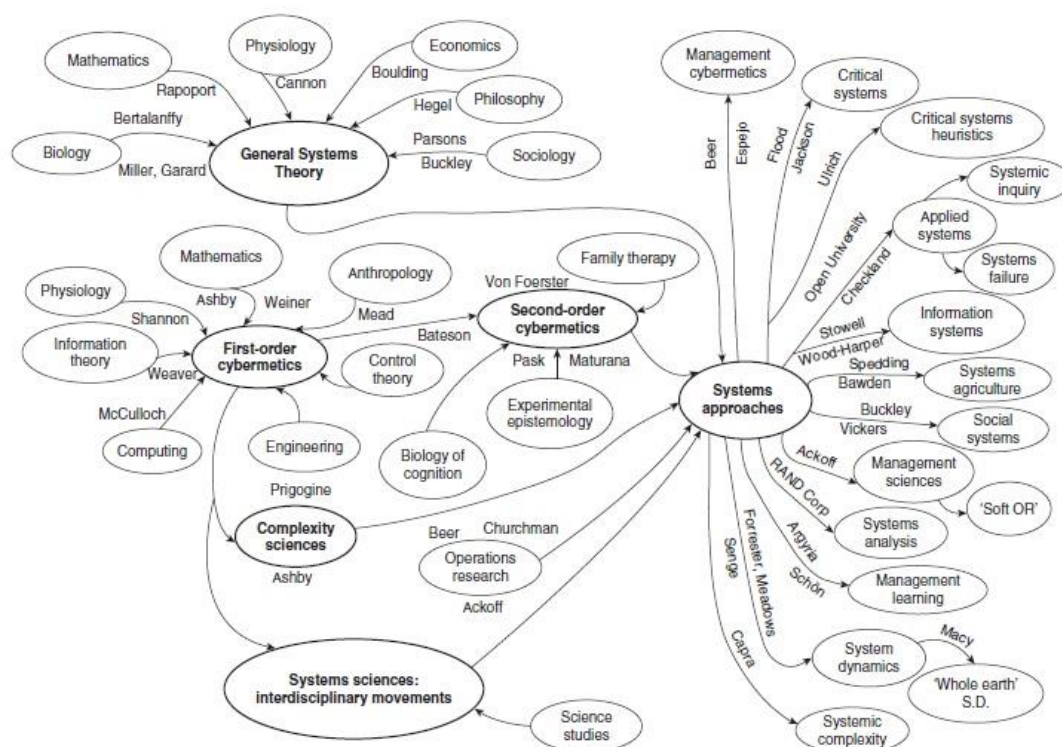
Figure 2.3.1: A model of the different influences that have shaped contemporary systems approaches (from Ison, 2008:144)

Checkland (linked to applied systems in Figure 2.3.1) developed a systems typology consisting of three basic types of system; these are natural systems, physical systems, and human activity systems (Khisty, 1995). The first two types of system are characterised as hard systems, which can be engineered to achieve specific objectives. The third type of system in the typology is characterised as a soft

system and is described by Khisty (1995) as follows. *"The third system type, the human activity system, is usually very messy, ill-defined, and cannot be adequately described by its state, in which case the analyst must concede to its purposeful activity, human values, and non-physical relationships. This is so because human activity can be expressed only as perceptions of people who attribute meaning to what they perceive. There is therefore no single 'testable' account of a human activity system, only possible accounts, all of which are valid according to a particular 'worldview' (or Weltanshuuang)."* (Khisty, 1995:92)

Soft systems, by their very nature, are less tangible and more challenging to conceptualise than hard systems. Drawing a comparison between the characteristics of hard and soft systems as set out in Table 2.3.1 below provides a perspective on the types of relationships that exist within soft systems and the dynamic and emerging nature of soft systems.

Identifying soft systems is due as much to the approach and perspective adopted towards systems as it is to the inherent nature of a particular system. The importance played by the perspective adopted, or to put it another way, the selected lens through which the system is viewed, is a conceptual point addressed by Sterling in his 2003 PhD thesis. He emphasises the differences between the assumptions upon which hard and soft systems are based, and he identifies a shift between seeing the world as systemic and seeing the process of enquiry as being systemic (Sterling, 2003:396). This has implications for research methodology, as a context or problem can be approached in different ways revealing both hard and soft aspects of a system. While Checkland's work focuses on the soft systems methodology which can assist in dealing with complexity and emergent properties, other approaches to systems have included elements of both hard and soft systems. The right hand side of Table 2.3.1 indicates the diversity of approaches, including the work of Capra and Senge, both of whom have contributed to the application of systems thinking in the fields of education and sustainability.

In *The Turning Point* (Capra, 1982) Capra challenges the traditional perspective of the material world provided by physics with an ecological, non-linear view capable of accommodating emergent properties to produce a new form of order organised around new meaning. Capra applied this perspective of a dynamic model based on ecological systems to social and economic aspects of the world including institutional change (Capra, 2003), an area taken on by Senge.

The hard systems thinking tradition	The soft systems thinking tradition
Oriented to goal seeking Assumes the world contains systems that can be engineered	Oriented to learning Assumes the world is problematical but can be explored by using systems models
Assumes system models to be models of the world (ontologies) Talks the language of 'problems' and 'solutions'	Assumes system models to be intellectual constructs (epistemologies) Talks the language of 'issues' and 'accommodation'
Advantages Allows the use of powerful techniques	*Advantages* Is available to all stakeholders including professional practitioners, keeps in touch with human content of problem situations
Disadvantages May lose touch with aspects beyond the logic of the problem situation	*Disadvantages* Does not produce the final answers, accepts that enquiry is never ending

Table 2.3.1: The hard and soft traditions of systems thinking compared. (From Ison, 2008:147, adapted from Checkland, 1985.)

Senge (1990) developed his Fifth Discipline model with systems thinking at the centre connecting with the other four disciplines as shown in Figure 2.3.2. Systems thinking is the perspective adopted by Senge to link his five disciplines into a holistic learning approach to institutional change. This model is discussed further in Chapter 4 of this thesis.

Adopting a systems perspective that is based on ecological principles and that can be applied to social phenomena has particular synergy with a model of sustainability that is ultimately bounded by ecological limits, such as the model adopted by this thesis and presented in Chapter 1, section 1.2. It is a perspective that enables a deeper level of understanding of the interconnections between the ecological systems and the social systems constructed by humans. This understanding of the interaction between the socially constructed world and the natural world is central to understanding sustainability and sustainable development.

This is why developing people's ability to think systemically and to adopt a systems perspective has become an important aspect of ESD.
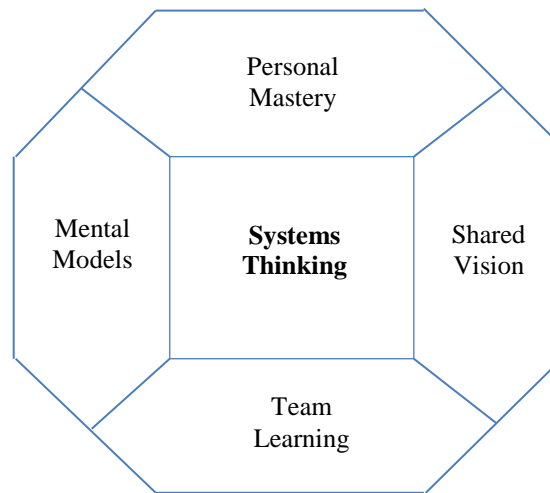
Figure 2.3.2: Senge's Five Disciplines (Senge, 1990)

In this study a systems thinking lens is central to enabling the research questions listed in Chapter 1 to be addressed. Systems thinking brings greater clarity to the relationships between the elements of a system. It reveals the relationships between the natural world, the built environment and the social constructs, and it is applied to the context of developing sustainably designed buildings in the FE sector. The next section of this chapter examines the emergence of sustainability in the FE sector in England and Wales and the policy context in which the development of new buildings was subject to sustainable design criteria.

2.4 Further Education: the Sustainability Sector

There are three main, formal education sectors in the UK: the schools sector, the FE sector, and the Higher Education (HE) sector. The boundaries between these sectors are 'porous' to some extent, with FE colleges offering a similar provision to the schools sector for the 16-19 age group; and with an increasing level of HE provision being delivered through FE colleges. Little wonder some commentators describe the FE sector as *".....poorly defined and understood. It has been characterised as the 'everything else' sector because of the sheer breadth of provision."* (Panchamia, 2012:1). Apart from the nature of their provision the sectors are further differentiated by policy, funding and their historical roots. In

relation to policy and funding in recent years the FE sector in England and Wales is often subsumed into a broader 'learning and skills sector', where FE is by far the largest provider along with commercial and third sector training providers and elements of the HE sector.

An historical perspective on the emergence of FE colleges contributes to an understanding of their cultural context and their connections to local and wider communities. FE colleges have their roots in two main traditions dating from the end of the 19th and the early 20th centuries. One tradition being working class, community based, vocational training institutes and the second being social movements, mainly sponsored by the middle classes to promote craft skills, applied science and work-related subjects combined with a liberal education (Howard, 2009:53). By the second half of the 20th century the FE sector had become well-established, with colleges fulfilling roles in the 16-19 age group; in vocational education; and in adult education, depending on the needs of the local education authority (LEA) in which a college was situated.

This thesis is particularly concerned with FE colleges in England and Wales during the first decade of the 21st century when sustainable development was on the FE agenda and a significant number of new buildings were constructed on FE college campuses. What follows is a brief review of the control of colleges in terms of policy and funding, starting with a key turning point in 1993.

April 1993 saw the incorporation of colleges as institutions independent of local education authorities in England and Wales. LEAs had been responsible for the FE colleges that existed within the authorities' boundaries for much of the 20th century. From 1993 until 2000, FE colleges were controlled in terms of policies and funding by the FE Funding Council (FEFC), with each college having its own board of governors, who operated within the frameworks set out by the FEFC. As part of the Labour Government's political devolution process, which started in 1999, responsibility for education policy and funding in Wales passed to the newly formed WAG. From the year 2000 onwards funding for the Welsh FE colleges was controlled by WAG's Department for Education, Lifelong Learning and Skills (DELLS) (later to become Department for Children, Education, Lifelong Learning and Skills (DCELLS)). This political reorganisation required changes in England where funding for FE colleges became primarily the responsibility of the Learning and Skills Council (LSC). The LSC was responsible for administering funding to

other providers of skills training, but FE colleges formed the major part of the learning and skills sector. Although FE colleges also accessed other sources of funds, with regard to capital developments on FE college campuses in the first decade of the 21st century, the LSC was the main source for colleges in England and the WAG via DELLS was the main source for FE colleges in Wales. The LSC and DELLS were responsible for the main policy documents relating to sustainability in the sector during the period of this study with *From Here to Sustainability: The LSC's Strategy for Sustainable Development* (LSC, 2005) and *ESDGC: A Strategy for Action* (DELLS, 2006).

The way in which the sustainability agenda has developed in FE colleges in England and Wales is primarily the result of policy and funding directives. However, the individual context of a college and the priorities of the stakeholders in the college are also influential in terms of how a college responds to the sustainability agenda. In order to review the influences on the development of the sustainability agenda in FE colleges in England and Wales it is useful to have a snapshot or broad baseline of the situation in FE colleges towards the end of the 1990s. The work of the Toyne Report on environmental responsibility in FE and HE, and particularly the review of the Toyne Report (Ali Khan, 1996), provide a good starting point for the purposes of this thesis.

The original Toyne Report, *Environmental Responsibility: An agenda for further and higher education* (Department for Education and The Welsh Office, 1993) set out an agenda for environmental responsibility and global citizenship in FE and HE. The agenda consisted of twenty-seven recommendations for stakeholders including government funding councils, qualifications authorities and the individual institutions. *Environmental Responsibility: A Review of the 1993 Toyne Report* (Ali-Khan, 1996) published by The Welsh Office, the Department for the Environment and the Department for Education and Employment is the more revealing document as it researched the progress that had been made on the twenty-seven recommendations.

Although the review document was headed Environmental Sustainability, the contents of the review was focused on education for sustainability. The outcomes of the 1996 review revealed a low level of engagement with sustainability in both the FE and the HE sectors, particularly in terms of integration into the various curricula.

"Only 17 of the respondents to the FHE questionnaire, which had been sent to 756 institutions, had even attempted to articulate a common learning agenda for sustainability and responsible global citizenship which would be relevant to all students." (Ali Khan 1996:34)

The review reported on research carried out by WWF-UK and the National Council for Vocational Qualifications (NCVQ) into General National Vocational Qualifications (GNVQ) courses, which were a prominent part of FE provision during this period. This research revealed virtually a complete lack of engagement with sustainability by these courses. *"The WWF-NCVQ research revealed that the common learning agenda for sustainability is completely absent from existing GNVQ provision and that, while some attempt has been made to integrate the specific learning agenda for sustainability overall coverage is patchy."* (Ali Khan 1996:34)

The 1996 review of the recommendations put forward by Toyne summarises the situation in FE and HE towards the end of the 1990s. *"This appraisal of the progress which the further and higher education sector has made in the development of environmental education, against the background of the 1993 report 'Environmental Responsibility' – the Toyne Report – has revealed considerable indifference to the Report's recommendations on the part of the institutions concerned. ……………………………………………………………………………………..*

"The size of the task of reorienting both academic and housekeeping practices tends to be under-estimated and, in general, institutions have not made the link between environmental management and quality management. Hardly any progress has been made in respect of curriculum 'greening'." (Ali Khan, 1996:2)

The 1996 review did recognise that a *"... small number of trail blazing institutions are making significant progress"* (Ali Khan, 1996:2), and these isolated institutional initiatives were soon to be complemented by a number of top down drivers which led to significant progress in sustainable development in FE colleges in the first decade of the 21st century.

At government level there was a growing response to the general sustainable development agenda and to the sustainability agenda in education, including FE. The UK Government established a Sustainable Development Education Panel in 1998 which had a remit to comment on, and provide guidance for, all sectors of education with regard to sustainability. The Labour Government published its first Sustainable Development Strategy in 1999 and this was reviewed and updated in 2005. During

the same period the WAG incorporated sustainable development into its newly formed constitution and those with an interest in ESD, such as Oxfam Cymru and RSPB Cymru, started to challenge the WAG with regard to the implications of the new constitution for education. Partly as a result of this an ESDGC Panel was established in 2004 which included the WAG minister responsible for DELLS. It is also relevant to note that the international backdrop during this period included the Rio+10 Earth Summit in Johannesburg and the start of the UN Decade for ESD in 2005.

The main strategy documents for FE colleges in the first decade of the 21st century have already been mentioned. For England this was *From Here to Sustainability: The LSC's Strategy for Sustainable Development* (LSC, 2005) and for Wales it was *ESDGC: A Strategy for Action* (DELLS, 2006). The approach in both of these documents was one of whole institutional change, something which was common in other education sectors and in organisations outside education as discussed in Chapter 4 of this thesis.

In *From Here to Sustainability* the LSC supported a whole institutional approach by identifying the following 'key areas for action':

- Buildings and Estates
  - environmental management system
  - building and design
  - procurement
  - biodiversity
  - travel
- Curriculum
  - ESD
  - learning materials
  - whole institutional approach
  - links and partnerships
  - healthy college programme
- Community
  - community engagement
  - local and regional networks
  - local markets and ethical trade
  - shared facilities

        ○ local economic strategies

        ○ volunteering

The 'Proposed Action' for 'Building and design' in the LSC's delivery plan for implementing sustainable development was to *"Promote and deliver sustainable practice in all design, new build and refurbishment activities."* (LSC, 2005:14)

  The 2006 ESDGC Strategy in Wales used the term 'Common Areas' to establish the breadth of approach required for whole-institutional implementation of ESDGC in all sectors. These Common Areas were as follows.

- Commitment to leadership
- Teaching and learning
- Institutional management
- Partnerships
- Research and monitoring
- Resourcing

Under 'Institutional Management' the Strategy opens with the following statement under the heading 'Sustainable Estates': "*An organisation can demonstrate its commitment to sustainable development and global citizenship through the management of its estates and facilities. The quality of the physical environment for learning is fundamental to the learning experience."* (DELLS, 2006:28)

  This concept of the grouping of categories, which together help to ensure a whole institutional approach to sustainability, is further reflected in the approach presented by bodies with a remit to support sustainability in the FE sector. The EAUC and the Learning and Skills Improvement Service (LSIS) both used the following four categories: Leadership, Learning, Organisational Capacity, and Partnerships as shown in Figures 2.4.1a and 2.4.1b.

Leadership   Organisational   Partnerships   Learning
       Capacity

Figure 2.4.1a: Categories from the home page of *Sorted* the EAUC online resource (www.eauc.org.uk/sorted/home accessed 8 April 14)
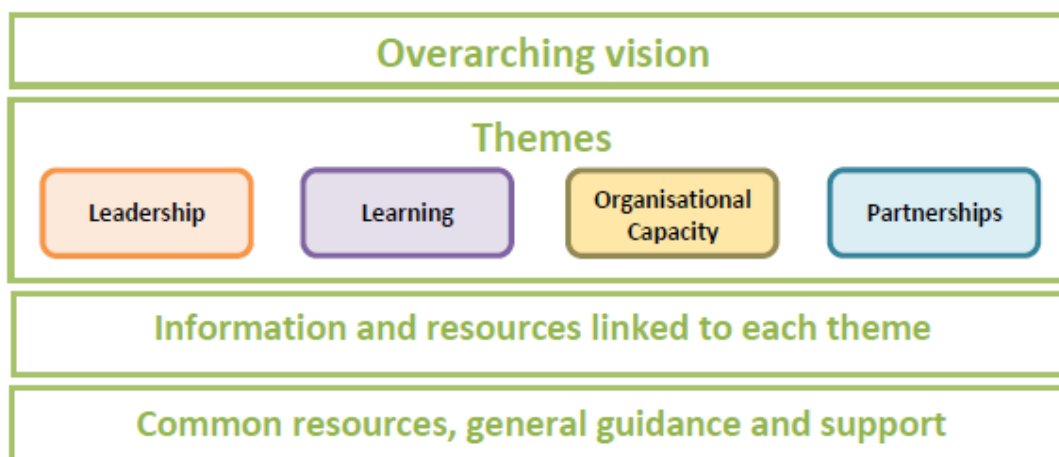
Figure 2.4.1b: LSIS Sustainable Development Framework (LSIS, 2011:2)

The 'Organisational Capacity' section of the EAUC's online resource has eight sub-topics all of which are relevant to the sustainable development of new buildings on FE college campuses. The sub-topics are as follows.

- New buildings and Refurbishments

- Using Energy Efficiently

- Conserving Water

- Reducing Unnecessary Waste

- Encouraging Biodiversity

- Purchasing

- Transport and Fleet Management

- Environmental Management Systems

The approaches from government and non-government sources in the early part of the 21st century support the notion that the design, development and management of buildings within the physical estate of FE colleges is an integral part of implementing sustainability in a holistic way. Therefore the development of a new building on an FE college campus has the potential to influence change towards sustainability within the institution.

2.5 Summary

This chapter has explored the emergence of sustainability in education and in the FE sector in particular. It has also explored how particular approaches to education can support sustainability. ESD, as an approach to education, is an integral

part of the concept of change for sustainability. ESD is characterised by the inclusion of systems thinking as a means of developing an understanding of phenomenon not revealed by reductionist thinking. ESD is also characterised by the capacity to take account of emerging knowledge. Responding to emerging knowledge is another facet of change associated with education and sustainability. Systems thinking has been introduced in this chapter as a lens through which to conduct this research. The next part of the thesis introduces the fields of study of sustainable design and institutional change which both contribute to the analysis of change for sustainability on FE campuses.

Chapter 3

SUSTAINABLE DESIGN IN ARCHITECTURE

"In design – this futures-oriented, trial and error process for making meaningful order – we work intellectually as well as from deep levels of intuition and feeling." (Papanek, 1995:7, *The Green Imperative*)

3.1 Introduction

This chapter provides an overview of the roots of sustainable architecture and draws on definitions and frameworks from the existing literature to identify what characterises sustainable design in the context of education buildings. To supplement this mainly theoretical analysis of sustainable design the chapter reviews two applied frameworks for assessing education buildings in respect of sustainability. The chapter concludes by constructing a framework of the elements of sustainable design that can be found in education buildings for the purposes of applying this framework to the examples selected for analysis later in this thesis.

3.2 The Green Shoots of Sustainability in Architecture

Embedded within the quotation at the head of this chapter from Victor Papanek's book *The Green Imperative* is a succinct view of how we might conceive design and also how it is practised. This is an ecological view of design and while it is possible to identify inherent potential synergies with sustainability (e.g. "futures-oriented", investigative approach open to reassessment and change, and drawing on emotional intelligence as well as intellect) it also immediately opens up areas of contest and debate. For example who determines what is 'meaningful order'? Does it mean that there is a lack of order in the multiple contexts in which design takes place? And do all designers draw on both the left and right hemispheres of the brain?

Papanek believes that there can be no life on Earth and no human culture without ecology and environmental equilibrium, which leads him to assert that design must be *"a bridge between human needs, culture and ecology"* (Papanek, 1995:29). This strikes a chord with the way in which systems thinking recognises connectedness between the natural world, human activity and social constructs as discussed in the previous chapter of this thesis.

From the time designers first started practising their craft the natural world has been a source of inspiration. One of the main influences on sustainable design is ecological design, which is much older than sustainable design as an area of design practice. Ecological design is not simply about being inspired by the natural world in terms of the design aesthetic, it also involves applying the principles of ecology to the object being designed in order to have minimum impact on the environment. While ecological design is primarily focused on working with low impact natural materials, sustainable design also draws on appropriate new materials and technology. The term "green" is sometimes used as an alternative to both ecological and sustainable, which adds to the ambiguity around terminology. Debates over the similarities and difference between ecological, green and sustainable design are manifest within the literature as demonstrated by the way the terms are sometimes differentiated and sometimes used inter-changeably as illustrated by this quote from James Wine in his book *Green Architecture*, which uses the term ecological design where the term sustainable design might be more appropriate. *"Even the most advanced advocates of ecological design are still struggling to integrate environmental technology, resource conservation and aesthetic context."* (Wine, 2000:20).

The inter-connected nature of sustainability and the way in which it crosses disciplinary boundaries presents complex challenges. This has led to the need for a multi-disciplinary perspective being essential for understanding and for implementing sustainable design practices. Papanek recognises this in his approach to design; *"The requirements of decent design are far too complex for a designer to solve alone. It is essential to work with people from other fields."* (Papanek, 1995:61). In Papanek's case the basic members of his team always included an anthropologist, a psychologist, an environmental scientist, as well as engineers, lawyers. Other specialists were brought in as needed depending upon the project.

Papanek raises the question of whether there is a need for a separate category of design labelled "sustainable", because all design should aim to incorporate the principles of sustainability and therefore good design is always going to be sustainable design. *"Perhaps there should be no special category called 'sustainable design'. It might be simpler to assume that all designers will try to reshape their values and their work, so that all design is based on humility, combines objective aspects of climate and the ecological use of materials with subjective intuitive*

processes, and relies on cultural and bio-regional factors for its forms." (Papanek, 1995:12).

This view is supported by Jonathan Chapman in his book *Emotionally Durable Design* when he says *"Essentially, catering for the needs of the natural environment is simply another element of good design."* (Chapman, 2005:173). For Chapman the term sustainable is an umbrella term that covers all activities geared towards reducing the negative social and environmental impacts of contemporary life. Despite the fact that the term sustainable design is underpinned by what Chapman refers to as *"complexity and numerous hypocrisies"* and is used by different designers for different ends, sustainable design has to a large extent become mainstream or as Chapman puts it *"Sustainable design is no longer regarded by the wider creative industry as a whimsical mutation of design proper,......"* (Chapman, 2005:7)

With the advent of lifecycle analysis and the footprint of products being able to be assessed in a variety of ways the sustainability of an object, and therefore its design, has become more accountable and more integrated into the decision-making processes. Braungart and McDonough (2009) placed the ecologically accountable practices firmly in the design sphere with their book *Cradle to Cradle: Re-making the way we make things.* However, *s*ustainable architecture still suffers from some of the general ambiguities associated with sustainability and there are on-going debates around approaches to the sustainable design of buildings.

"The terms sustainable, ecological and green are often used interchangeably to describe environmentally responsive architecture..." (Steele, 2005:6). This quotation from Steele in the preface of his book *Ecological Architecture: A critical history*, demonstrates a similar ambiguity with these three terms in relation to architecture as there is within design generally. Williamson et al (2003) note the imprecision of the way the term sustainable architecture is applied for different reasons to many kinds of buildings, from *"a woven grass and thatch bure on a Pacific Island to a high-tech office building in the United States."* (Williamson et al, 2003:6). The former is considered sustainable because it is constructed entirely of biodegradable materials and has an extremely low ecological footprint, while the office building may be considered sustainable if it uses significantly less energy for heating and cooling than is typical for this class of building. As with sustainability generally, sustainable architecture attracts contested definitions. Numerous

frameworks and sets of criteria have been developed, some outlining general principles relating to sustainable architecture, while others focus on more specific criteria aimed at assessing whether a building design is sustainable or not. Reviewing some of the sets of general principles can contribute to a fundamental understanding of what constitutes sustainable architecture.

Statement by the Union of International Architects' World Congress of Architects, Chicago, 1993.

We commit ourselves, as members of the world's architectural and building-design professionals, individually and through our professional organisation to:

- Place environmental and social sustainability at the core of our practice and professional responsibilities;
- Develop and continually improve practice, procedures, products, curricula, services and standards that will enable the implementation of sustainable design;
- Educate our fellow professionals, the building industry, clients, students and the general public about the critical importance and substantial opportunities of sustainable design;
- Establish policies, regulations and practices in government and business that ensure sustainable design becomes normal practice;
- Bring all existing and future elements of the built environment – in their design, production, use and eventual re-use – up to sustainable standards.

Box 3.2.1: Statement on Sustainability by the Union of International Architects
        (Williamson et al, 2003:6)

The Union of International Architects produced a statement on sustainability in 1993, which is reproduced in Box 3.2.1. There are no details about how materials or technology might be used, nor are there specifics about human, cultural and community aspects of design. These are all implied within the first general point about placing environmental and social sustainability at the core of practice. It is a statement of intent rather than a detailed policy with real teeth. However, the third point calls for architects to educate not only their fellow professionals but also clients and the wider community. This is a key issue in shifting perceptions and understanding in relation to the sustainable design of buildings, which generally differ from buildings designed through the established practices of the late 20th century. Often there is a lack of understanding as to why differences exist as well as how the building should be used to maximise the benefits to the occupants. This

emphasis on education needs to be a part of the sustainable design process and an element that differentiates it from standard practice.

A more comprehensive set of principles were developed by the American architect William McDonough for the Hannover World Expo 2000. These are reproduced in Box 3.2.2. The Hannover Principles, as they are known, were produced in conjunction with guidelines for the competition to design national pavilions for the World Expo 2000. The aim was to make this international event more sustainable, and the nine principles are accompanied by more detailed guidance. The nine principles reflect the conceptual approach to sustainable architecture of an internationally recognised practitioner of sustainable design.

The Hannover Principles

1. Insist on the rights of humanity and nature to coexist in a healthy, supportive, diverse and sustainable condition.
2. Recognise interdependence. The elements of human design interact with and depend upon the natural world, with broad and diverse implications at every scale. Expand design considerations to recognise even distant effects.
3. Respect relationships between spirit and matter. Consider all aspects of human settlement including community, dwelling, industry, and trade in terms of existing and evolving connections between spiritual and material consciousness.
4. Accept responsibility for consequences of design upon human well-being, the viability of natural systems, and their rights to coexist.
5. Create safe objects of long term value. Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to careless creation of products, processes or standards.
6. Eliminate the concept of waste. Evaluate and optimise the full lifecycle of products and processes, to approach the state of natural systems, in which there is no waste.
7. Rely on natural energy flows. Human designs should, like the living world, derive their creative forces from perpetual solar income. Incorporate this energy efficiently and safely for responsible use.
8. Understand the limitation of design. No human creation lasts forever and design does not solve all problems. Those who create and plan should practice humility in the face of nature. Treat nature as a model and a mentor, not an inconvenience to be evaded or controlled.
9. Seek constant improvement by sharing of knowledge. Encourage direct and open communication between colleagues, patrons, manufacturers, and users to link long term sustainable considerations with ethical responsibility, and re-establish the integral relationship between natural processes and human activity.

Box 3.2.2: The Hannover Principles, McDonough and Partners (1992)

A more systemic and holistic view of sustainability emerges from these design principles. It is a view that corresponds closely to the model of sustainability developed in Chapter 1 of this thesis. The key elements of sustainability inherent in these Principles can be identified as follows.

- Human well-being: physical, emotional, intellectual and spiritual – e.g. *"rights of humanity"; "relationships between spirit and matter"; "consequences of design upon human well-being".*

- The limits and the well-being of the natural environment – e.g. *"consequences of design upon the viability of natural systems"; "the rights of humanity and nature to coexist in a healthy, supportive, diverse and sustainable condition".*

- Systems approach – e.g. *"Recognise interdependence"; "Respect relationships"; "Rely on natural energy flows"; "approach the state of natural systems, in which there is no waste"; "re-establish the integral relationship between natural processes and human activity".*

- Futures perspective – e.g. *"Accept responsibility for consequences"; "existing and evolving"; "Create safe objects of long term value"; "No human creation lasts forever"; "link long term sustainable considerations with ethical responsibility".*

- Participation, communication, exchange, education – e.g. *"Consider all aspects of human settlement including community, dwelling, industry, and trade"; "Seek constant improvement by sharing of knowledge. Encourage direct and open communication".*

The Hannover Principles can be applied to any context where a building needs to be designed. The design will be a solution to the task of creating the building within the given physical, social, cultural and economic context. Although the same principles are applied every solution will be different as a result of the context. This way of perceiving what sustainable architecture might be aligns with a description offered by Williamson et al (2003).

"Sustainable architecture, then, is a revised conception of architecture in response to a myriad of contemporary concerns about the effects of human activity.

The label 'sustainable' is used to differentiate this conceptualisation from others that do not respond to these concerns." (Williamson et al, 2003:1)

The conceptualisation referred to here is underpinned by the same principles that shape McDonough's view of sustainability. The "response" will generate a diverse range of design solutions according to context. The design solutions will not produce a common "style" of architecture, hence Guy and Moore's statement *"By exploring sustainable architectures in the plural, as competing interpretations of our environmental futures, we can begin to ask new questions and perhaps introduce some fresh thinking about sustainable design".* (Guy and Moore, 2005:2).

Later in their book Guy and Moore emphasise the multiplicity of sustainability. *"What is important, then, is to consider the multiple possibilities for meaning, the alternative construction of culture and nature in each case we explore, rather than to limit meaning to narrow calculations concerning efficiency."* (Guy and Moore, 2005:223).

For Guy and Moore and for other architects subscribing to a similar view of sustainability to McDonough, the sustainability of a building is far more than the level of its carbon emissions, although this is still the main criteria for some mainstream architects. A systems perspective incorporates carbon emissions together with other physical and social processes. While every building is an open system to some degree, one aim of sustainable architecture is to create a building that is as close to a closed system as possible.

David Orr has written extensively on design and sustainability and shares a systems perspective; for example, he encourages designers of buildings to approach their task by thinking of designing a system to fit within a system (Orr, 2007). In his address to the School of Design at the University of Pennsylvania in 2007 he identifies the four main facts that architects need to take account of when designing a building and offers three principles that should guide their response to these facts. These four facts characterise the unsustainability of contemporary western lifestyles; they can be summarised as follows.

1. We have become disconnected from nature and lost our sense of rootedness in place. We are becoming an indoor species, spending most of our time in houses, cars, offices and schools. The problem is most severe for children, who might spend up to eight hours a day in front of a television or computer

screen and with limited opportunities to engage with the outdoors, they have been referred to as the 'bubble-wrap generation' (Malone, 2007).

2. The rise in population creating not only problems of ecological carrying capacity, but also issues of justice and fairness as the gap between rich and poor continues to widen in an increasingly crowded world.

3. The end of cheap fossil fuels, which our society has come to rely on. Oil will still be available in the future, but at vastly increased prices as demand outstrips supply.

4. The increasing concentration of CO_2 in the atmosphere leading to climate change that will bring unstable and less predictable weather conditions and degrade our life support ecosystems.

Orr (2007) presents three principles to underpin a design response to these facts.

1. See design as a large and unifying concept, the remaking of the human presence on Earth. Learn how to: use nature as a standard; power the world on current sunlight not ancient sunlight; eliminate waste; pay the full cost of development; and build prosperity on a durable basis. When designers get it right they create ways that reinforce our common humanity at the deepest level.

2. Use a moral compass to guide the design journey – aim to cause no ugliness, human or ecological, somewhere else or at some later time. Think upstream and downstream of the building and think in terms of place-making rather than form-making.

3. Place your work in the wider historical and cultural context. The great work of the current generation is to extend ecological enlightenment that joins human needs and purposes with the way the world works as a biophysical system.   (After Orr, 2007).

Guy and Moore believe that architects who engage with sustainability have, to one degree or another, been affected by post-modern methods of interpretation. These methods point towards *"an interdisciplinary perspective that emphasises the co-construction of nature and culture, of society and technology, and of place and the future."* (Guy and Moore, 2005:231). All these co-constructed elements are important influences in building design. Viewing these as social constructs adds to

the complexity of applying the principles underpinning McDonough's view of sustainability and increases the potential diversity of the design solutions. Accounting for the social constructs within a particular context draws the stakeholders into the design process and highlights the elements of participation and communication.

Identifying and involving the stakeholders in the design process could be one differentiating feature of sustainable design. So who are the stakeholders? Williamson et al (2003) identify two subsets of stakeholders. 'Passive stakeholders' are people who may be affected by the building in some way, but who play no active part in the decision-making process (Williamson also suggests that the Planet or the environment could be seen as a passive stakeholder). Secondly, there are 'active stakeholders' and these include all decision-makers, no matter how small. So in terms of a sustainable design process that seeks participation and interdisciplinary contributions, there is likely to be a range of stakeholders empowered to become 'active' rather than 'passive'. In the case of an education building active stakeholders will include all parts of the learning community that are connected to the institution, including current students (future students can be considered passive stakeholders), teaching and non-teaching staff, and the board of governors. The level of stakeholder engagement will be reflected in the methods used and weight given to consulting staff, students and other active stakeholders. Funders, local authorities, politicians and the wider community are also potential active stakeholders, along with educationalists and engineers working with the architects.

The literature reviewed in this chapter is drawn from the general field of design and from the field of architecture. It has focused on the outputs of academics and practitioners in these fields who see themselves writing from a sustainable, ecological or green perspective. From this body of literature it is possible to identify some of the key elements of sustainable design that will assist in differentiating between sustainably designed education buildings and those which are less sustainable in their design and operation. These elements can be summarised as follows.

- <u>Raise the importance of context</u>

  Create a place and build a system that fits within the wider system. Take account of the biophysical context and the socio-cultural context of the building - how the building fits into the physical landscape and connects

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to its local community. This requires research and engagement of the local community and an understanding of the ecological systems. It influences size, orientation and aesthetic.

- <u>Give equal weight to the emotional as well as the physical well-being of the occupants</u>

  Create spaces and use materials and technologies that are safe, but also uplifting in terms of light and aesthetic design. Create spaces to meet the diverse needs of teachers and learners including spaces for social interaction, spaces for quiet working, spaces for large groups and spaces for small groups.

- <u>Take account of environmental sustainability</u>

  The ecological footprint, including the carbon footprint, of the building has been calculated to influence the choice and source of materials. Achieve as closed a system as possible with regard to energy, water, food and waste.

- <u>A sustainable legacy – future perspective</u>

  Create a building with an inherent pedagogy that teaches all who use it, a resource that can be exploited by teachers, and a positive resource for management to influence practices. The building will not be a burden on future occupiers, it will have built-in flexibility to meet the changing educational needs of future generations and materials/components will be recyclable for minimal waste end of life disposal.

Developing this perception of sustainable architecture from the literature, to some extent, assumes an ideal scenario for the development of education buildings. These principles are severely tested in practice by the constraints and barriers that accompany most development projects including limited budgets, criteria imposed by funding bodies and the difficulty of finding project managers and construction companies that are committed to, and can put into practice, sustainability principles. However, there are some practical schemes available to assist with supporting new education buildings to be developed along more sustainable lines. Two of these schemes are reviewed in the following section.

3.3 How do We Know a Building is Sustainable?

Frameworks such as the two described here focus on the output of the design rather than the principles that underpin the design. They attempt to assess the design through identifiable and, to some extent, measurable criteria. The first example is the Commission for Architecture and the Built Environment (CABE) review of school designs and the other is the Building Research Establishment Environmental Assessment Method (BREEAM) Education Assessment.

CABE runs design review panels for some individual developments in the UK and it has held specific design review panels for London 2012 projects, for Eco-Towns and for Schools. Each school design submitted for review is assessed by a panel of six architects and practitioners, who review the design against a set of ten criteria. Although CABE is not reviewing from a sustainable design perspective, it is seeking to encourage 'good' design which incorporates aspects of sustainable design as demonstrated through its ten criteria listed in Table 3.3.1.

1. Identity and context	2. Site plan
• School ethos and identity • Relationship and Neighbourhood • Civic character	• Enhancing the character of the site • Working with existing site constraints and opportunities • Strategic site organisation
3. School grounds	**4. Organisation**
• Relationship between the grounds and the building • Social spaces and play • Outdoor learning • Physical activity	• Accommodating the educational agenda • Spatial organisation • Movement routes
5. Buildings	**6. Interiors**
• Concept • Form and massing • Appearance • Construction and materials	• Variety and delight • High quality • The building in use

7. Resources	8. Feeling safe
• Orientation • Ventilation • Daylighting • Energy and services strategy	• External environment • Internal environment
9. Long life, loose fit	10. Successful whole
• Day-to-day adaptability • Flexibility • Furniture, fittings and equipment	• Appropriateness • Delight • Timelessness • Fulfilling user intentions

Table 3.3.1: CABE criteria for reviewing the design of school buildings

Although sustainability is not mentioned overtly in the criteria, the supporting documentation indicates a commitment to sustainable practices. Criteria 1 links the values of the school with the community and the locality. Criteria 2 and 3 indicate a desire to link the students with the outdoor environment including the ecology of the site. Criteria 7 addresses the resource impact of the design on the environment, especially in relation to energy. Throughout the criteria there is a 'joined-up approach' indicating an awareness of systemic thinking that is brought together in criteria number 10, which focuses on 'making the design work in the round', including recognising the potential emotional impact of the design (CABE, 2009). These criteria provide a framework for the review panel to discuss a design, which allows for interpretation and qualitative assessment. This differs from the approach and from the purpose of BREEAM assessments.

The Building Research Establishment has developed its BREEAM Education Standards for use with schools, sixth form colleges and FE colleges. It also identifies ten categories for assessment with benchmarks and targets set in each category. The ten categories carry different weightings and the assessment will generate a final score which will determine the assessment awarded to the building. The award scheme ranges from "Outstanding" through "Excellent", "Very good", "Good" and "Pass".

Management	Waste
• Commissioning • Construction site impacts • Security	• Construction waste • Recycled aggregates • Recycling facilities
Health and Wellbeing	**Pollution**
• Daylight • Occupant thermal control • Acoustics • Indoor air and water quality • Lighting	• Refrigerant use and leakage • Flood risk • NOx emissions • Watercourse pollution • External light and noise pollution
Energy	**Land Use and Ecology**
• CO_2 emissions • Low or zero carbon technologies • Energy sub metering • Energy efficient building systems	• Site selection • Protection of ecological features • Mitigation/enhancement of ecological value
Transport	**Materials**
• Public transport network connectivity • Pedestrian and cyclist facilities • Access to amenities • Travel plans and information	• Embodied lifecycle impact of materials • Materials re-use • Responsible sourcing • Robustness
Water	**Innovation**
• Water consumption • Leak detection • Water re-use and recycling	• Exemplary performance levels • Use of BREEAM Accredited Professionals • New technologies and building processes

Table 3.3.2: Summary of BREEAM categories and main issues

The BREEAM standards have been produced to allow for an external BREEAM assessor to review the development of the building and award a quantitative score. This does not allow for the level of qualitative discussion that can take place in the CABE review panel. As a result the detail within the categories focuses on measurable indicators. The "Health and Wellbeing" category concentrates on factors that influence physical wellbeing and does not engage with emotional wellbeing. Although the focus is on education buildings in this BREEAM standard

there is no overt link between the building design and the education function of the building. The "Land Use and Ecology" category assesses the protection of the existing ecology, but does not consider how the design might connect learners with that ecology.

Although these standards are titled the BRE Environmental and Sustainability Standard they reflect a strongly environmental perspective. The greatest weight in the BREEAM assessment is given to the energy category, emphasising the importance of carbon emissions in mainstream architecture. There is no category for holistic integration of the design, indicating a lack of systemic thinking and no opportunity to credit a systems approach in the final award.

These two schemes are not directly comparable but the difference between the methodologies of the schemes is reflected in the number of projects they are engaged with. The qualitative approach of CABE's design reviews, which involve the convening of an appropriate panel of 'experts' has reported on relatively few projects compared with the target-oriented BREEAM framework applied by trained assessors to numerous education projects in the UK and beyond.

CABE and BREEAM are the most prominent options in the UK for an education building to achieve some form of credibility in sustainability. The education sector in the United States has embraced the Leadership in Energy and Environmental Design (LEED) assessment scheme for buildings run by the United States of America Green Building Council. Both BREEAM and LEED are expanding internationally.

Not surprisingly, given the contested nature of sustainability, both BREEAM and LEED are subject to debate and criticism. The comparative study conducted by Aspinall et al (2012) assesses BREEAM against standards from other countries including LEED. The general conclusion supports the notion that BREEAM assess environmental performance rather than a holistic approach to sustainability, *"....BREEAM is perceived as a very useful tool when addressing the environmental performance of buildings: however it is perceived that it does not address the whole concept of sustainability and sustainable development."* (Aspinall et al, 2012:7). On this basis BREEAM can provide a good framework for environmental sustainability and individual projects can choose to go beyond this in terms of other aspects of sustainability.

3.4 A Framework for Sustainable Design in Education Buildings

Set out below are key elements of sustainable design that can occur within the development of education buildings. This framework of elements is based on the theoretical concepts discussed in section 3.2 and on the more applied sets of criteria discussed in section 3.3 above. These elements are not simply physical features that will form part of the completed building they are also features of the design process which contribute to the final design being sustainable in a broad sense.

1. Design process, consultation with the stakeholders and support for the leaders in the institution
   - The design process is a two way learning experience between the architects and the education institution. It can involve learning activities with the stakeholders, including the students, to explore their ideas on design. In some cases the students have taken the lead in the design process.
   - Leaders in the institution make use of the architects as a resource to inform staff and students about sustainability issues and draw on the architects' expertise to maximise the effectiveness of the design.

2. Links with the physical context and landscape
   - The position on the site and the aspect take advantage of natural factors such as solar gain and northern light.
   - The design connects the students with the outdoor setting of the building, especially if green areas exist in the grounds. (Figure 3.4.1)
   - The design complements the surrounding built environment where appropriate.

3. Links with the socio-cultural context
   - Taking account of the social and cultural setting of the building and its users.
   - Taking account of actual and potential community use and engagement.

4. Physical well-being of occupants
   - All materials used are non-toxic.
   - Opportunities for exercise are created.

5. <u>Emotional well-being of occupants</u>

    - Spaces that can lift the spirit and not feel oppressive.

    - A sense of belonging to the institution is encouraged through the design.

6. <u>Materials used and respect for the Earth's resources</u>

    - The selection of materials is considered and justified with regard to environmental impact, embodied energy, and distance transported.

    - A celebration of local materials where possible, such as overt information about the materials.

7. <u>Reduce, re-use and recycle</u>

    - Construction waste is designed out.

    - Design in operational waste management based on the waste hierarchy.

    - Consideration given to how the building can be de-constructed at the end of its use and how the materials can be re-used or recycled.

8. <u>Energy sources and energy management</u>

    - Opportunities taken for renewable energy production based on the local context.

    - Overt information on energy sources and levels of use.

    - Staff given the ability through training to monitor and control energy use, and use the data within the curriculum.

9. <u>Water use and water management</u>

    - Water saving, rainwater capture and on-site processing of waste water.

    - The opportunity to monitor, display and use data on water management.

10. <u>Transport</u>

    - Priority given to approaching the building on foot or by cycle.

    - Account is taken of public transport links.

11. <u>Building pedagogy and teaching resources</u>

    - The building conveys passive information on sustainability through its design and use of materials. (Figure 3.4.2)

    - The building actively communicates information on sustainability through information panels and displays. (Figures 3.4.3 and 3.4.4)

    - The design of the building allows teachers to utilise aspects of the design in their curricula.

12. Flexibility of spaces and future adaptability

- The ability to change spaces for different uses and add to the potential occupancy rate
- An awareness that the building will have to serve future generations of learners who may have different needs.

Some of these elements of sustainable design in this framework can be found in a range of education buildings in England and Wales. The principles embedded in this framework are relevant to the schools sector and the HE sector, as well as to the FE sector, which greatly increases the number of examples that can be drawn on for reference purposes. The examples below are some of the buildings visited as part of the research process for this PhD. They illustrate a variety of the points in the framework.

Kingsmead School in Cheshire was a flagship development of the Labour Government's Schools for the Future programme. It was completed in 2004 and it demonstrates many of the elements in the framework including the selection of materials, rainwater harvesting with active display and the conservatory spaces linking the classrooms to the outdoor areas.

Figure 3.4.1: Using conservatory-type spaces to connect teaching rooms to the outdoor environment at Kingsmead School in Cheshire

Figure 3.4.2: Exposing straw bale and rammed earth materials in the Genesis Project at the Somerset College of Arts and Technology

The Genesis Project at the Somerset College of Arts and Technology was completed in 2004 and is an example of how the development of the building, as well as the finished building, can be used as a pedagogical resource. In addition to pro-actively displaying many sustainable design elements, the development process of the Genesis Project was led by construction students who developed the original design in response to a brief. The involvement of the students at this level is an example of the design process being a characteristic of sustainable design as well as a unique learning opportunity for the students (Baines et al, 2005; Simmons, 2009).

The live displays incorporated into a building at Hartpury College in Gloucestershire (Figure 3.4.3) illustrate the detailed data that can be made available not only to illustrate sustainable aspects of the building and its design, but also to provide real data sources for students to use as part of their courses.

The interpretation panel outside the International Digital Laboratory at Warwick University (Figure 3.4.4) is a simple way of drawing attention to the sustainable design aspects of this building. The architects facilitated consultation sessions with the various stakeholders as part of the design process for this building and the interpretation panel highlights the physical elements of sustainable design that emerged from the process. This building also has the ability to reorganise internal spaces, allowing flexibility to meet the needs of different users from inside and outside the University.
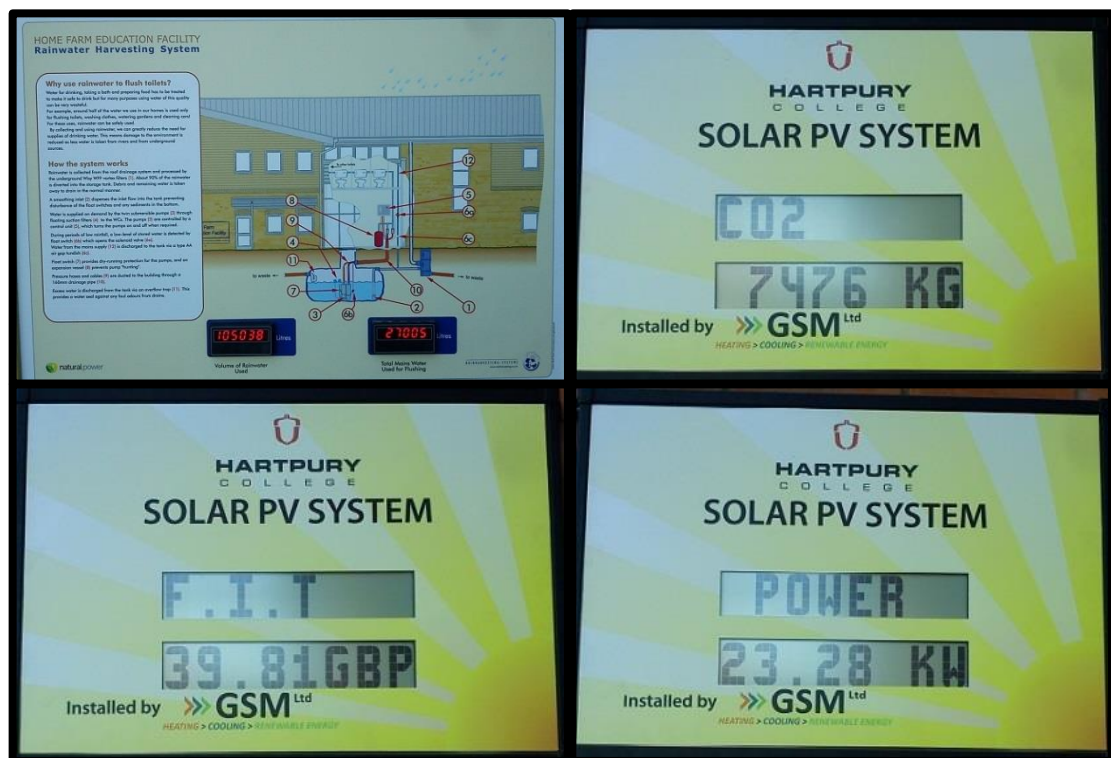
Figure 3.4.3: Examples of live displays for rainwater harvesting and energy at Hartpury College, Gloucestershire
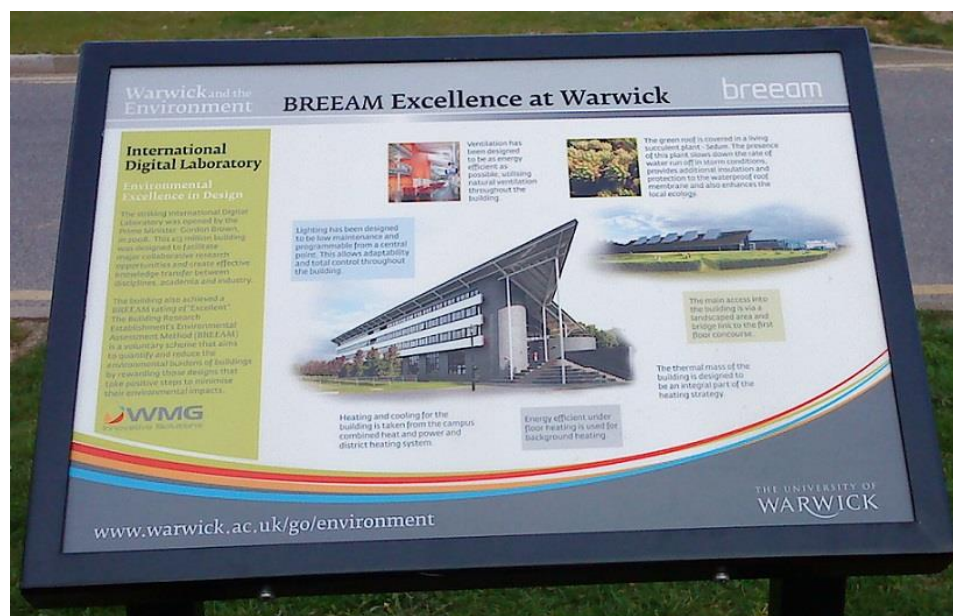
Figure 3.4.4: Interpretation panel for a BREEAM building at Warwick University

While the elements listed in this framework are mainly in the control of the architect, they can be used by education institutions to inform a brief for a new building. This framework was used in assessing the elements of sustainable design in the two examples of buildings selected for this research. The outcomes from applying this list to the buildings informed the analysis presented in Chapter 8. A table identifying examples of the indicators in the two examples is presented in Appendix C.

The links between these indicators of sustainable design and indicators of institutional change for sustainability are central to understanding the potential influences of the buildings in the selected examples. A framework of indicators for institutional change for sustainability is presented in the next Chapter.

3.5 Summary

The principles and practices associated with the sustainable design of education buildings have emerged from the debates that have characterised the contested nature of sustainability and sustainable development. Leading voices in the field of sustainable design such as McDonough and Orr have encouraged an approach that incorporates systems thinking and addresses the connections between ecological and socially constructed elements within systems. This corresponds to the approach being adopted in this research.

The buildings created for FE colleges become physical elements of the institutions in which they are located. The next chapter looks at the nature of institutions and the way in which institutional change for sustainability can be promoted and assessed.

Chapter 4:
MOVING EDUCATION INSTITUTIONS TOWARDS SUSTAINABILITY

"Change in education is easy to propose, hard to implement, and extraordinarily difficult to sustain." (Hargreaves and Fink, 2006:1, *Sustainable Leadership*)

4.1 Introduction

The designers of new buildings in the FE sector between the years 2000 and 2010 found themselves responding to the sustainability agenda through compliance with frameworks such as BREEAM Excellent, as in the case of government policy in Wales, which required all new college buildings to meet this standard (WAG, 2009). These new buildings brought an additional presence to college campuses and in so doing they introduced a physical change to the institution.

This research is concerned with how this physical embodiment of sustainability had the potential to influence institutional change beyond the physical form of the campus. Can the physical presence of the building influence a change towards sustainable policies and practices in the institution and influence the perspectives that students and staff have on sustainability? In response to this question, this chapter explores the nature of institutional change for sustainability and identifies the aspects of this change that a sustainably designed building could influence.

The first step is to identify what constitutes an institution and to establish FE colleges as institutions in their own right. To address this, the thesis will draw on the work of Dovers (2001) to identify key features which underpin institutions and on the work of Senge (1990 and 2000) and others to present a particular view of institutions as being dynamic and responsive.

A review of the literature starts in the broad landscape of institutional change theory and identifies some of the ways in which theories in this field are differentiated. In particular the difference between planned institutional change and emergent institutional change is explored. The literature on change for sustainability across a range of institutions (commercial, public and civil society), and institutional change in the education sector are sub-sets within this broader field of literature. The

specific literature that focuses on institutional change for sustainability in the education sector is a relatively small part in the broader landscape of institutional change. This chapter intends to draw on aspects from the broader scope of the literature to contribute to understanding change for sustainability in FE colleges.

Exploring the distinction between planned and emergent institutional change has relevance in relation to identifying the influence of a new building in bringing about change. However, the differences between these two categories are not always clear-cut. The primary purpose of developing a new college building is not to create the 'catalyst for change for sustainability' that this research seeks to explore, rather, the primary purpose of a new building is to replace existing buildings or to expand the physical capacity of the institution; therefore, any change for sustainability triggered by a new building might be seen as emergent. However, the institution may already be engaged in a programme of planned change for sustainability and the new building might present an opportunity to influence the rate and the direction of change.

Section 4.5 reviews applied frameworks for institutional change for sustainability in the education sector. It draws together a summary of key factors for identifying change for sustainability that were used in the evaluation of the FE colleges associated with the two buildings selected for this study. These indicators of institutional change for sustainability are presented in section 4.7.

Leadership is seen as a key element of implementing change towards sustainability in educational institutions and organisations generally (Fullan, 2005; DCELLS, 2008 and 2008b; Doppelt, 2010; Scott et al, 2012). Leadership is explored in the final section of this chapter as it has particular relevance for the key personnel in each college who played a leading role in the development of the buildings.

4.2 What is an Institution?

In order to understand institutional change it is first necessary to understand the complex and dynamic nature of institutions. Institutions take many forms in the public sector, private sector and in civil society. They vary in size, formality of constitution and degree of physical manifestation, but there are common features that enable an organised group of individuals with established structures to be recognised as an institution. Stephen Dovers' (2001) paper *Institutions for Sustainability* focuses on change in national institutions in Australia, but before addressing the issue of

sustainability in institutions he performs the useful function of identifying what constitutes an institution. For Dovers an institution is an identified group of people working to a "durable pattern of rules and behaviour" (alternatively these could be described as a durable set of systems) that is also flexible and responsive to change. Institutions also need a purpose that is generally understood by the people involved and towards which the pattern of rules are directed. The complexity of the concept does not lend itself to a simplistic definition, instead Dovers identifies a list of design features for institutions, which individuals use in creating institutions. The design features identified by Dovers are as follows:

- spatial extents or limits;
- political and administrative boundaries;
- permanence and longevity;
- role or roles;
- sectoral or issue focus;
- nature and source of mandate;
- autonomy, independence and accountability;
- formality or informality;
- political nature and support;
- exclusive/inclusive;
- community awareness and acceptance;
- functional and organisational flexibility;
- resource requirements;
- information requirements;
- linkages with other institutions.

This list covers the areas of decision-making through which individuals and groups can influence the creation of the systems that come together to form an institution. These features apply equally to institutions in the public sector, the private sector and civil society. For example, they can be found in schools, colleges, universities, government departments, courts of law, commercial corporations and non-governmental organisations. Most organisations share common features with institutions although, as Dovers points out, some organisations may lack the durable lifespan of an institution. In his 2001 paper Dovers merges the two terms for

"convenience and brevity" with this proviso, that only an organisation that has *"a good degree of longevity and social acceptance"* can be considered to be the same as an institution (Dovers, 2001:5).

The interchange between the terms institutional change and organisational change is common, because while the public sector generally refers to institutional change, institutions in the public sector draw heavily on organisational change theory from the corporate sector, as demonstrated by Kaplan and Norton (1996) and Willard (2009). There is also considerable cross-over of academics and practitioners in the field between the public and the corporate sector, for example, Bob Willard after a 34 year career with IBM is now working with education institutions in his native Canada as well as with corporations[11], while Peter Senge, who has a strong academic record and is based at MIT, has applied his Fifth Discipline model in the public and the corporate sectors (Senge, 1990 and 2000). This thesis will draw from the literature on institutional change from across sectors and from the links between theory and practice in this field.

4.2.1 The terminology of institutional change in this thesis.

Following the lead given by Dovers this thesis accepts that the terms institution and organisation can be used interchangeably and that theories on institutional change and organisational change can contribute to understanding change in FE colleges. A mapping of the literature is provided in Figure 4.4.2 in the next section of this chapter. However, because schools, colleges and universities are generically referred to as education institutions (e.g. HEIs) the term institutional change will be used unless referring directly to literature which uses the term organisational change.

4.3 A Systems Perspective on Institutional Change

In line with the systems approach which underpins the perspective on sustainability presented in Chapter 2 of this thesis, a systems approach is also adopted here to explore the complex nature of institutions and to apply this to understanding institutional change. This approach is relatively common in the literature, especially among writers who also have an interest in sustainability.

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[11] http://www.sustainabilityadvantage.com/about.html accessed 12 November 2014

Doppelt sees organisations as social systems and builds a systems view of organisations (Doppelt, 2010:89-91) before developing his model of change management. For Fullan (2005) a systems approach to institutions is essential for leaders to engage institutions in a process of continuous improvement. Both of these examples, as well as Willard (2009) and Crossan et al (1999) reference the work of Peter Senge and the concept of a 'learning organisation'. Senge's vision of a learning organisation as a group of individuals who are continually enhancing their capabilities is based on his model of five disciplines, with the fifth discipline being systems thinking, which integrates the other four disciplines into a systemic whole (see Figure 2.3.2 in Chapter 2). In exploring the issues around institutional change for sustainability, this thesis will use a model of an institution based on the design features presented by Dovers combined with the systems view of a learning organisation as presented by Senge in order to understand the inter-relationships between the design features and the institution, and between the individuals and groups that make up the institution.

4.4 Theoretical Models of Institutional Change
4.4.1 What is it that changes?

Institutional change can be driven by internal or external factors as Dunphy et al (2007) point out when discussing change for sustainability in institutions. The left hand box in Figure 4.4.1 provides examples of the types of drivers for change that impact on the patterns of rules and behaviours that Dovers (2001) identifies as constituting an institution. Although there may be a key driver that initiates change, in most cases there will be a combination of linked drivers. In the case of a public sector institution it might be a combination of government policy and changes to funding.

The resulting changes can be structural, process oriented or values-based changes. These changes lead to either a shift in the purpose of the organisation or, more usually, a shift in the way in which the purpose of the organisation is achieved. The right hand box in Figure 4.4.1 summarises the aspects of an institution that can be subject to change. Each aspect can be viewed as a system or as multiple nested systems all of which are linked and all of which would be affected in the context of whole-institutional change. The aspect of 'processes and practices' covers multiple systems, in the case of an educational institution (and in the context of sustainability)

this includes the core activities around teaching, learning and assessment as well as procurement, communication, resource use and estates management.
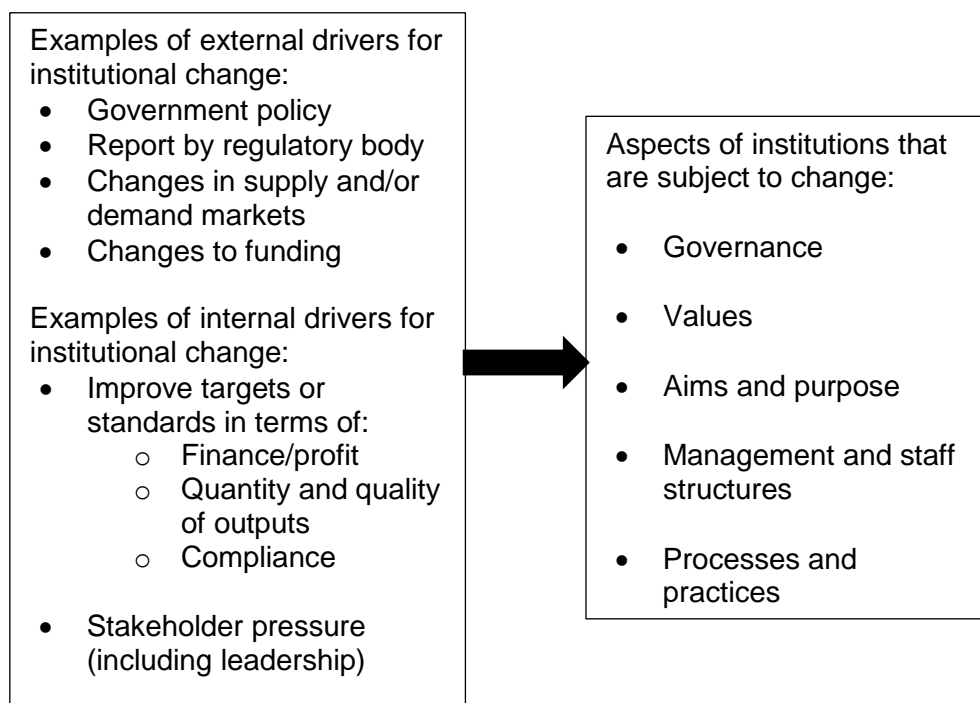
Figure 4.4.1: Drivers and aspects of institutional change

4.4.2 Models of institutional change in the literature

The dynamic nature of institutions means that change is constantly happening to a greater or lesser degree. Models of institutional change are about initiating change for a particular purpose and managing that change. Figure 4.4.2 illustrates how the literature on institutional change for sustainability in the education sector is located within the broader field of institutional and organisational change and change management. In this broader field it is possible to identify theoretical approaches to institutional change which can be used to inform an understanding of institutional change for sustainability in the education sector. In particular, change for sustainability in education institutions draws on the literature from general institutional change in the education sector, and from change for sustainability in organisations in the public and private sectors and in civil society.
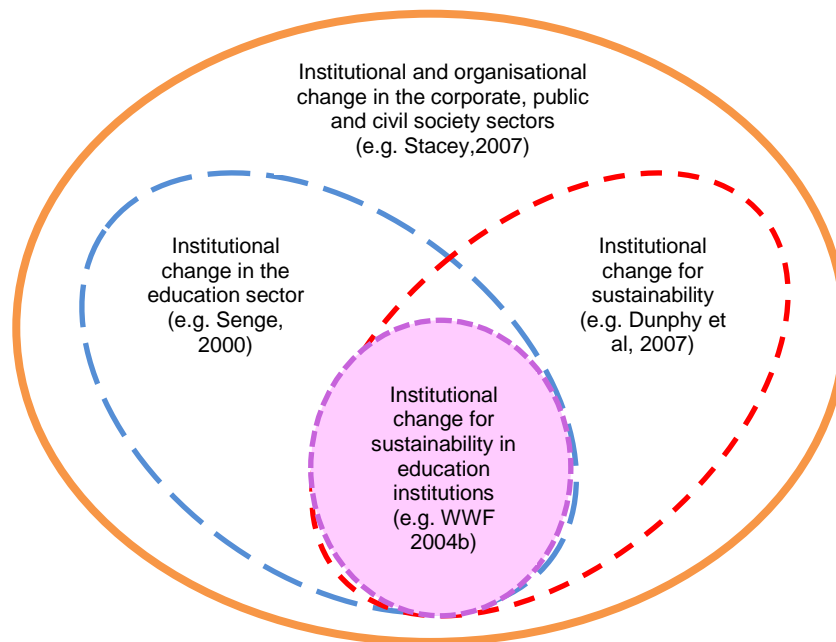
Figure 4.4.2: Locating institutional change for sustainability in education institutions in the broader field of institutional and organisational change

Writing about strategic management and organisational dynamics, Ralph Stacey (2007) emphasises that there is no single theory of institutional change and that the various theories and models are underpinned by a range of ontological and epistemological perspectives. In order to position theories in the landscape of generic institutional change they may be located on a continuum in relation to a particular concept. Stacey (2007) illustrates this when discussing the level of reification attributed to institutions as systems which exist independently of the individuals in the institution. According to Stacey there is a tendency in the dominant discourse on institutions for an institution to be perceived as a system, or series of systems, created by individuals, which then become reified. *"Human individuals are thought to create organisations as systems in their interaction with each other and these systems are then thought to act back on individuals as a cause of their behaviour."* (Stacey, 2007:21). While Stacey acknowledges that few people see individuals as being objective observers, external to the organisation and unaffected by it, it is possible to adopt a position where organisations are thought of 'as if' they were systems and individuals as participants in the system but not subject to it. This is a key issue with regard to institutional change for sustainability, because individuals and groups need to feel empowered to bring about change.

Another way in which theories of institutional change can be differentiated is to present them in relation to diametrically opposed concepts of change as identified by Cao, Clarke and Lehaney (2000). For example, a theory may subscribe to incremental change as opposed to radical change, or it may subscribe to planned change as opposed to emergent change. Theories of planned change identify a series of 'steps' which institutions can be seen as 'working through' in order to achieve a targeted outcome. Kotter (1996) provides an example of this approach in which he has eight steps or stages, which can be seen in the left hand column of Table 4.4.2 below. This theory sees change as a structured process, which could be linear in relation to a specific change or an on-going cyclical process. Although theories of planned change may appear quite rigid and narrow in terms of addressing the complex issues of sustainability, the influence of theories such as Kotter's can be seen in the models from Willard (2009) and Doppelt (2010) represented in Table 4.4.2.

Kotter, 1996 "Eight Stages"	Willard, 2009 "Seven Steps"	Doppelt, 2010 "Seven Levers"
- Develop a sense of urgency - Create a guiding coalition - Develop a vision and strategy - Communicate the change vision - Empower broad-based action - Generate short term wins - Communicate gains and produce more change - Anchor approaches in the culture	- Wake up and decide - Inspire shared vision - Assess current realities - Develop strategies - Build the case - Mobilize commitment - Embed and align	- Alter the mind-set - Alter planning and decision-making - Re-orient the vision, goals and guiding principles - Re-structure strategies to achieve goals - Shift flow of information to support goals - Improve the organisation's capacity to learn - Embed the new vision and goals in standard operating practice

Table 4.4.2: Examples of steps in institutional change

Kotter's 1996 book *Leading Change* does not have a sustainability focus, while Willard and Doppelt are both concerned with institutional change for sustainability. However, all three examples in Table 4.4.2 have common features in

bringing about change, these features include: engaging the individuals in the institution in the process from the outset; maintaining communication and participation throughout the process; and ensuring the change is embedded. A prominent feature in each model is the vision of where the changes are taking the institution and implicit in each model is the need for leadership to take the institution towards the vision. Willard's model is presented as a linear process, albeit one that may be repeated, while Doppelt's Seven Levers are presented as a cyclical model that can be entered at any point, making it more adaptable to context and responsive to sustainability issues.

In contrast to theories of planned change, theories of emergent change do not identify prescribed steps, but they do provide frameworks, which can be used to recognise and understand the change process. In *An Organisational Learning Framework: From Intuition to Institution,* Crossan et al (1999) present a general theory of institutional change, which has a framework of four processes: 'intuiting', 'interpreting', 'integrating' and 'institutionalizing'. These four processes, referred to as the 4i's, occur at three levels: individual, group and organisation. Intuiting and interpreting occur at the individual level, interpreting and integrating occur at the group level, and integrating and institutionalizing occur at the organizational level. The theory is based on the proposition that the 4i's are *"related in feed-forward and feedback processes across the levels"* (Crossan et al, 1999:523). This dynamic model is summarised in Figure 4.4.3 and it provides a more complex and dynamic view of the idea of 'embedding' as included in the models presented in Table 4.4.2 above. Crossan et al link the idea of institutions being responsive to feedback in order to influence the change process to the concept of a learning institution.

In terms of this thesis the feed-forward and feedback between individuals, groups and the organisation are particularly relevant to the development of a new building on a college campus. The development process of a building involves key individuals or a small group, at least in the initial stages. These individuals are in a position to be most influenced by the development of the building and as potential leaders for change they can influence wider groups and eventually the whole institution. The resultant changes in the policies and practices of the institution feed back to stimulate further changes to groups and individuals. In relation to sustainability, perspectives and practices adopted by individuals engaged in the development of a sustainable building could lead to changes in the policies and

practices of the institution, which in turn influences a shift in perspectives and practices of other individuals in the institution.
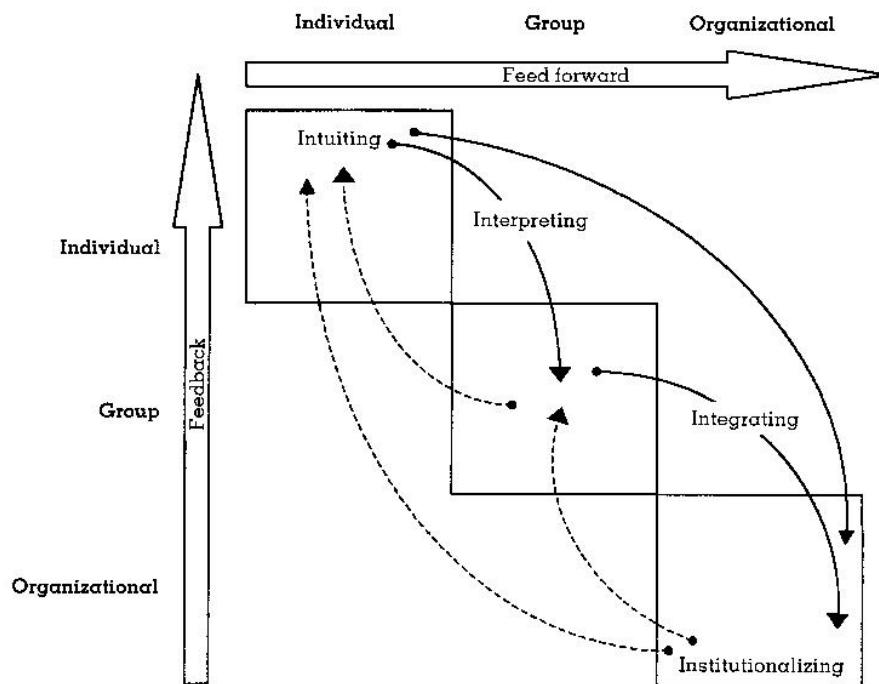
Figure 4.4.3: Organizational learning as a dynamic process (Crossan et al, 1999)

The theories of emergent change have been criticised for their lack of usefulness in specific organisations due to the broad nature of the emergent approach. It is argued that a 'situational' approach that takes into account the unique situational variables of individual institutions can override the emergent approach in terms of application (Dunphy et al, 2007; Stacey, 2007). However, the emergent framework can be used in conjunction with other theories and is recognised as contributing to understanding institutional change by Dunphy and others as discussed below.

Senge's Fifth Discipline framework, presented in Figure 2.3.2 in Chapter 2, is a theory of emergent change based on the concept of learning institutions. Senge has applied his theory to institutions across different sectors (Senge, 1990) including focusing on the education sector through *Schools That Learn* (Senge, 2000). In *Schools That Learn* he emphasises the links between learning and change within an institution. His systemic approach is concerned with whole institutional change in which all the stakeholders in the institution engage in learning related to the change process. *"It is becoming clear that schools can be re-created, made vital and*

sustainably renewed not by fiat or command, and not by regulation, but by taking a learning orientation. This means involving everyone in the system in expressing their aspirations, building their awareness, and developing their capabilities together." (Senge, 2000:5).

4.5 Applied Models of Institutional Change for Sustainability

Emergent theories of institutional change are not prescriptive by definition and they allow unforeseen developments to be incorporated into the change process. In keeping with a view of sustainability in which knowledge is perceived as incomplete and emergent, theories of institutional change which can accommodate uncertainty and complexity are better suited to understanding change for sustainability.

While emergent theories of institutional change do not have predetermined steps many of them identify phases that organisations may pass through as a way of recognising and monitoring the change process. As a result, organisations can assess and re-assess their position and review their strategy for moving forward. In *Organizational Change for Corporate Sustainability* Dunphy et al (2007) identify the following six phases.

- Rejection
- Non-responsiveness
- Compliance
- Efficiency
- Strategic proactivity
- The sustainable corporation

These six phases of institutional change towards sustainability allow the institutions to be categorised into three waves. The model was originally developed by WWF-UK in the report *To Whose Profit?* (WWF, 2004a) and presented as the Sustainability Spectrum as seen in Figure 4.5.1.

The Sustainability Spectrum *"shows an 'ideal type' model of the phases through which an organization that begins by exploiting the ecological and social environment might progress to eventually become a sustaining organization."* (Dunphy et al, 2007:16). This model implies a shift in values individually and collectively in the institution, a transformative process which changes internal and

external relationships. Figure 4.5.1 implies a linear process, but in order for the organisation to maintain 'sustainable business', once in the transformation stage there needs to be a process of continuous re-assessment and improvement in the light of emerging knowledge. Thus the transformation stage might be seen as an on-going spiral rather than either an end point or repeated linear process.

Figure 4.5.1: The Sustainability Spectrum (WWF, 2004a)

Dunphy et al highlight the drivers for these sorts of changes in corporations, which include global economic factors as well as the business case for sustainability. While theories on institutional change for sustainability in the corporate sector can contribute to understanding in the education sector, there are differences for the key drivers for change in the different sectors. The business case for sustainability exists within the management of the education institutions, but it is linked to dominant external factors such as funding, government policy, inspection bodies and the demands of employers; and internal factors such as the quality of teaching and the demands of students.

Similar progression frameworks to the Sustainability Spectrum (Figure 4.5.1) have been developed for schools. In *ESDGC: A Common Understanding for Schools*, DCELLS (2008a) a table for evaluating progression in ESDGC is presented with indicators for each of the Common Areas (see Chapter 2, section 2.3 for details of the Common Areas) across the following levels of development: 'Basic'; 'Developing';

'Developed'; 'Embedded' (DCELLS, 2008a:45). *Pathways: To Education for Sustainable Development* (WWF, 2004b) is described by WWF as a practical tool for planning a whole school approach. The document contains a self-assessment tool for schools with indicators for a series of whole school related themes across the following stages of progression: 'Pre-engaged'; 'Interested'; 'Introductory'; 'Emergent'; 'Advanced' (WWF, 2004b:43).

There was no similar evaluative grid for FE colleges in the early period of the 21st century; however, the 'Implementation and Delivery Plan' in *From Here to Sustainability: The LSC's Strategy for Sustainable Development* (LSC, 2005) did have indicators of progression in the form of two year and five year milestones for the LSC sector as a whole, incorporating the providers in the sector which includes the FE colleges. These milestones were updated in the *LSC Sustainable Action Plan 2007/08* (LSC, 2007).

An analysis of these documents (DCELLS, 2008a; WWF, 2004b; LSC, 2005 and 2007) in terms of the indicators of achievement in implementing sustainability in schools and colleges show a significant degree of consensus and commonality and these are summarised in section 4.7 towards the end of this chapter. Only one document identified sustainable buildings as a learning resource: *"'buildings that teach' through their transparent technologies that advance sustainability"* (WWF, 2004a:43).

The strategies for promoting sustainability and other documents aimed specifically at the FE sector, such as *Sustaining Our Future: A Framework for Moving Towards a Sustainable Learning and Skills Sector* (LSIS, 2011), and *ESDGC in the FE Sector in Wales* (DCELLS, 2008b) all provide frameworks that are non-prescriptive and adaptable in approach, but they lack the dynamism of the Crossan et al. model and the strong systems perspective of the Senge's Fifth Discipline model. However, they all emphasise a key element that drives change for sustainability, which is the role of leadership.

4.6 The Role of Leadership in Change for Sustainability

The role of leadership is a prominent feature in both the theory and the practical application of institutional change. However, as with the broad scope of institutional change, there are competing approaches to the role of leadership, and in the specific field of leadership for sustainability there are diverse perspectives on

sustainability. For Doppelt (2010) leadership is a central factor in change-management programmes for sustainability in business, government and civil society. Doppelt's perspective on sustainability recognises key elements of the model presented in Figure 1.2.3 in Chapter 1 of this thesis, including the environmental limits within which human activities should take place, and the future perspective of inter-generational equity[12]. Fullan (2005) is concerned with leadership and sustainability in the education sector and although he adopts a systems perspective his view of sustainability is narrowly focused on maintaining improvement within the education sector. *"Sustainability is the capacity of the system to engage in the "complexities of continuous improvement consistent with the deep values of human purpose"* (Fullan, 2005:ix). Hargreaves and Fink (2006) acknowledge the work of Fullan and develop it further to produce their own definition of what leadership for sustainability might look like in the education sector. *"Sustainable educational leadership and improvement preserves and develops deep learning for all that spreads and lasts, in ways that do no harm to and indeed create positive benefit for others around us, now and in the future."* (Hargreaves and Fink, 2006:17). Both Fullan, and Hargreaves and Fink, demonstrate the argument presented by Stirling (2009) that systems thinking alone is not sufficient to achieve what Jucker (2014) describes as a 'deep green' model of sustainability, where systems thinking needs to be allied to ecological intelligence.

In order to identify an appropriate, or possibly an essential, type of leadership for change for sustainability in the education sector a typology of recognised leadership approaches provides a starting point. Bolden et al (2003), based at the Centre for Leadership at Exeter University, conducted a review of leadership theory and identified diverse approaches to leadership ranging from those with a very individual focus such as the 'Great Man Theory' based on exceptional people with innate qualities, through to 'Transformational Theory' where the focus is changing organisational performance. The report produced by Bolden and colleagues also refers to a *"school of thought gaining increasing recognition is that of 'dispersed' leadership."* (Bolden et al, 2003:6). This approach *"views leadership as a process that is diffuse throughout an organisation rather than lying solely with the formally designated 'leader'. The emphasis thus shifts from developing 'leaders' to*

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[12] For a full account of Doppelt's perspective on sustainability see Chapter 3: *A Primer on Sustainability* in Doppelt, 2010.

developing 'leaderful' organisations with a collective responsibility for leadership." (ibid).

This notion of leaderful organisations has some synergy with Senge's notion of learning organisations, with both concepts having organisations which have institutionalised the qualities and the abilities associated with leadership in one case and with learning in the other.

The diversity of approaches to leadership raises questions as to whether or not there is a particular approach to leadership that is appropriate for encouraging institutional change for sustainability, or, indeed, whether there is a particular approach to leadership which is a necessary component of achieving institutional change for sustainability in the FE sector. The responses to these questions in the available literature are more complex than simply pointing to a particular leadership style.

Leadership is a significant element of strategies for change for sustainability in the sector. 'Commitment to leadership' is one on the Common Areas in the *ESDGC: A Strategy for Action* (DELLS, 2006) and *ESDGC in the FE Sector in Wales* (DCELLS, 2008b) as presented in section 2.3 of this thesis. Leadership is one of four main categories on the EAUC resource website for further and higher education institutions (www.eauc.org.uk/sorted/home) also referenced in section 2.3 above. The Centre for Excellence in Leadership (CEL) was set up by the UK Government in 2003 specifically to support leadership in the Learning and Skills sector with sustainable development included in its brief. CEL became part of LSIS in 2009 where leadership became one of four key themes (LSIS, 2011). However, these applied strategies and resources provide only limited details on the type of leadership to be employed.

A more in depth assessment of the type of leadership required for change for sustainability comes from research commissioned by CEL in 2006. In *Leadership for Sustainability: Making Sustainable Development a Reality for Leaders* (CEL, 2006) the evidence from the research points towards a dispersed or distributed approach to leadership in those institutions recognised as making progress in terms of sustainability. The report expanded on the qualities associated with leaders who had demonstrated success in moving their institutions towards sustainability at the time of the report. It also identified areas that leaders still needed to develop in order to maintain progress in sustainability. Table 4.5 contains key points from the

conclusions of the report that are of relevance to this thesis and to the influence on institutional change of sustainably designed buildings.

An awareness of the potential for sustainably designed buildings to be a resource in relation to leadership for sustainability was identified in the CEL (2006) report. In a section on catalysts for sustainability that leaders in the sector could use *"New buildings creating an interest in sustainability issues"* (CEL, 2006:41) is listed as a factor leaders could capitalise on.

Key qualities for leadership for sustainability	Key areas for development in leadership for sustainability
• A distributed style of leadership • Zest for knowledge, experiences and challenges • Adaptation of leadership style to situations • Commitment to equality and fairness • Embedding corporate ethical and social responsibility at strategic and operational levels • Adding value through collaboration, partnerships and group synergy • Influencing relationships • Understanding organisational climate and knowing and involving key influencers	• Systems thinking to understand interconnectedness, manage complexity and balance national, regional and local objectives • Futures thinking to create a compelling vision of a sustainable college of the future • Creating and capitalising on learning opportunities for sustainability • Understanding that change may need to be radical to achieve learning improvement in terms of CPD and recognition of the learning organisation as a whole • Incorporating sustainability into core strategies and organisational business

Table 4.6.1: Leadership qualities and areas for leadership development in relation to sustainability in the FE sector (adapted from CEL, 2006:44)

Although focusing on higher education and spanning institutions across three continents, the findings in the report from Scott et al (2012) on research into 'turnaround leadership' reveal some support for the influences and leadership capabilities identified in the CEL 2006 research. *Turnaround Leadership for Sustainability in Higher Education* (Scott et al, 2012) places the role of leadership firmly in the context of institutional change for Education for Sustainability (EfS). The importance of a vision in terms of a clear picture and strategic direction is identified as an influence on EfS leaders in higher education institutions. Engaging with both senior leaders and with students in the institution is a key element of the EfS leader's role and heading the capabilities identified by leaders is *"having energy,*

passion and enthusiasm for learning and teaching" (Scott et al, 2012:86). This research highlights the role leadership can play in bringing about change for sustainability.

In the context of this research there are several aspects of leadership that are of interest. Leadership for sustainability as an influence on the nature of the building; leadership in achieving the building; the influence of the building in terms of supporting and being a resource for leaders for sustainability in the institution; and the influence of the building on the overall leadership of the organisation in relation to change for sustainability.

This section recognised the particular role of leadership in institutional change for sustainability. The next section draws on the literature on institutional change and on leadership to create a framework of indicators for institutional change in the FE sector in England and Wales.

4.7 A Framework of Indicators for Change for Sustainability in FE Colleges

In order to identify linkages between elements of sustainable design and institutional change for sustainability in the two examples selected for this research it was necessary to first of all recognise evidence of institutional change towards sustainability. There was no single framework of indicators for the FE sector in the early part of the 21st century, therefore a framework of indicators was developed drawing on the theoretical background of institutional change and the indicators and milestones presented in the following three documents:

- DCELLS, 2008a, *ESDGC: A Common Understanding for Schools;*
- WWF, 2004b, *Pathways: To Education for Sustainable Development*;
- LSC, 2005, *From Here to Sustainability: The LSC's Strategy for Sustainable Development*.

The following list of indicators was used to identify evidence of institutional change for sustainability in the two examples selected for this research and presented later in this thesis. The results from applying these indicators to the examples are presented in Appendix C and the outcomes fed into the analysis of the biographies presented in Chapter 8.

Indicators for institutional change for sustainability in FE colleges.

1. SD/ESD is embedded in the development plans, the policies and the practices of the institution; these are communicated to all stakeholders (staff, students, governors and local community); and they are monitored and evaluated regularly.

2. A distributed approach to leadership is in place, allowing leadership to emerge at all levels, with leaders at a senior level in the institution giving sufficient priority and resources to SD/ESD.

3. All staff and governors receive CPD/training in relation to SD/ESD.

4. ESD knowledge and skills is embedded across curricula and courses, and is monitored and reviewed.

5. There is a collaborative approach to SD/ESD and a sharing of good practice across the FE sector.

6. Mechanisms are available for learners and other stakeholders to contribute to decision making.

7. Sustainable procurement policy and practice extends to all institutional activities and covers ethical issues.

8. Resource use across the institution is monitored and reviewed.

9. The institution has multiple links with the community that it serves and is seen as a community resource, including for sustainability.

10. The institution is outward looking in terms of global issues.

11. All new building and refurbishment meet recognised standards of environmental sustainability.

4.8 Summary

The purpose of this chapter was to identify how institutional change for sustainability could be recognised in FE colleges, and to review some of the theoretical approaches to understanding how change in institutions takes place. From the broad landscape of the literature on institutional change it was possible to draw out the approaches that showed synergy with sustainability generally, and with sustainability in the context of FE colleges in particular. For example, adopting a systems approach to institutional change enables an understanding of the position of sustainability within the institutional change process, and it also retains the theoretical lens employed in this thesis. Equally, an emergent model of institutional

change is consistent with the epistemological position of this thesis, which takes the view that knowledge emerges over time.

Within the field of institutional change the role of leadership emerges as a key factor and within the smaller, albeit rapidly growing, field of leadership for sustainability in the education sector there is a strong focus on the type of leadership that is adopted. Distributed leadership that allows for leadership to flourish at different levels within the institution has emerged as a potentially key element in institutional change for sustainability.

At an operational level, educational institutions have specific drivers that they respond to and all institutions have a context which is unique to some extent. Therefore, a flexible framework for assessing institutional change for sustainability is required. In assessing institutional change for sustainability in the examples chosen for this research the indicators identified in section 4.7 will be used in conjunction with the model offered by Crossan et al in Figure 4.4.3. The activities reflected in the indicators will be viewed in relation to the level of embedding and the dynamic relationship between individuals and the whole institution. The extent to which the identified changes can be linked to the presence of a sustainably designed building will be determined by analysing the relationships connected with the development of the building.

The following chapter sets out the approach for researching and presenting the information associated with the two selected examples of buildings.

Chapter 5

BIOGRAPHIES AND BIOGRAPHICAL RESEARCH METHODS: DEVELOPING A RESEARCH APPROACH

"Biographies of things can make salient what otherwise remain obscure."

(Kopytoff, 1986:67, *The Cultural Biography of Things*)

5.1 Introduction

This research is concerned with how the sustainable design of education buildings can be a catalyst for institutional change for sustainability. The buildings in the selected examples provide a focus for the research, but the research is interested in more than the physical buildings. In order to address the research questions it is necessary to explore the relationships which connect each building to the key stakeholders in its institutional context, and to identify how these relationships develop and influence institutional change over a period of time.

This chapter presents the approach that has been adopted to research the relationships between two examples of sustainable college buildings and the institutional change for sustainability taking place in the relevant colleges during a specific period of time. To identify these relationships, to record the narrative development of the relationships, and to analyse them, the research adopted a biographical approach with the subject of the biography being the building. Biographies are usually related to people, but the concept of biography has been applied to inanimate objects as well. The most common inanimate objects to become the subject of biographies are ancient artefacts (Alberti, 2005) where the biographical approach is used to develop some understanding of the people and the society that produced and used the artefact. The scope and timescale of the biographies of inanimate objects is wide ranging and extends from small, ancient artefacts to modern buildings (Rybczynski, 2011) and even to the 13.7 billion year old Universe itself (Gribbin, 2007).

Bibliographic searches failed to identify any existing PhD theses or research initiatives where a biographical approach has been applied to an education building as part of the research method. It is *de rigueur* for PhD theses to first establish the inquiry paradigm in which the researcher will operate (Guba and Lincoln, 1994). However, because this research is developing an approach that is somewhat different

and in so doing is attempting to break new ground in terms of investigating institutional change for sustainability compared to any examples of research that could be located, the sequence in this thesis is slightly different. Following a review of the established research approaches in qualitative research in section 5.2, the approach to this research is presented and justified in two stages. The first stage seeks to legitimise the concept of a building having a biography; the second stage seeks to establish the biographical research approach as appropriate for investigating the influence of the selected buildings on institutional change for sustainability and to justify attributing agency to a building. Once the research approach has been presented, section 5.7 will locate the approach in an inquiry paradigm.

Based on this strategy section 5.3 analyses the concept of a biography and reviews how biographies have been used to explore the life histories of objects as well as people. Section 5.3.3 makes the link between the concept of biography and biographical research, which may seem obvious, but it is an important step in accepting the legitimacy of the biography of a building in this research approach. Biographical research has an established literature and methodology and is regarded as a recognised field within academic research (Denzin, 1989; Denzin and Lincoln, 2005; Merrill and West, 2009). Biographical research uses the biographies of individuals and groups as a means of investigating social phenomena. A precedent for applying biographical research methods to inanimate objects is found in the field of anthropology (Hoskins, 2006), including the concept of agency being attached to objects. Establishing the view that agency is not an exclusively human phenomenon has particular relevance for investigating the influence of the buildings in the selected examples.

The chapter will draw together the analysis of a biography and the review of biographical research to present the structure and content of the biographies of the buildings that will form a basis for the research methods discussed in Chapter 6. Finally, this chapter will reflect on where this research approach combined with the theoretical lens of systems thinking discussed in Chapter 2 might reside in relation to inquiry paradigms.

5.2 The Need for a New Research Approach

Buildings can be studied for many different purposes from design aesthetic to function and performance, and as Seamon (2014) notes, researchers can apply a wide

range of conceptual and methodological approaches to the study of buildings and other architectural works (Seamon, 2014:1). While every research project may be unique to some extent, research approaches can be categorised and the uniqueness may arise from adaptions or combinations of the different research approaches. Creswell (2007) identifies five different approaches to qualitative research: grounded theory research; ethnographic research; phenomenological research; case study research; and narrative research. No single category of approach was deemed sufficient to address the research questions identified at the start of this thesis. A grounded theory approach is designed to go beyond analytical description and generate or discover a new explanatory theory through the process of the research (Creswell. 2007:63). While this research into the influence of sustainable building design on institutional change for sustainability is attempting to identify replicable principles from the examples studied, it does not aim to develop an encompassing theory on the influence of sustainable building design. Equally, the ethnographic approach has a limited contribution to make to the research in this thesis as it has an emphasis on description rather than theory (Schratz and Walker, 1995:73) and in particular on describing patterns in the behaviours, beliefs, language and other cultural phenomena within a culture-sharing group (Creswell, 2007:68). While this may have some tangential relevance to the response of the learning community in a college to a new building on campus, it has less relevance to addressing the research questions than the remaining three categories identified by Creswell (2007).

The phenomenological approach is used to explore the lived experience of individuals or groups in relation to a particular concept or phenomenon. Seamon (2014) provides an example of a phenomenological approach to researching a building with his study of the public library in Seattle designed by Rem Koolhaas. Seamon draws on a body of work that adopts a primarily phenomenological perspective in researching buildings (Thiis-Evenson, 1989; McCann, 2005; Weiss, 2008; Seamon, 2010). This approach to researching buildings is heavily influenced by the 20th century philosopher Maurice Merleau-Ponty and focuses on the emotional, sensual and visceral dimensions of how an individual experiences the physicality of a building and the aesthetic design aspects. Seamon explores the phenomenological approach by comparing and contrasting it with a related hermeneutical approach to researching the building. (In this example the hermeneutical approach is concerned with 'reading' the physical building, rather than

analysing texts about the building.) The phenomenological approach is concerned with the individual response of people engaging physically with the building and the impact on the individual of the design and physical manifestation of the building. For example, in his study of the library in Seattle Seamon is concerned with assessing the first impressions that people have of the external design of the building, the words people would use to describe the building and what the design implies about the use of the building. He then goes onto to explore how the users of the building engage with the physicality of the design as they enter the building. Most significantly, the phenomenological approaches are concerned with how individuals make meaning of the building they are encountering from an ontological perspective. While this is relevant to the research focus of this thesis in as much as individuals within the institutions in the examples selected for study were actively engaging with the buildings, an exclusively phenomenological approach would not necessarily explore the aspects of the building that might lead to an understanding of how buildings can influence institutional change.

The concentration on the individual response does not take account of the relationships within the institution of which the building is a part, nor does it explore the systemic response of the institution to a new building in terms of changes to policies and practices, something which is key to the research in this thesis in identifying institutional change for sustainability. However, the way in which individuals and groups of individuals within the network of relationships around a building engage with and respond to the building can contribute to identifying the influence that the building can have on bringing change to an institution. A perspective on how individuals engage with inanimate objects and the relationship between objects and individuals is discussed in section 5.5 of this chapter. In addition, a research approach that focused on the individual's response to the completed building does not encompass the dynamics of the relationships around the development of a building, which emerged as an important aspect of this research.

A research approach that encompasses a greater temporal and spatial breadth to cover the period of design, construction and use of the building along with its impact on the wider institution is required. The need to explore the design and development processes associated with the buildings being studied led to a strong focus on a narrative approach which revealed and then analysed the story associated with the development and the use of the buildings. The concept of biography presented the

scope for covering the time element and the broader network of relationships. The academic rigour of the biographical research approach combined with the concept of the biography of a building offered a solution to the challenges presented by the research questions. The development of the research approach, based primarily on a narrative approach, but incorporating elements from other approaches is covered in the subsequent sections of this Chapter.

The case study approach referenced by Creswell (2007) could be seen as relevant to this thesis as two examples are studied in some depth. However, whether or not case study is a research approach is contested within the research literature. While Creswell views it as *"a methodology, a type of design in qualitative research, or an object of study as well as a product of inquiry"* (Creswell, 2007:73), Robert Stake argues that *"Case study is not a methodological choice, but a choice of what is to be studied."* (Stake 2005:443). Regardless of this contestation, both Creswell and Stake agree that the concept of a 'case' in case study is a 'bounded system' (Creswell, 2007:73), which is the view taken in this thesis in terms of the analysis of the selected examples, and is synergistic with the systems perspective adopted in this thesis. The criteria for selecting the examples in this research are particularly important to the outcomes of the research and they are explored in Chapter 6, section 6.2.

Researching a case involves seeking out both what is common and what is particular about the case (Stake, 1994). Most cases are unique in some aspect and this uniqueness *"is likely to be pervasive, extending to: 1. the nature of the case; 2. its historical background; 3. the physical setting; 4. other contexts, including economic, political legal and aesthetic; 5. other cases through which this case is recognised; 6. those informants through which the case can be known"* (Stake, 1994:238). These aspects of a case as identified by Stake overlap with the concept of the biography of a building as developed in the research approach discussed in the following sections of this Chapter.

5.3 Framing the Concept of Biography

5.3.1 What constitutes a biography?

Literary biography has existed for centuries and during that time it has undergone many variants (Lee, 2009[13]) making a single, concise definition of biography difficult to pin down. Lee (2009) resorts to two metaphors to illustrate the diverse aspects of biography, one being 'an autopsy', highlighting the forensic examination that a biography can deliver, and the second metaphor being 'a portrait', something that can bring the subject of a biography to life and capture its character (Lee, 2009:5).

Biographies are generally related to a person, something that can be confirmed by entering any large bookshop or library where a section on the biographies of various people will generally be found. However, as Lee (2009) points out, biographies can relate to animals or things as well as people. They usually take a written form, but biographies can use other media; there is a biographical genre of films, commonly referred to as 'biopics'.

Not all accounts of a life, human or otherwise, can be considered a biography. Biographies are complex narrative accounts and not just a chronological presentation of facts about a life (Lee, 2009:5). Rather, biography of a subject is concerned with a web of relations between the subject and the contexts in which the subject exists. These include both physical or environmental contexts and human contexts such as the social, political, cultural and economic contexts. How these contexts influence the subject and in turn how the subject influences the contexts are key aspects of a biography. As a result, biographies are far more than a simple narrative about a particular individual. They have the potential to provide a perspective on developments in the various contexts that surround the individual, such as changes to the environment, or major social and political changes. For example, a biography of Aneurin Bevan by Michael Foot (1973) explores the emergence of the National Health Service along with other major political developments in the UK after the Second World War.

One subject can have many biographies depending on which relationships and on which part of the subject's life the biographer chooses to focus; for example, in *Brown's Britain*, Robert Peston (2005) produces a biographical account that focuses

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[13] Hermione Lee is a leading academic in the field of biography, she is President of Wolfson College Oxford and lately Goldsmith's Professor of English Literature at Oxford University.

on Gordon Brown's political relationships during his period as Shadow Chancellor and Chancellor from 1994 to 2005. Equally, several biographies of different subjects can be used to illuminate a bigger picture. This technique is used by established biographer Richard Holmes[14] in his book *The Age of Wonder* (Holmes, 2008). He uses biographical accounts of several 18th century scientists to chart the scientific revolution at the end of the 1700s. *"The Age of Wonder is a relay race of scientific stories, and they link together to explore a larger historical narrative. This is my account of the second scientific revolution, which swept through Britain at the end of the eighteenth century, and produced a new vision which has rightly been called Romantic science."* (Holmes, 2008, page xv).

The concept of biography, as described above, attempts to explain a bigger picture through a narrative account of the relationships of individual people or groups of people set within a specific time period and in specific contexts. Progression through the narrative account of a biography is marked by significant events, sometimes these are momentous such as the 1997 Labour general election victory in Peston's 2005 biography of Gordon Brown and sometimes these events are less momentous, but just as significant, such as Brown's decision to stand aside in the Labour leadership election of 1994, also discussed by Peston. What makes these events significant is that they are key turning points which determine the subsequent direction of the biographical narrative. For Holmes (2008) scientific discoveries were key turning points.

The use of biography in relation to inanimate objects is far less common, but does exist, particularly with regard to museum objects as described by Samuel Alberti (2005) in the quotation below and as demonstrated by the BBC Radio 4 series *The History of the World in 100 Objects* broadcast in 2010[15].

"Drawing on anthropological work on the cultural biography of things, I seek to explore some ways that historians of science might approach the study of collections through the trajectories of specific items and the relationships they form with people and other objects. Material culture is thus afforded a metaphorical 'life'

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[14] Richard Holmes is a Fellow of the British Academy and was Professor of Biographical Studies at UEA from 2001 to 2007. He is the author of several biographical books.
[15] The original radio series was published as a book in October 2010. MacGregor, N. (2010) *The History of the World in 100 Objects*, London, Allen Lane

or 'career.' As Igor Kopytoff[16] has suggested, we can ask of objects questions similar to those we raise when writing biographies of people. What are the key moments in the career of this thing? How has its status changed over the course of its life—what have been its significant "ages"? What makes it different from other, similar, objects? How has the political and social climate impacted on its trajectory?" (Alberti, 2005:560).

Similar questions to these posed by Alberti can be directed at buildings and there are a small number of biographies of specific buildings that have been developed, for example: Silver (1994) *The making of Beaubourg: A Building Biography of the Centre Pompidou, Paris*; Bain and Lowenstein (2008) *Architecture in Scotland 2006-2008: Building Biographies*; and Rybczynski (2011) *The Biography of a Building – How Robert Sainsbury and Norman Foster Built a Great Museum*.

In a similar manner to the way in which the biography of a person engages with multiple relationships in various contexts, the biography of a building engages with a range of 'aspects' as recorded in the description of Silver's book on the inside of the book cover: *" Not just a book about a building, but about the making of a building, this fresh, heterodox means of inquiry is a holistic reading of the intricate process of creating architecture in contemporary society that brings to light its human story, encompassing its stylistic, historical, technical and social aspects."* (Silver, 1994).

Rybczynski's (2011) book is presented as the story of the development of the Sainsbury Centre building at the University of East Anglia. However, it is equally concerned with the Robert Sainsbury's passion as an art collector, the early professional career of Norman Foster and the turbulent relationships around the development of the building, particularly between Sainsbury and the University. The experience of this building and other projects caused Norman Foster to write the following in Rybczynski's book. *"I sometimes refer to a building as being like the tip of an iceberg: the process that generated it, with all the many intrigues, lies hidden below the surface. As in so many projects the heroic struggles between differing cultures and personalities are largely untold."* (Rybczynski, 2011:9).

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[16] Kopytoff, I. (1986) "The Cultural Biography of Things," in Appadurai, A. (Ed) *The Social Life of Things: Commodities in Cultural Perspective,* Cambridge, Cambridge Univ. Press.

The biography of an individual may span that individual's entire lifetime or it may focus on just part of a life. Focusing on an individual's earlier years has become common in the biographies of young sporting and media celebrities with some having several biographies written about their early careers, for example, Wayne Rooney was only nineteen when Frank Worrell published a biography of him in 2005. The full life history of a building can span from its perceived need, through design and conception, construction, commissioning, occupation and use, adaptation and changes of use, to demolition and recycling of materials. However, as with human biographies, the biographies of buildings can focus on part of the life history. In the case of the biography of the Pompidou Centre, Silver (1994) starts with references to the cultural, political and social issues in the 1930s that resulted in the site for the future building being established. The Centre was designed and built between 1971 and 1977, and Silver concludes the book in the 1980s reflecting on just a few years of the building's operation.

Key events or turning points can be identified in Silver's 1994 narrative of the Pompidou centre in a similar way to which turning points can be identified in the biography of a person. One example is the outcome of the design competition for the building, which was a radical design by architects Piano and Rogers. A second example is the death of President Pompidou in the middle of the construction of the building resulting in changes being demanded by his successor Giscard d'Estaing.

Bain and Lowenstein (2008) cover the biographies of fourteen contemporary buildings through the design and construction phase of the life of each building. Each biography has three presentational elements: a table of basic facts covering location, architect, budget, completion date and use; a written narrative of around six hundred words; and up to twelve supporting photographs and diagrams. The focus on the 'young lives' of a diverse range of contemporary buildings is explained by reference to the purpose of this collection of biographies. *".....the point of departure was to ask to what extent today's new buildings are a reflection of the region in which they are produced."* (Bain and Lowenstein, 2008:6). Although the historic period of each building is relatively short, the broad scope of the biographies and the relationships between the buildings and their contexts are maintained. This broad scope is set out in the foreword of the book and covers the technical specifications, the geographical relationships with the landscape, the ideas of the architect and the ambitions of the client. It also refers to *".... a cocktail of cultural, aesthetic and*

political forces." (ibid), and the recognition of the relationship between the buildings and people are noted in the following sentence *"Every building will in turn influence the biographies of the people who occupy it."* (ibid).

An example of the use of biography which has a strong focus on the relationship between the built environment and people is *East Kilbride: The Biography of a Scottish New Town, 1947-1973* (Smith, 1979). This research report for the Building Research Establishment focused on the physical, social and economic development of East Kilbride as an evaluation of the wider aims of new towns in the context of the political and economic contexts of the UK. Although the biography relates to 1947-1973, the report uses historical data stretching back to the nineteenth century to explain developments in this post-war era, which highlights the importance that historical context can have in biographies. The inter-connections between planning, economic development, lifestyles and culture are explored in order to draw out lessons for future urban planning. According to the author this biography achieves the following: *"The development of East Kilbride has been described and, within the constraints of the available data, its dynamics analysed."* (Smith, 1979:147).

5.3.2 Key elements of a biography

From the discussion of the concept of biography above it is possible to identify some key elements of biographies which are present in both the biographies of people and the biographies of inanimate objects such as buildings. These elements are inter-related and can be summarised as follows.

- A biography has a **timeframe**, it relates to a defined period in the life span of the subject. This may be any length from a specific short period to the entire life of the subject. The time period selected will be influenced by other key elements.

- A biography will identify and focus on one or more **themes** associated with the life history of the subject, as a biography is not able to explore every aspect of the subject's life. The themes will be part of the bigger picture which the biography is seeking to portray.

- A biography is concerned with important events or **turning points** in the life span of the subject, but it is more than a chronological reporting of events experienced by the subject.

- A biography is concerned with the **<u>relationships</u>** of the subject. These relationships will take place in physical and human contexts and it is through these relationships that the themes of the biography are explored.

5.3.3 Linking biography and biographical research methods

The academic study of the development of biographies, and the study of biographies themselves, is the focus of research centres such as: the Centre for Narrative and Auto/Biographical Studies at Edinburgh University in the UK, which has received support from the Economic and Social Research Council (ESRC); and the Centres for Autobiographical Studies and for Life History and Life Writing Research both of which are at the University of Hawaii. The University of Hawaii also publishes the journal *"Biography: An Interdisciplinary Quarterly"*, which has provided an outlet for research in this field since 1977.

Producing a biography, whether the subject is a person, an artefact, or a building requires an element of research. For autobiographical and biographical studies the main focus is the narrative itself. However, during the 20th century the research methods associated with producing biographies have been adopted in the wider field of social science and applied in research into a range of social phenomena. Biographical research methods are now used extensively across social science research (Merrill and West, 2009) where developing a biographical narrative is often part of the data gathering element of the research process. Once developed the biography is the subject of analysis with the final output being a research paper, book or report on broader social or physical phenomena. For example, Ian Finnis (2003) used biographical methods to investigate risk taking among small business entrepreneurs with a view to investigating the theory and practice of marketing in small firms.

The literature on biographical research methods does not tend to distinguish between the methods used to research the construction of a biography and the methods used to analyse and draw inference from biographies. Denzin (1989) provides numerous illustrations of biographical research where the actual biography varies from the un-edited recording of the narrative account provided by a subject to a detailed biography constructed from multiple sources. The following section explores the emergence and characteristics of biographical methods in qualitative

research with a view to identifying the approaches within the field of biographical methods that are relevant for the research in this PhD.

5.4 Biographical Methods in the Field of Qualitative Research
5.4.1 The emergence of biographical research methods

According to Merrill and West (2009) and Bornat and Walmsley (2008) biographical methods have claimed an increasingly important place in academic research and have been recognised as making a positive contribution to social research generally, and in areas of health, social care and education in particular. Given that biographies are almost always concerned with human life stories, as outlined above, the focus of biographical methods in research are individual stories and group stories which can cast light on social phenomena. For example in the field of migration studies Apitzsch and Siouti (2007) claim that, *"the biographical approach offers a way of empirically capturing the diversity, complexity and transformational character of migrational phenomena and of reconstructing them through biographical analysis."* (Apitzsch and Siouti, 2007:3). However, while the focus on people remains, Apitzsch and Souti go on to acknowledge that *"...the principles of the methods and methodology of biographical research are extremely well-suited to a range of disciplinary and interdisciplinary fields of research."* (ibid: page 6).

Academic commentators on biographical research methods point to the work of the Chicago School of the 1920s and 1930s as significant in the emergence of this research tradition, which gained further ground in Europe in the 1970s. The last thirty years of the 20th century saw a major 'turn' to biographical, autobiographical, life history and narrative approaches in research methods (Denzin, 1989; Chamberlayne et al, 2000; Riessman, 2000; Apitzsch and Siouti, 2007; Merrill and West, 2009).

Sociologists and psychologists in the Chicago School of the 1920s developed biographical research as an innovative method in order to explain complex migration-specific social phenomena in qualitative terms and as a reaction against forms of social enquiry that tended to deny subjectivity in research and to neglect the role of human agency (Apitzsch and Siouti, 2007 and Merril and West, 2009). Through the 1920s the Chicago School saw the emergence of symbolic interactionism to capture the *"dynamic, learned, malleable and constructed quality*

of human identity and society, ..." (Merrill and West, 2009:4). Researchers at the Chicago School broadened their use of the biographical approach into the study of social deviance. A study by Clifford Shaw in 1930 called *The Jack Roller* (re-published in 1966) is credited as a significant work in terms of systematising the biographical approach (Apitzsch and Siouti, 2007). Working across disciplines within the social sciences, the Chicago School laid the foundation for the interdisciplinary nature of biographical methods.

In West Germany in the 1970s, the Frankfurt School and others drew on sources such as pragmatism, symbolic interactionism, conversation analysis, sociolinguistics and phenomenology and on the work of sociologists such as C. Wright-Mills to progress the biographical approach. It was during this period that the Frankfurt School of Sociology developed critical theory in an attempt to achieve unity between theory and practice, including systemic links between theory and empirical research (Calhoun, 1995; Merril and West, 2009). In 1973 Fritz Schütze of the Bielfield Sociologists' Working Group developed a model for an open narrative form of interviewing and a procedure for analysing narrative texts within the area of sociolinguistic theory (Merril and West, 2009:143). The use of biographical methods continued to develop and expand within the interpretive research paradigm through the latter part of the 20th century and continued to focus primarily on the marginalised in society. By the 1990s, Schütze's model had been developed into the central interpretative research approach in biographical analysis, based on the key assumption that biography is a social construct (Apitzsch and Siouti, 2007). The popularity of biographical methods in the 1990s and early 21st century is explained in part by reference to postmodern culture in which the social scripts that shaped peoples' lives in industrial societies in earlier periods have been weakened or rejected and no longer provide a complete framework for understanding social phenomena (Merrill and West, 2009).

5.4.2. The application of biographical research methods

Biographical methods are usually applied in research where the narrative is focused on individuals or groups of people. Chamberlayne et al (2004) explore the use of biographical methods of research in a study of professional practice in the health and social care professions across Europe. They are particularly interested in how professionals respond to welfare policies. For Chamberlayne et al biographical

methods *"provide a tool for reconnecting welfare systems with lived experiences and social change, ..."* (Chamberlayne et al, 2004:19). In the ESRC funded research project entitled "Cultures of Care", which ran from 1992 to 1996, Chamberlayne et al used a biographical approach with home carers in a comparative study across three social welfare contexts: East and West Germany and Britain. Chamberlayne et al state that *"...the focus was using a biographical approach to transform local welfare cultures - by mutual recognition of expertise between managers, agents and clients, valuing and codifying face-to-face relationships, ..."* (ibid: 28). The attention biographical methods can give to relationships is of particular relevance to the research in this thesis.

Interdisciplinarity is a central feature of biographical research in terms of both its methods and the topics targeted by research. According to Merrill and West (2009) biographical research is found in *"challenging"* spaces and it *"transgresses overly rigid academic boundaries"* (Merrill and West, 2009:54). Biographical research methods have been *"adopted or rediscovered in diverse disciplines"* (ibid: 39), which is synergistic with the interdisciplinary nature of research in the field of sustainability. In the field of education Merrill and West reference the work of Miriam David[17] in support of the assertion that biographical research methods contribute to the understanding of the complexities of learning by an individual or group, which quantitative evidenced based approaches often miss or neglect.

5.4.3 The limitations of biographical research methods

Just as all research approaches have weaknesses, so the biographical approach to research is not without its critics. A major criticism centres around the debate between 'realism' and 'constructivism' and the extent to which reported accounts reflect lived reality (Roberts, 2002). For Denzin (1989) all lives are constructed and they are re-constructed in biographies. Denzin argues that in biographical research the boundary between fact and fiction becomes blurred, *"The point is, as Sartre notes, that if the author thinks something existed and believes in its existence, its effects are real."* (Denzin, 1989:25).

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Roberts (2002) also raises questions about the 'adequacy' and the 'quality' of accounts from individuals; this leads to concerns regarding 'validity' and 'reliability'. He poses the suggestion that while life stories provide insights, they are best seen as *"sources for possible hypotheses before the formulation of 'real' objective research"* (Roberts, 2002:6). Here Roberts is suggesting the biography is one component in the research process and validity comes from the researcher investigating other sources to corroborate or challenge the findings emerging from the biography.

Merrill and West (2009) highlight the view of some historians that the biographical turn was a kind of retreat into *"fine meaningless detail"* (Merrill and West, 2009:11), which leads to a failure to see the 'bigger picture'. This is something a systems perspective can address, through an awareness of the subject's connections to larger systems. Merrill and West (2009) also reference the criticism levelled by Foucault that people are positioned by language in power relationships in ways they may be unaware of, and therefore this significant influence on their lives may not emerge through their own narrative. The counter argument to this revolves around the human capacities for reflexivity, for learning and greater awareness, including how power and knowledge can shape individuals (Merrill and West, 2009:32).

Linked to this Bornat et al (2008) raise the danger of the researcher "colonising" the subject, which leads into the broader area of the influence of the researcher on the subject. Biographical research methods can lead the researcher into close contact with a subject and the researcher needs to recognise, and take account of, his or her presence in the research, and his or her relationship with the subject, on the research outcomes. Denzin also emphasises the impact of the researcher in biographical research as being particularly acute and something that needs to be accounted for in the interpretive perspective. *"When a writer writes a biography, he or she writes him- or herself into the life of the subject written about."* (Denzin, 1989:26).

Another of Denzin's concerns is the potential for the stories of individuals to become a kind of "narrative heroic fiction"; however, while Denzin recognises the weaknesses in the biographical research methods, he is also an advocate of the approach. He defined the biographical method as *"a studied use and collection of life documents that describe turning point moments"* (ibid: 69). Turning point moments,

or epiphanies as Denzin also refers to them, are *"interactional moments which leave marks on peoples' lives. …… Their effects can be positive or negative."* (ibid: 70).

Recognising the weaknesses of a particular research approach is the first step towards mitigating their impact on the validity of the research. Retaining a systems perspective throughout the research process goes some way towards addressing the problem of missing the bigger picture because of a focus on meaningless detail as highlighted by Merril and West (2009). The systems perspective also moves this research approach away from the danger of an overly narrow, phenomenological approach as discussed in section 5.2 of this Chapter.

5.4.4 Interpreting biographical data

In his book *Interpretive Biography* Denzin (1989) provides a degree of methodological mapping to the strands of biographical research, which have developed since its emergence in the 1920s. Figure 5.4.1 summarises the categories of approaches for organising and interpreting biographies.

Denzin divides the interpretation of biographies into two main categories, objective formats and interpretive formats. On the far left of Figure 5.4.1, the classic natural history approach is based on the position that lives have natural histories that unfold over time and that these lives are marked by objective events and experiences. He sets out nine steps for organising a life history report with the first step being to select a series of research hypotheses and problems to be answered. He concludes that biography reflects a *"life pictured as an orderly production"* Denzin (1989:50). The interpretation is preoccupied with objective events and subjective definitions of these events. The problem with this approach according to Denzin is that it turns lives into objects of study, *"with scant attention to the problems involved in describing real lives with real, objective meanings."* (ibid: 52).

Denzin describes the objective hermeneutics and biographical narrative approach as *"the most advanced sociological development of the objective approach"* (ibid: 54) resulting from the work of a group of German sociologists in the 1980s, including Schütze, referred to earlier by Merrill and West (2009). Sociologically relevant information is extracted from the biographical account given by the subject. Researchers construct a 'typical' narrative and 'typical' hypothetical motivations for actions. Deviations between the biographical account and the typical account are used to understand the structure of the individual case. Denzin's main

criticism of this approach is around reliability and supporting evidence for both the individual's account and the typical account.

| Denzin identifies two main categories for interpreting biographical material |

Objective Formats — Interpretive Formats

Objective Formats:
- The classic, natural history approach associated with the Chicago School
- The objective hermeneutics and biographical narratives approach of the late 20th century German life history researchers (Helling, 1988)

Interpretive Formats:
- From the subject's point of view
- Subject produced auto-biographies
- Making sense of an individual's life

Figure 5.4.1: Categories of approaches in biographical research (devised from Denzin, 1989)

The three interpretive frameworks identified by Denzin, and represented on the right hand side of Figure 5.4.1 above, differ in terms of who writes the biography, the perspective adopted and how the biography is used. They can be summarised as follows.

- The first is where the researcher presents the biography totally from the subject's point of view, without any interpretation by the researcher.
- The second refers to those approaches which rely on the subject's perspective and are often written by the subject, but are then interpreted for sociological, psychological or anthropological purposes.
- The third variation is where the researcher's interpretations are woven into and through the biography in order to make sense of the life of the subject.

All the theoretical perspectives reviewed here, including Denzin's, are concerned entirely with the biographical research of people and their associated actions and phenomena. Section 5.6 of this chapter identifies how the principles of the biographical approach can be applied to researching the influence of the buildings which are the focus of this research. In particular it takes account of Denzin's third interpretive format as a way of presenting the biographies of the

buildings. First, however, the next section will take account of the much smaller field of object biography in anthropological research.

5.5 The Concept of Agency in Inanimate Objects

Section 5.3.2 above established the key elements of a biography, which included 'relationships'. Accepting that a building can have relationships, and, beyond that, influence change in the institution of which it is a part, implies that a degree of agency can be attributed to a building. Defining the concept of agency is a contested area as outlined by Knappett and Malafouris (2008). If agency is defined as 'acting with intent' and 'reflecting on that action' then agency is restricted to humans (Knappett and Malafouris, 2008:ix). However, there is a body of work linking the concept of agency to non-human objects, with the seminal book *The Gift* by Mauss published in 1954, seen as a significant contribution to an area of study that has grown within and beyond the field of anthropology. This led to the view that physical commodities, which could encompass buildings, can have social lives in the same way as people (Appadurai, 1986:3).

Writing in 2006 Janet Hoskins refers to the *"recent agentive turn in social theory"* leading some theorists to *"speak in new ways about the agency of objects"* (Hoskins, 2006:74). Hoskins traces the emergence of this turn in social theory and highlights the significance of the volume of essays edited by Arjen Appadurai in 1986, which included the influential *The Cultural Biography of Things* by Igor Kopytoff (1986) referenced earlier in this chapter. Kopytoff is particularly concerned with the commoditisation of objects and the change this brings to the relationship between people and objects in different cultures. Kopytoff and subsequent commentators on the agency of objects with an anthropological perspective (MacKenzie, 1991; Gell, 1998; Hoskins, 2006) are primarily concerned with objects that have a close relationship with individuals or a series of individuals and objects that have a cultural significance. Examples of such objects would include a tool, a piece of jewellery or a piece of artwork, and applying a biographical approach to these objects can reveal their agency, which otherwise might not be identified, or as Kopytoff puts it *"biographies of things can make salient what otherwise remains obscure."* (Kopytoff, 1986:67).

The notion that inanimate objects have agency with individuals and groups of individuals is relevant for exploring the influence buildings can have on individuals

within an education institution. Hoskins (2006) cites the work of Maureen MacKenzie who was one of the first anthropologists to take a biographical approach to the study of objects. She explicitly focuses on *"the lifecycle of an object"* in order to *"uncover the relations and meanings which surround it."* (MacKenzie,1991:27).

In reviewing the way researchers have attempted to use a biographical approach with objects, Hoskins identifies two distinct forms. *".... (1) those 'object biographies' that begin with ethnographic research, and which thus try to render a narrative of how certain objects are perceived by persons that they are linked to, and (2) efforts to 'interrogate objects themselves' which begin with historical or archaeological research, and try to make mute objects 'speak' by placing them in an historical context, linking them to written sources such as diaries, store inventories, trade records, etc."* (Hoskins, 2006:78).

Constructing the biography of a building based on data from stakeholders associated with the building would be located within the first form of object biography identified by Hoskins. Identifying the extent to which a building on a college campus can be said to have agency through its relationships with individuals in the college, and in so doing be a catalyst for institutional change, is central to the aims of this research. In the context of this research the relationships between buildings and people is important for understanding the influence of the buildings. These relationships are also relevant to the role of non-human objects within the concept of agency as developed by Knappett and Malafouris (2008) and Latour (1999 and 2005). According to Malafouris *"The argument is not for an either/or choice between human or material agency nor for extending a human property to the realm of materiality"* (Malafouris, 2008:33). Rather, agency is the product of human engagement with material objects, *"Within this situated dialectic of activity, material or human predications of agency make sense only from the perspective of dynamic spacio-temporal relations."* (ibid).

To explore how objects can bring agency into a relationship with humans, Knappett refers to an example often used in the debate around the agency of objects. The example object is a gun and the debate centres on whether a gun or the person shooting the gun is the primary source of agency. *"A more familiar and polarised debate of this kind is that between the pro-gun and anti-gun lobbies. While the anti-gun lobby argues that guns kill people, the pro-gun lobby maintains that people kill people, with the gun as nothing more than a neutral tool.   ....the former portrays*

the gun as the responsible agent, the latter puts all responsibility in the hands of human agents" (Knappett, 2008:140). Knappett discusses two solutions that could resolve this dualistic debate. The first centres around the idea of the designer or maker of the gun delegating a level of agency to the product being made, which is then accessed or activated by the person using the gun. This view places agency primarily in the human realm with the object having secondary agency. In the context of this PhD thesis it offers an interesting conceptual explanation for the architect being able to consciously design-in elements to a building that could then be exploited by staff in a college to bring about institutional change for sustainability.

Knappett's second solution to the dualistic debate draws on the work of Latour and is a more widely held explanation within the field of Actor Network Theory (ANT). This solution sees a symmetry between the human and the non-human. There is no primacy in either the person or the gun, *"Rather, the two are mutually constituted, each being transformed by the other in their conjunction. Trying to decide whether one or the other is the agent makes little sense from this perspective. Think not of agents as entities, but of agency as a process"* (ibid). In particular, Knappett sees agency as a process emerging from the relationship between human and non-human within the context of given situations or specific activities.

For Latour, within the realm of ANT *"**any thing**[18] human or non-human that does modify a state of affairs by making a difference is an actor"* (Latour, 2005:71). This leads Latour to state that *"....the questions to ask about any agent are simply the following; Does it make a difference in the course of some other agent's actions or not? Is there some trial that allows someone to detect this difference?"* (ibid).

ANT uses the term 'network' in relation to a series of actions between actors rather than to any form of fixed network, indeed Latour believes that ANT should have abandoned the term long ago as its diverse meanings lead to ambiguity in the context of ANT (Latour, 2005:129). However, the notion of the symmetry of agency between people and non-human objects such as buildings and the importance of the relationships resulting from the engagement of people with buildings provides a theoretical construct to apply to the biographies of the buildings developed in

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[18] Latour's emphasis.

Chapter 7 of this thesis. Although the connections in the networks identified in ANT are of an amorphous and abstract nature, there is a degree of synergy with the systems perspective in that the focus is on relationships and the impacts of those relationships. This focus on relationships has a particular relevance to the approach to the analysis of the biographies of the buildings, which is introduced in Chapter 6 and employed in Chapter 8 of this thesis.

5.6 Reflections on the Characteristics of the Biographical Approach

The preceding sections in this chapter provide an overview of the theoretical development of the biographical approach and in particular the turn towards biographical research methods in the late 20th century and the early part of the 21st century. Part of this turn towards biographical methods has been the emergence of object biography with the application of a biographical approach to the research of inanimate objects, which has relevance for the role that the examples of sustainably designed buildings play in this thesis.

The following key characteristics of the biographical approach are drawn from the review of the literature in sections 5.4 and 5.5 above. These characteristics provide a framework for the research methods adopted in collecting and analysing the data on the influences of sustainably designed college buildings on institutional change for sustainability.

The characteristics of the biographical approach:

- The biographical approach informs, and merges, both the collection and the analysis of data. The form in which the actual biography of the subject is presented as part of the research process can vary and is dependent on the overall aims of the research.
- Biographical research methods are not discipline specific or discipline limited. They can be applied in interdisciplinary contexts in order to address complex questions.
- The subject of the biography has a degree of agency, even where the subject is an object rather than a person.
- The data, once collected, is assembled in a narrative format. This involves a reconstructing of the data by the researcher. The influence of the researcher

is significant and should be acknowledged and accounted for, with particular regard to:

- o the selection of the subject of the biography and the themes that will be the focus of the biography;
- o the selection of the perspective from which the narrative is told;
- o the selection of the sources of data that inform the narrative and an acknowledgement of those that are unavailable or not selected;
- o the extent to which the interpretation of the researcher is woven into the narrative;
- o and the selection of the framework and methods for analysing the narrative.

The characteristics of the biographical research methods display a degree of synergy with sustainability in terms of the interdisciplinary, complex and emergent nature of sustainability.

This research approach does have strong narrative characteristics, but is by no means a purely narrative approach. It has incorporated elements from other research approaches as identified in section 5.2 of this Chapter. The key characteristics of the biographical approach listed here also have a degree of similarity to the aspects of a 'case' as described by Stake (1994) and referenced in section 5.2. However, the main link with case studies results from the approach to the selection of the examples and the in-depth focus on two examples. The framework for developing the biography of a building goes beyond a general notion of a case study, in that it is a replicable research approach that can be applied within the specific context of exploring the relationships and influences between a building and the people who engage with it.

5.7 The Inquiry Paradigm

There are a range of inquiry paradigms that examples of qualitative research can fall into. Guba and Lincoln (1994) identify four inquiry paradigms: positivism; post-positivism, critical theory and constructivism. However, both the nature and number of Guba and Lincoln's 1994 typology has been challenged by other researchers (Heron and Reason, 1997; Alvesson and Sköldberg, 2000; Charmaz, 2006; Creswell, 2007). Heron and Reason (1997) criticise the gaps in the typology of inquiry paradigms by introducing a further paradigm, the participatory paradigm. All

paradigms have their strengths and weaknesses in terms of what the research conducted in a particular paradigm can reveal (Tuli, 2010), and the contested nature of the inquiry paradigms add to the difficulty of locating research precisely within a particular paradigm.

Guba and Lincoln (1994) do offer a general description of a paradigm, which is a helpful starting point. *"A paradigm may be viewed as a set of basic beliefs (or metaphysics) that deals with ultimates or first principles. It represents a worldview that defines for the holder, the nature of the 'world', the individual's place within it, and the range of possible relationships to that world and its parts, as, for example, cosmologies and theologies do."* (Guba and Lincoln, 1994:107).

Further, there is a degree of consensus amongst the researchers referenced here that there are three key areas or questions that help to distinguish the various inquiry or research paradigms, these are:

- the ontological question;
- the epistemological question;
- and the methodological question.

These three questions are closely linked and within any one paradigm each question is constrained by the answer to the other questions. The epistemological question on what an individual can know is related to the individual's perception of reality or ontology and is in turn related to methodology or how the individual comes to know (Guba and Lincoln, 1994:108).

Section 1.4 in Chapter 1 of this thesis provides an insight into the ontological and epistemological position of this researcher. An acceptance that individuals hold different perceptions of reality, rather than there being a single objective reality, places this researcher in the interpretive-constructivist paradigm or paradigms. Interpretive and constructivist paradigms are seen as closely linked or overlapping, with constructivism seen as a later development emerging from within the interpretive paradigm. Creswell's account of the constructivist worldview is synergistic with this researcher's ontology. *"In this worldview, individuals seek understanding of the world in which they live and work. They develop subjective meanings of their experiences – meanings directed towards certain objects and things."* (Creswell, 2007:20). As well as being the ontological perspective of this researcher, it is also the ontological view that this researcher ascribes to the participants in the research.

Tuli (2010) sees all qualitative research underpinned by constructivist ontology, this assumes that meaning is embedded in the experiences of the research participants and that this meaning is mediated through the researcher's own perceptions (Tuli, 2010:102). This matches the methodological approach associated with this research, where the researcher is conscious of having an impact on the research through perceiving and filtering the data collected on the examples being studied. This is a point that is discussed in the next chapter.

The model of sustainability presented in Chapter 1 has implications for locating this thesis within a particular paradigm. The view of sustainability adopted here relates to a view of the world that is inter-connected and systemic. The interaction between individuals and between social and environmental systems as revealed by a systems perspective facilitates the construction and interpretation of realities and of knowledge. The acceptance that knowledge is incomplete and not absolute, but continues to emerge through co-creation between individuals, places this view of sustainability, and the research associated with it, in the interpretive-constructivist paradigm as opposed to the positivist paradigm.

The methods of data collection discussed in the next chapter fall within the interpretive-constructivist paradigm, especially with the focus on the perceptions of individuals in relation to the development and influence of new buildings, perceptions which are then filtered by the researcher.

5.8 Summary

This chapter has presented an original approach to researching the influence of sustainable design in FE college buildings as a potential catalyst for embedding sustainability in colleges, a topic for research that has largely been overlooked. The research approach has been to combine three main elements. The established concept of biography has been combined with the tradition of biographical research methods from the field of social research. This has been further combined with the concept of agency in order to take account of the influence of sustainable design in the selected buildings on the people and systems in the institutions under investigation. The justification for adopting this approach has been supported through references to established theoretical perspectives in qualitative research.

The consistency and integrity of the research approach with the perspective of the researcher and the model of sustainability adopted in the thesis is demonstrated

by the congruence of all these aspects of the thesis being able to be located within a common inquiry paradigm. This consistency is followed through in the next chapter where data collection methods are discussed.

Chapter 6

DATA COLLECTION METHODS AND THE ANALYTICAL FRAMEWORK

"Throughout the slow process of collecting data and analysing them, we shape our narrative – a narrative with many forms in qualitative research." (Creswell, 2007:43, *Qualitative Inquiry and Research Design*)

Who the researcher is can no longer be left out of the account without jeopardising the validity of the enquiry." (Schratz and Walker, 1995:5, *Research as Social Change*)

6.1 Introduction

Earlier chapters have identified what constitutes sustainable design in buildings and how institutional change for sustainability can be recognised in FE colleges in England and Wales. The aim of this research is to explore the connections between elements of sustainable design and institutional change using a systems perspective and applying a biographical approach to the development of sustainably designed buildings on two FE campuses. This chapter reviews the practical approaches to data collection and to the analysis of the data. The methods discussed in this chapter should be viewed from the perspective of the methodological approach adopted for this research and presented in Chapter 5. The selection criteria for the two examples that form the subjects of the two biographies of the buildings are set out and then justified. The central importance of the two examples to the research meant that their selection was a key step in the validity of the research and in the value of the outcomes. The data collection methods are presented, with a strong focus on semi-structured interviews with key personnel in the two institutions concerned.

The extent to which there was filtering and analysis of the data by the researcher is discussed in section 6.4, which raises questions about the influence and bias of the researcher. This is picked up again in section 6.6. The main analytical process in the research is the application of the systems framework of relationships to the two biographies. This links back to the systems perspective introduced in Chapter 2, and the framework is presented in detail in section 6.5.

In addition to dealing with issues of bias, section 6.6 reflects on the limitations of the methods and also addresses the practical ethical issues involved in conducting this research.

6.2 Selecting the Two Examples of Sustainably Designed Buildings

The selection process to identify two buildings to be investigated in depth is similar to what Stake (2005) sees as the selection process for a case study. The research methods employed beyond the selection process are what set this thesis apart from other research. The buildings, and their development, are the subjects of the biographical research approach. The application of the biographical research methods to the buildings reveals information about the influence of the buildings as agents of change and their role in institutional change for sustainability in FE colleges. The buildings were selected from the numerous capital developments that took place in the FE sector in England and Wales during the first decade of the 21st century.

The selection criteria were developed with the following rationale in mind. The buildings selected needed to have the potential to demonstrate how elements of sustainable design can influence institutional change for sustainability in the specific context of the colleges of which they are a part. The buildings, and the colleges that hosted them, needed to be representative of the FE sector so as to have the potential to provide transferable lessons for other institutions in the sector.

The criteria for selecting the two examples are listed below, the list is followed by explanatory notes on each criteria.

i. The building had to be part of a general FE college that covered a range of subjects, both academic and vocational. (Not a specialist college such as an agricultural college, and not a specialist campus for one discipline such as construction.)

ii. The new building had to be on a campus which was the single or main campus for the college and where a range of subjects were delivered.

iii. The college had to fall within the middle range in terms of size in respect of the number of students.

iv. The new building was used for teaching, at least in part, and not purely an administrative building.

v.   The building was completed within the last four years at the time the data collection phase of the research took place.

vi.   The building had external recognition of its sustainable design.

vii.   The college had been recognised for engaging with the sustainability agenda.

viii.   The key stakeholders associated with the development and with the use of the building were available for interview.

The following points relate directly to the numbering of the selection criteria and provide further explanation of the rationale behind the criteria.

i.   One of the aims of the research was to explore the influence of the elements of sustainable design across the whole institution, including evidence of crossing disciplinary boundaries. Therefore, although the building may be linked to a specific subject department, it was important that the building was physically and institutionally located in the context of a general FE college where there was an opportunity for influence across disciplinary boundaries. All colleges are unique to some extent, so it is not possible to assert that a college is typical of the FE sector. However, a general FE college presented the best option of producing outcomes that might be relevant to other FE colleges.

ii.   The building had to be located on a campus that is either the only campus of the general FE college or at least on its main campus where a good range of subject departments were located along with the majority of the non-academic departments or teams. The majority of the staff and students at the institution would therefore have been aware of the physical presence of the building.

iii.   FE colleges vary in size considerably although the smaller colleges tend to be the specialist colleges focusing on the disciplines within one vocational sector. The college size is most often measured in terms of student numbers, which includes both full time and part time students, with part time students being the much larger absolute number for general FE colleges. College size is therefore often quoted in full time equivalent students; in England this is referred to as the Standard Learner Number (SLN). In England the SLN for

the 376[19] colleges (of which 286 were identified as general/tertiary colleges) at the time of the research ranged from 150 to 12,520. The figures for the 23 colleges in Wales are provided in absolute numbers of full and part time students, and range from just under 1,000 to 33,000. Since the incorporation of the colleges in England and Wales from LEAs in 1993 there has been numerous mergers of colleges creating the largest institutions in the size range, located on multiple campuses. The small specialist colleges and the large multiple campus colleges were avoided when selecting the examples.

iv. The research was aimed at exploring the relationship between the new building and whole institutional change. As discussed in Chapter 2 of this thesis whole institutional change for sustainability in colleges embraces teaching and learning, and therefore the building needed to be used for teaching and learning, although the building may have also housed other college functions.

v. The biography of the building was researched from the time the need for the building was identified through its conception, design, construction and through the early stages of the use of the building. In order to balance the access to the historical process and the details of the development of the building with a reflection on its practical use the aim was to choose examples where the buildings had been in use for at least one academic year, but no more than four academic years so that stakeholders in the development could recall details of the processes and there would be a greater chance of documentary evidence still being available.

vi. For the purposes of the research it was essential that recognisable elements of sustainable design were present in the building, in line with the framework presented in Chapter 3, section 3.4. The building needed to be acknowledged or accredited for its sustainable design by an organisation or assessment scheme external to the selected institution, for example, BREEAM Excellent.

vii. In order to explore the institutional change for sustainability that may have taken place as a result of the design of the new building there had to be some form of record that the institution was engaging with the sustainability agenda. This could have taken the form of a strategy, the record of the actions

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[19] This figure relates to the academic year 2006/07 (HEFCE, 2009)

of a sustainability group within the institution or a reference in an external report.

viii. The evidence supplied by the stakeholders in the development and use of the building form the main source of data for developing the biography of the building. Therefore it was essential that these stakeholders were available for interview.

The examples chosen as a result of applying these criteria are presented in the form of the two biographies of the buildings in Chapter 7. One building was at the Cambridge Regional College in the East of England and the other was Pembrokeshire College in West Wales. The structure of the biographies and the method of constructing the biographies are presented in section 6.3.

6.3 Applying Biographical Research Methods to Constructing the Biography of a Building

In Chapter 5, section 5.3.2 four key elements of biographies were identified. These elements were timeframe, theme or themes, turning points and relationships. Table 6.3.1 sets out what these elements mean in terms of the biographies for the two buildings used as examples in this research.

The timeframe for the biographies is linked to the selection criteria for the examples of college buildings in the research. The buildings needed to have been in use for a maximum of four years, so that the key people at the college who were involved with the development of the building could draw on their memory and the records of the development process.

The purpose of this research is to explore how a sustainably designed building can be a catalyst for change for sustainability in a college. Therefore the theme of the narrative will be the aspects of the physical building and the process of its development that can be linked to change for sustainability in the institution.

Linked to the theme of change for sustainability are the key events and decisions that can be seen as turning points in determining why the development of the building took the course that it did. The particular turning points that are of interest are the ones which resulted in the building being an influence for change and any turning points that may have prevented the building from maximising its potential as a catalyst for change for sustainability.

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The identifying and recording of the relationships that the key stakeholders had with the building and with each other during the development of the building provides the detailed content of the narrative to add to the basic structure of the timeframe.

Key element	The key elements in the biographies of the buildings in this research
Timeframe	The time period for the biography of the building covers the early part of the "life" of the building. It starts from the need for the building being identified, through its design, construction and the early years of the building's use.
Theme	Change for sustainability linked to the influence of the building is the main theme in the biography. The biography will hold a sustainability perspective in relation to the physical, institutional, educational, economic, social and cultural contexts of the building.
Turning points	The biography will focus on activities and events in the narrative story of the building that can be linked to changes for sustainability in the institution, in terms of both perception and practice.
Relationships	The biography will be informed by the people associated with the building during the time covered by the narrative. The relationships between these stakeholders and the building and their relationships with each other form an inter-connected web, which reflects a systemic approach to developing the biography.

Table 6.3.1: Key elements of the biographies of the buildings

All four of these elements are inter-related and they combine to provide the narrative of each building from the perspective of the researcher. Applying biographical research methods to the development of the biography identifies how the data has been selected and used to construct the biographies in order to address the research questions. In line with Denzin's (1989) constructivist assertion that the lives of all subjects are constructs and that a biography is re-constructed by the researcher, in writing biographies it is up to the researcher to make sense of the subject's life. The two biographies placed the building, as the subject, at the centre of a narrative which was constructed by the researcher from primary and secondary data gathered in each case. The researcher used the theme of the building's influence on

change for sustainability in the institution as a filter for what is included in the biographies. Through this theme the researcher ascribed a degree of agency to each of the buildings at the centre of the biographies. The researcher has woven a level of interpretation into the biographies based on making sense of the 'life' of the buildings in respect of their influence on institutional change for sustainability.

Figure 6.3.1 below is a diagrammatic representation of how the particular interpretive-constructivist biographical approach adopted for this research was combined with developing the biographies of the buildings. The information fed into this process of constructing the biography by the four elements at the top of Figure 6.3.1 was supplied by the data collection methods outlined in section 6.4 below.
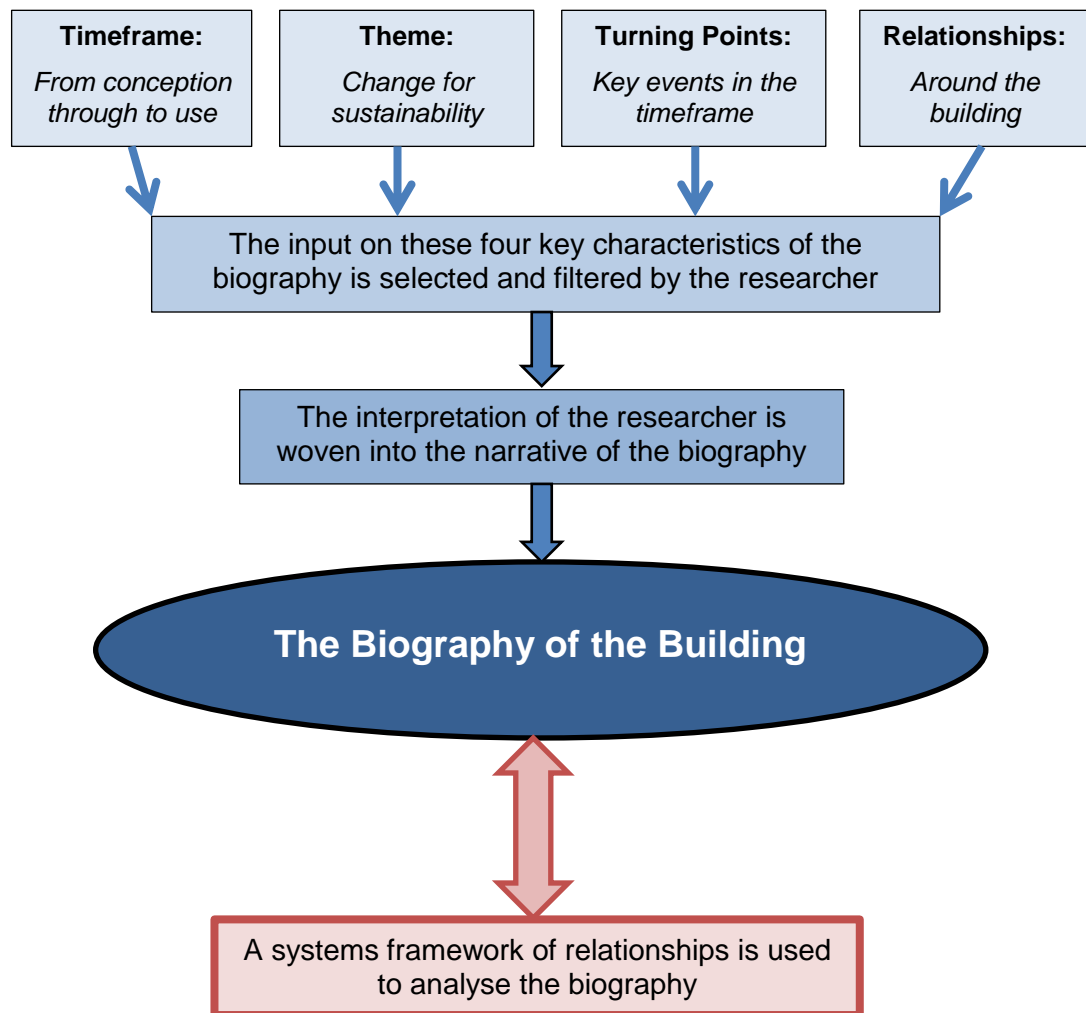
Figure 6.3.1: Combining key elements of biography with biographical research

Figure 6.3.1 also indicates how the analytical framework, which is used to analyse the biographies, entered the process after the biographies had been constructed. This analytical framework is a systems view of the relationships associated with the development of the buildings and is introduced in section 6.5.

6.4 Data Collection to Inform the Biographies

The data upon which the biographies of the buildings are based involved both primary and secondary sources. The primary data was collected through semi-structured interviews with the key members of staff involved with the development of the buildings and with leading sustainability in the two selected institutions. Primary data was also gathered from observations and recorded in the form of photographs taken while touring and viewing both the buildings and the campuses in which the buildings were set. The secondary data consisted of documents and online writings about the buildings, the institutions and the architectural practices which designed the buildings.

All of the four types of information identified by Creswell (2007) were covered as a result of employing the methods described above, *"I like to think in terms of four basic types of information: interviews, observations, documents and audio-visual materials."* (Creswell, 2007:43).

6.4.1 Primary data collection

Once the two examples had been identified contact was made with the senior manager in each institution, who had overall responsibility for the development of the new building. Agreement to interview the key personnel associated with both the development of the building and with leading sustainability developments in the institution was established. Between them the interviewees needed to be able to respond to questions relating to sustainability across the whole institution, which meant covering the areas identified in Chapter 2, section 2.4, that is: leadership, organisational capacity, teaching and learning, and partnerships. This targeted selection of interviewees is consistent with narrative forms of research as pointed out by Creswell (2007:128). The respondents interviewed in the two FE colleges occupied the following positions.

Example 1: Pembrokeshire College
- Director of Estates and member of the Senior Management Team

- Chair of the Sustainable Development and Environment Committee and academic lecturer

Example 2: Cambridge Regional College

- Vice Principal and Director of Finance
- Sustainability Officer and Associate Principal
- Sustainability Manager (Curriculum Leader for sustainability)

The main data collection tool was a semi-structured interview guide or interview schedule. The semi-structured interview is described by Robson (1993) as follows, *"interviewers have their shopping list of topics and want to get responses to them, but as a matter of tactics they have greater freedom in the sequencing of questions, in their exact wording, and in the amount of time and attention given to different topics."* (Robson, 1993:237). In this research the researcher drew on previous experience of using semi-structured interviews to achieve what was perceived to be an appropriate balance between directing the respondents through the use of specific open questions, and allowing the respondents sufficient scope and freedom to reveal unanticipated but relevant information.

An interview guide was developed and used as a checklist and as a note-taking device during the interviews. However, the interviews were all recorded for transcription purposes. The questions from the interview guide can be seen in the left hand column of the tables in Appendices A and B, which also contain the transcripts of the responses to the questions. Written consent for participation in the research process was obtained from all respondents as described in section 6.5 below.

Griffiths (1998), in her book *Educational Research and Social Justice*, emphasises the importance of reflexivity in the research process. In particular *"reflexivity about own position and interests"* and *"reflexivity about own understanding and values"* in relation to the researcher (Griffiths, 1998:96). The philosophical influences that have shaped the worldview of this researcher were discussed in Chapter 1, section 1.4. The basic assumption affecting this research is the belief that change for sustainability is a positive phenomenon. Further reflection on the data collection process and the potential for bias is discussed in section 6.5.

Transcribing the outcomes from the interviews was both a reflective and a filtering process. The interviews were transcribed into data tables which related to the interview questions and to the themes that were covered in the interviews.

Because of the semi-structured nature of the interviews the responses to questions did not occur in the same order in the different interviews. Occasional pertinent responses to a particular question were given at separate points in the interview. Hence there was a need to place the transcribed responses into the tables in order to connect the questions with the appropriate responses. One completed table was produced for each example, combining the responses from those interviewed in each college.

'Respondent validity', described by Griffiths (1998) as *"validation by taking the data and analysis back to the subject to check their accuracy"* (Griffiths, 1998:132), was achieved by sending the combined table for each college back to respondents for their approval[20]. Once approved these tables were a key source of information for constructing the biographies. The tables are presented in Appendices A and B.

During the visits to each of the selected examples the researcher was given a tour of the new building and of other parts of the college by one of the respondents involved in the interviews. At other times the researcher was given the opportunity to view the building and the campus alone. In all cases the researcher gained permission to record observations using photography and he also reflected on what had been observed by making journal notes. The photographs contributed to the biographies produced for each example and the reflections contributed to the comments made by the researcher in the data table for each example.

6.4.2 Secondary data collection

"The value of secondary sources should not be minimised. There are numerous occasions where a secondary source can contribute significantly to more valid and reliable historical research than would otherwise be the case." (Cohen and Manion, 1989:56).

Developing the biographies of the buildings involved a relatively short and recent historical perspective, looking back over four years from the point at which the research was conducted. The documentary evidence and website evidence provided information on the colleges and the buildings in respect of their perceived sustainability, both from within the institutions and from external sources. The

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[20] Emails received from each college confirming approval of the transcripts have been securely kept on file.

internal documents were supplied by interview respondents, while external documents and websites resulted from internet searches.

There was a range of external documentary sources from public sector bodies and the journalist media. This included reports from Ofsted (2007; 2008), Estyn (2006b; 2010; 2011), Cambridge CC (2008), DELLS (2006), DCELLS (2008b), BRE (2008), EAUC (November 2009a; November 2009b) and the Ecologist journal (Rees, 2009). The websites of the Colleges and the architects were accessed for information that was not available in hard copy. This documentary evidence and website evidence contributed to the biography of the buildings as a supplement to the primary data sources.

6.5 A Systems Approach to Analysing Relationships

Chapter 2 of this thesis introduced systems thinking as a theoretical lens that has been linked to the field of sustainable development and education for sustainable development. Adopting a systems perspective is helpful in considering what information is required to address the research questions. The research questions were originally introduced in Chapter 1 and they are repeated here for convenience.

1. How is sustainable building design being used to influence management practices and pedagogy?
2. How can leaders in an education institution use sustainable building design to influence institutional change towards sustainability?
3. How can mapping the relationship between the sustainable building design and institutional change inform the work of building designers and educators?

These research questions are concerned with influences and relationships as well as physical elements such as buildings and people. While the individual elements are generally the most visible aspects of a system (Meadows, 2009), a systems perspective recognises the importance of the relationships between elements. Understanding the web of relationships between the buildings selected for this research and the people associated with the development of the buildings is seen as central to investigating the influences referred to in research questions one and two. A systems approach is inherent in the final research question, which is to determine how mapping and investigating these relationships can maximise the benefit of the

specific relationship between those people who design the building and leaders in the institution who commission and use the building.

The data collection methods discussed earlier in this chapter were designed to generate the biographies of the two buildings. The resulting biographies could then be analysed using a systems framework of relationships to reveal evidence used to address the research questions.

As discussed in Chapter 2, systems can be seen to exist at different levels. Taking a systems view of an FE college reveals that some elements that exist within the college system, such as a library, may be seen as a system in their own right. Equally, the college may be an element in a larger system such as the tertiary education sector. This is a phenomenon has been referred to by Sterling (2003) and others as nested systems, that is, systems which occur inside other systems. Therefore, it is possible to recognise that a system may occur at a specific 'level' within a series of nested systems as demonstrated by Figure 6.5.1 below.

The English
Learning and Skills
Sector

Individual FE
College

College
Library
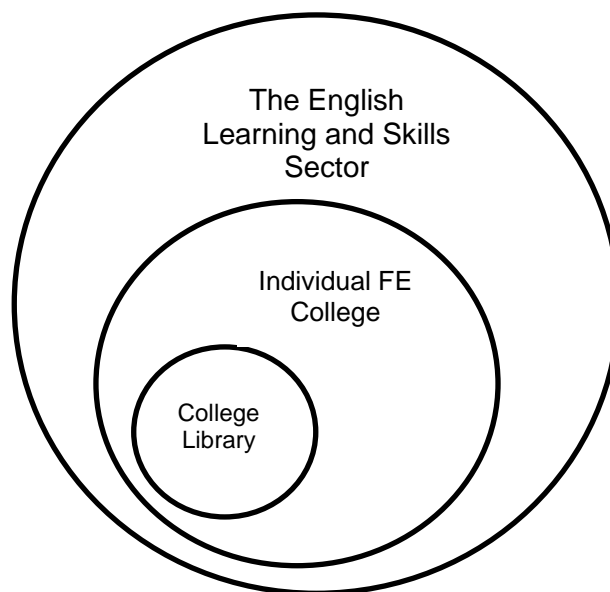
Figure 6.5.1: An example of nested systems

If the concept of nested systems can been seen as giving the dimension of 'depth' to the systems perspective, then the dimension of 'breadth' can also be considered. This requires a worldview which sees everything as connected; no system exists in isolation. However, it is impossible to take account of everything in

the world at the same time, hence, as Meadows points out there is a need to establish a boundary around the system under discussion. *"There are no separate systems. The world is a continuum. Where to draw a boundary around a system depends on the purpose of the discussion – the questions we want to ask."* (Meadows, 2009:97).

In this thesis the research questions are *"the questions we want to ask"* and it is the research questions that determine the framework of relationships for analysing the data. The research questions are used to establish the depth and breadth of the relationships to be analysed by identifying the relevant levels and the boundaries.

6.5.1 A systems framework of relationships

Treating this framework of relationships as a system means that the framework has two main components; the relationships themselves and the elements in the system which the relationships connect. The elements, as the more visible parts of the framework, were identified first.

Although the research is concerned with the influence of the new campus building on change for sustainability across the whole institution, there is a particular focus on how leaders in the institution can utilise the sustainable design as a catalyst for change for sustainability. The relationship between the designers of the building and leaders in the institution responsible for developing the building and/or promoting sustainability was identified as a central relationship within the research questions.

This emphasis on the sustainable design of a building as a catalyst for institutional change for sustainability leads to the 'building' and the 'whole institution' to be identified as two of the elements for the framework. The importance of the relationship between the architects of the building and the leaders within the institution means that these two sets of individuals are also identified as elements within the framework, creating a framework with a total of four elements: the building, the architects, the whole institution, and the leaders concerned with developing the new building.
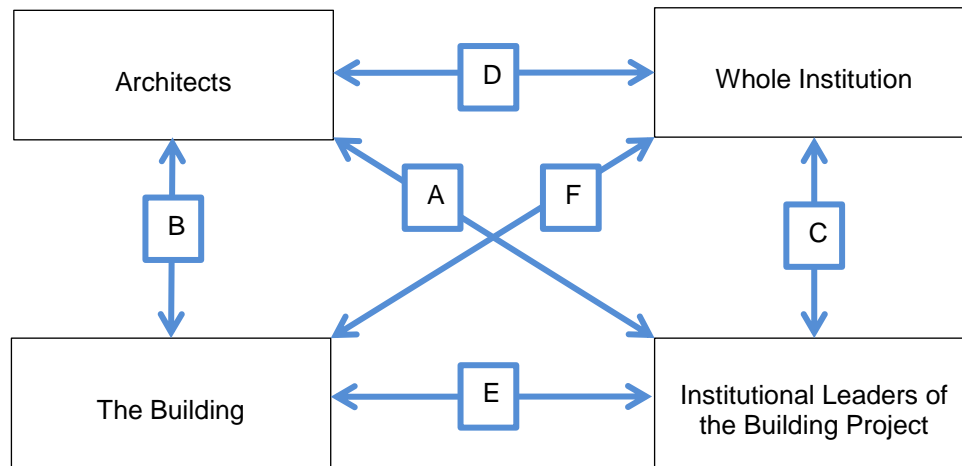
Figure 6.5.2: The framework of relationships

Having identified these elements it is then possible to identify the relationships between the elements as illustrated in Figure 6.5.2. The aspect of the relationships which the research is concerned with is its potential for the relationship to influence institutional change for sustainability. Combining this aspect of the relationships with the elements establishes the boundaries for the system represented by the framework.

Once these system-based parameters are established for the framework it can be summarised in a diagram as presented in Figure 6.5.2 with each relationship identified by a letter. The individual elements and relationships identified within the framework are discussed in the following section.

It is important to keep an awareness of the fact that each of these four elements, i.e. the building, the architects, the whole institution, and the leaders concerned with developing the new building, are connected to other elements and systems, which are external to the framework, but which can have an influence on change for sustainability, for example, government policy on sustainability or experience gained from a previous building completed by the designers. However, in terms of the influence of the sustainable design of the current building on the institution, all external influences will be connected through one or other of these four elements as demonstrated by Figure 6.5.3.
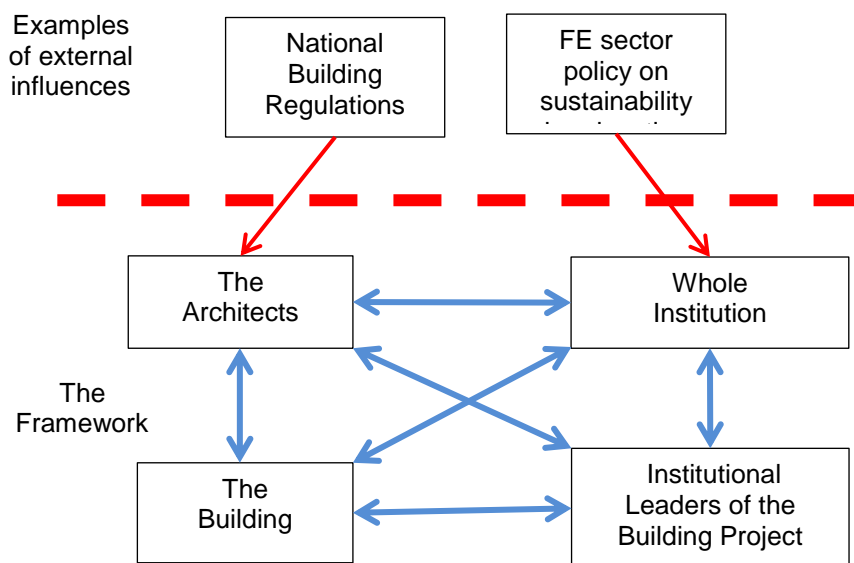
Figure 6.5.3: External influences

6.5.2 The elements

The Architects design the building, albeit in response to a brief from the client. The architects are responsible for incorporating any elements of sustainable design, either on their own initiatives or under instruction from the client. The influence that the architects can bring to the relationships, in terms of sustainability, will partly depend on their prior knowledge and experience of sustainability and of working with education institutions. Architects commissioned to design public buildings generally operate in practices. This means that there is a team of people to input into any one design. However, one architect in the practice usually takes the lead on a particular project and it is this person who will form the strongest relationships with the institution.

The Institution[21] as described by Dovers (2001) is a 'durable pattern of rules and behaviour', which people in the institution subscribe to and work within. An institution usually has a physical presence, which is the campus in the case of FE colleges. Doppelt (2010) and Senge (1990) both adopt a systems perspective in defining and understanding institutions and both focus on the social relationships. Senge (1990) developed the concept of a learning organisation, which he refers to as a group of individuals who are continually enhancing their capabilities. In the case of

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[21] See Chapter 4 on institutional change for a full discussion on what constitutes an institution.

the two FE colleges in this research the institution is represented by: the teaching and non-teaching staff and the students, full time and part time; the systems and rules, which govern the practices and behaviours of the staff and students; and the physical campus of the college. The institution is itself a system made up of numerous sub-systems. This analysis is concerned with changes towards sustainability identified in the institution as a result of the development of the building.

The Building is the particular campus building at each college that has been recently constructed and externally recognised as being sustainable in terms of its design and construction. The building, while being part of the institution, can also be thought of as a system in its own right. Orr (2007) urged architects, when designing a building, to think in terms of designing a system to fit within a system, that is, to design a building to fit within its physical and social setting. In terms of this analysis it is the ability of the sustainable design elements of the building to exert their influence through the relationships in the framework that is of interest.

Institutional Leaders of the Building Project are the members of the institution who are managing the building project on behalf of the institution. When a new building is commissioned on a college campus the institution as a whole might be considered to be the client. However, there will be key members of staff who take responsibility for the project, these will usually include a member of the senior management team. Where sustainability is a major concern in terms of the development, as in the examples selected, it may also include a sustainability officer or 'sustainability champion'.

6.5.3 The relationships

There are many facets to the relationships between the elements of the framework depicted in Figure 6.5.2. However, the main focus for this analysis of the biographies is the way in which the relationships have the potential to influence institutional change for sustainability. The relationships are discussed individually below, but as will become apparent from the discussion it is important to retain a view of the whole system as the relationships exert influence by working in conjunction with each other. The letters relate to the relationships in Figure 6.5.2.

Relationship A: This relationship is a main route for the architect to receive information about the institution and the requirements that the building needs to fulfil. It is the relationship through which an architect would expect to receive the

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brief for the design. Therefore, depending on the sustainability content of the brief, it has a large potential for indirectly influencing sustainability in the institution through the relationships the architect has with the building and the institution (relationships B and D). The architects may engage directly with the whole institution, but in practice the majority of information passes through the staff who are leading on the project. These leaders are the clients and the decision-makers as far as the architect is concerned and therefore they have a major influence on the final outcome of the building, although they are subject to a number of external influences including budget restrictions.

The architects bring a technical expertise to this relationship and depending on their prior experience they may bring a higher level of sustainability awareness than currently exists in the institution. This has the potential to be a significant learning relationship and a key aspect of this relationship is the approach to the design process adopted by the architect, which will determine the level of involvement of the leaders and the wider institution.

Relationship A has the potential to be a strong two-way relationship. It is also a relationship which the outcomes from this research seek to influence in future building projects. Maximising the potential of this relationship to influence institutional change for sustainability is dependent on the leaders of the development appreciating what the architects can offer in terms of sustainable design, and the architects understanding how the leaders in the institution can use the resultant design to influence change for sustainability across the institution.

Relationship B: In the context of this research, which is primarily concerned with the influence of the building on the institution, this relationship has a bias in one direction, with the architects having a major influence on the physical manifestation of the building including the elements of sustainable design. Because the building is part of the institution this relationship can be said to influence change in the institution directly. However, apart from the physical manifestation of sustainability in the building, relationship B has an indirect influence in terms of institutional change for sustainability across the whole institution via relationships E and F.

The influence of the building on the architects in terms of any lessons learned about the impact of sustainable design are more likely to influence future projects that the designers might be involved with than the current institution.

Relationship C: Established institutional management practices and the institutional ethos will influence the extent to which this is a balanced two way relationship. For example, if there is a representative sustainability committee, with an opportunity to report to the senior management team, or a culture of consultation in the institution, then the wider institution may have a significant influence on the leaders. This relationship gives staff and students the opportunity to lobby the leaders on the sustainability of the building and it provides an alternative route to influence the designers via the leaders and relationship A.

In terms of influencing institutional change for sustainability this is an important relationship. This relationship provides the leaders in the institution with opportunities to: communicate through a range of media; model good practice; deliver staff development; and influence teaching and learning.

Relationship D: This relationship provides the opportunity for architects and the broader institution to engage directly. The extent to which this relationship can develop relies on the institution creating the opportunity for staff and students to have access to the architect and feed in ideas, as well as the architect being willing to engage with the wider audience in the institution. There are examples of architects running workshops with students around the design of a new education building for their institution, including during the Building Schools for the Future programme which ran between 2000 and 2010 (Horton et al, 2009). In the FE sector students worked closely with an architect to design the Genesis Project at the Somerset College of Arts and Technology (Baines et al, 2005; Simmons, 2009). However, an institution may want to keep 'control' of the information flow to the architect and channel this information through relationship A.

The architect can use relationship D to inform the wider institution about the sustainable design elements of the building through presentations, college bulletins or other media. Some elements of sustainable design, such as passive ventilation, may need a training input from the designers if they are to be understood and appreciated by the users of the building. This is in keeping with the educational role of architects referred to by the Union of International Architects in Box 3.2.1 in Chapter 3 and incorporated into the framework for sustainable design in education buildings in section 3.4.

Depending on the sustainability credentials of the architect the influence of a voice from outside the institution can be a positive force for change, especially if

there is interaction through questioning and feedback building a balanced relationship.

Relationship E: In terms of change for sustainability the building can be an inspiration and resource to leaders in the institution who are concerned with sustainability and who are driving change for sustainability across the institution. This relationship can have an emotional dimension as well as a technical and practical dimension. With support from the architect provided through relationship A, leaders can utilise the tangible manifestation of sustainability in the building to influence the wider institution through relationship C.

The leaders' direct influence on the building in terms of developing it as a resource for institutional change for sustainability will be less than their indirect influence via relationships A and B. However, they do have an influence over how the building is eventually used and the way staff and students can be exposed to the sustainable design, which will have an impact on relationship F.

Relationship F: David Orr's view (Orr, 2002) referenced in Chapter 3 of this thesis, is that buildings have a pedagogy, in other words, people who see and use the building learn from it. In that sense the building has the potential to influence everyone on the campus to some degree. The building's influence in relationship F will be particularly strong for those members of the institution who occupy the building on a regular basis.

Relationship F will be biased in terms of influence from the building to the institution, although the attitude of members of the institution towards the building could be significant in bringing about change. Staff and students who engage with the building may have a phenomenological response to the aesthetic and ambience of the building, impacting on the affective domain. The attitude of the wider institution towards the building may be shaped in part by their level of involvement in the design and development phases. This involvement will be dependent on influence through relationships D and B; and through relationships C, A and B.

The description of each relationship in the framework has identified the nature and the potential of the relationship to influence change for sustainability in the institution. The relationships do not operate in isolation and where potential influence is dependent on the connections between the relationships this has been

highlighted. The detail presented here will be used to analyse the actual relationships in two examples presented through the biographies of the buildings.

6.6 Reflections on Methods and Ethical Considerations

6.6.1 Reflections on methods

The focus on two examples by means of compiling and analysing two narrative accounts of the biographies of the buildings in depth, does have some similarities to a case study approach as referenced in the previous Chapter. Therefore, the approach employed in this thesis can be considered to have some of the limitations associated with case studies. While a detailed understanding can be gained for specific cases there are always questions relating to the degree to which conclusions can be drawn that are transferable or can be considered as generalisations. However, this thesis has sought to mitigate this limitation by adopting a systems perspective in conjunction with the biographical research approach thus enabling an analysis of the examples with reference to their broader context. The overall purpose of the study was to inform a replicable process for developing new campus buildings that would maximise change for sustainability within any particular FE college.

There is a bias in the source of the primary data in the sense that the majority of the data is from the perspective of those in the two institutions with management and leadership roles, who were most involved in the development of the building. To some extent this is inevitable as this is where the vast majority of the data required resides and it reflects the challenges framed in the research questions. The majority of courses in FE institutions are for one or two years, which meant any students directly involved in the development of the building had left the institution before the research took place and were not available for interview.

As Schratz and Walker (1995) state strongly, the influence of the researcher cannot be escaped and therefore it must be accounted for. In developing the biographies for analysis the influence of the researcher is central to selecting the data that is subjected to analysis. This quotation from Griffiths (1998) summarises the main response for addressing researcher bias, *"...that bias comes not from having ethical and political positions – this is inevitable – but from not acknowledging them. Not only does such acknowledgement help to unmask any bias that is implicit in*

those views, but it also helps to provide a way of responding critically and sensitively to the research." (Griffiths, 1998:133).

The position of this researcher in relation to sustainable design and institutional change for sustainability is reflected in the frameworks derived from the literature at the end of Chapters 3 and 4 respectively. These frameworks have provided the filter through which the data has passed in order to develop the biographies of the buildings.

6.6.2 Practical ethical concerns

This research was conducted with reference to the British Educational Research Association (BERA) *Revised Ethical Guidelines for Educational Research (2004)* and later the BERA (2011) *Ethical Guidelines for Educational Research*. Lipson (1994) and Creswell (2007) both identify four categories of ethical issues. These are: informed consent procedures; deception or covert activities; confidentiality; and benefits over risks of the research to participants. The two categories that were pertinent to this research relate to informed consent and confidentiality.

The BERA guidelines give clear criteria for 'voluntary informed consent' of participants, which was applicable for the data collection methods in this research. The participants in this research were fully appraised of the research through being sent a briefing paper, they were given a further verbal briefing before being interviewed and they were asked to sign an agreement statement which set out the data collection procedures, details of how the data would be used and the option to withdraw from the research at any point.

With regard to confidentiality it was made clear that the recordings of the interviews would only be used by the researcher for transcription purposes, they would not be heard by other parties and the recordings would be deleted at the end of the research. The transcribed responses would be made available to the respondents for approval, they would be kept securely by the researcher and only used in the PhD thesis and not published in any other format without first seeking the respondents permission. There were no 'off the record' comments from respondents and comments on the financial details and the challenges faced by the architects were not deemed commercially sensitive.

6.7 Summary

This Chapter has presented the actual methods employed in data collection that fed into the development of the biographies of the buildings, as well as the rationale behind these methods. This rationale and the methods that emerged from it link closely to the research approach presented in Chapter 5. Interviews and documents are standard data sources within the biographical research approach. Developing the biographies is only one stage in this research process; to address the research questions the biographies have to be analysed. The framework of relationships presented in this chapter has been developed using a systems perspective. This framework will be applied to the biographies along with the frameworks for sustainable design and institutional change for sustainability developed in Chapters 3 and 4. The biographies are presented in the next chapter and the outcomes from the analysis are presented in Chapter 8.

The question of the influence of the researcher on the research is present throughout this Chapter in relation to both the data collection and the analytical framework. This issue was addressed directly in section 6.6 along with ethical issues.

Chapter 7

THE BIOGRAPHIES OF TWO FE COLLEGE BUILDINGS

> *"The architectural creative process unfolds in three different places: in the studio, on the building site and during meetings with clients."* (Rybczynski, 2011:117, *The Biography of a Building*)

7.1 Introduction and Preamble to the Biographies

This chapter contains the biographies of the two buildings selected as examples for the purposes of this research. The selection criteria for these two examples are set out in Chapter 6, Section 6.2.

The two biographies are structured according to the key components of a biography outlined in Chapter 5 and repeated in Figure 7.1.1. The four key components are timeframe, theme, relationships and turning points. The timeframe of the biographies spans the period from the need arising for a new building through to the first years of its use by the college. Both of the biographies are presented as a narrative that is broadly chronological through this timeframe, with the other three key components reflected at each stage of the narrative.

The main theme in the biographies is the influence that the building has on change for sustainability in the institution. The sustainability journey of each College is reflected in the narrative of the building's development, starting with an assessment of the college's engagement with the sustainability agenda at the time the need for the building was identified and following through to the potential future developments in terms of sustainability as identified by the stakeholders.

The biographies are informed by the stakeholders involved with the development of the buildings. The data for the biographies has been gathered from these stakeholders through interviews with some stakeholders and from the records produced by other stakeholders in the form of reports and other documents. The final element in the construction of the biographies is the identification of the key turning points which determined the eventual outcome of each building and the extent to which these turning points influenced institutional change for sustainability.

The time period for the biography of the building covers the early part of the "life" of the building. It starts from the need for the building being identified, through its design, construction and the early years of the building's use.	Change for sustainability linked to the influence of the building is the main theme in the biography. The biography will hold a sustainability perspective in relation to the physical, institutional, educational, economic, social and cultural contexts of the building.	The biography will be informed by the people associated with the building during the time covered by the narrative. The relationships between these stakeholders and the building and their relationships with each other form an inter-connected web, which reflects a systemic approach to developing the biography.	The biography will focus on activities and events in the narrative story of the building that can be linked to changes for sustainability in the institution, in terms of both perception and practice.
TIMEFRAME	THEMES	RELATIONSHIPS	TURNING POINTS

The Biography of the Building

Figure 7.1.1: Key components in constructing the biography of the buildings

7.1.1 Cross-referencing within the biographies

The data from the interviews with key stakeholders at the colleges was transcribed in the form of responses to the questions as described in Chapter 6, section 6.4.1. These responses are presented in the data tables in Appendices A and B. The responses were coded to the questions and where a point is made in the biography that has relevance for the research questions a code appears referencing it back to a specific interview response. For example, the code (PC1) refers to response number 1 in the record of the interviews conducted at Pembrokeshire College; (CRC3) refers to response number 3 in the record of the interviews conducted at Cambridge Regional College. In the tables the responses are also attributed to individual interviewees. The responses provided information on the relationships that the stakeholders have with each other and with the building and they help to reveal the influences on change for sustainability in the wider institutions.

7.2 Example 1: The Biography of the Construction and Technology Centre, Pembrokeshire College

The Construction and Technology Centre building is located on the main campus of Pembrokeshire College in the town of Haverfordwest. This building was planned as part of the Estates Strategy of Pembrokeshire College and this biography is a narrative account of the Construction and Technology Centre from the time the need for a new building was identified in 2003 through to 2011 when the building had been in use for two years.

Pembrokeshire College is a general FE college that offers a wide range of vocational courses, A Level courses, adult and community education, and work-based learning. There are around 2,000 full time students and 6,500 part time students, of which approximately 500 students follow higher education courses. The majority of learners study programmes at levels 2 and 3 (Estyn, 2011). The catchment area for the college is the rural county of Pembrokeshire with some students travelling from neighbouring counties, and there are approximately 100 international students studying at the College at any one time. The College operates within the policies and funding regime set by the Welsh Government (formerly the WAG).

The Genesis of the Building

According to the Chair of the cross-college Sustainable Development and Environment Group (SDEG), by the time the Construction and Technology Centre was being designed in 2006/7, *"The College was already on a sustainability journey…"* and *"… was well ahead at the time in terms of addressing sustainability"* (PC4). The evidence to support this statement includes a reference in an EAUC case study recording the fact that in 2003 the College conducted an energy audit and set out to reduce energy consumption and improve sustainability across the College over the following five years (EAUC, November 2009a). Following this audit the Director of Estates was charged with reducing carbon emissions across the College. As part of a whole institution strategy the SDEG was formed with representatives from students and staff including the Principal, emphasising the importance given to sustainability by the leadership in the College. In addition, prior to the building of the Construction and Technology Centre another building, the Innovation Centre, had been built, incorporating elements of sustainable design (PC2).

In 2006 Estyn (the body responsible for inspecting FE in Wales) noted that *"The College has a comprehensive and professionally developed Estates Strategy."* (Estyn, 2006b). This Strategy included the need for a new building to house construction related courses because according to the Director of Estates *"... the existing accommodation was not fit for purpose."* (PC1). The construction courses were taught in old buildings that were inefficient in terms of energy use, which did not provide a good environment in which to teach the construction professionals of the future. The context for FE, set by the WAG, changed between the construction of the College's Innovation Centre and the development of the Construction and Energy Centre. By 2006, as part of the conditions for receiving capital funding for new college buildings, the WAG required all buildings to achieve the BREEAM Excellent rating (an explanation of this rating can be found in Chapter 4 on sustainable design). Also in 2006 the WAG published *Education for Sustainable Development and Global Citizenship: A Strategy for Action* (DELLS, 2006), with actions identified for each sector of education in Wales. This strengthening of sustainability policy at sector level had an impact according to the Director of Estates at the College. He recalled that there was already a commitment at the College to build a sustainable building and the BREEAM Excellent policy at WAG level not only supported that commitment but also required that *"the level of commitment had to be stepped up…"* (PC2). In order to receive funding for the building it had to meet the demands of achieving BREEAM Excellent, which placed a responsibility on the College to make the right choices at the design stage. The BREEAM Excellent policy also placed a responsibility on the WAG to make sure their funding regime made it possible for the College to obtain the BREEAM Excellent standard for the building.

The fact that the new building would be BREEAM Excellent had an impact on the SDEG, according to its chair. The SDEG had representation from senior management, teaching staff, non-teaching staff and students. The chair felt that the Group responded to the fact that environmental sustainability was being taken much more seriously and given a higher priority (PC4). This, along with the WAG's *Education for Sustainable Development and Global Citizenship: A Strategy for Action* (DELLS, 2006), combined to give additional impetus to the Group. With the Principal of the College and the Director of Estates in the Group, the representatives of the staff and students in the Group had a direct link to those leading the

development of the new building. It was in this policy and funding context that the project to build the Construction and Technology Centre was initiated.

The Design Process

The Director of Estates led this capital development project, with the support of a steering group, from the concept stage through to the completion of the building. He was responsible for preparing the design brief, which he described in a Building Research Establishment document as follows: *"The brief for the project was to create a flexible and environmentally sustainable building, which would set a benchmark for future projects."* (BRE, 2008). Setting a benchmark with this building indicated that the Director of Estates saw it as having an on-going influence on the campus. The brief for the design formed the basis for a tender to select an architect for the project. The Cardiff office of Austin-Smith: Lord Architects[22] was selected to design the building following presentations from six shortlisted practices. The selection was made without reference to the cost of each design *"It was more important to get the quality than the fee."* (PC7). The fees for the selected design were checked only after the selection decision was made. None of the fees for the other designs were opened; the decision was made exclusively on the quality of the design (PC7). When the contract was signed between the College and the Architect, it was the first contract in Wales to have the BREEAM Excellent requirement built into it (PC2).

The Director of Estates is very clear about the fact that he led the project in a way that enabled him to keep close control of developments and, in particular, control of the communication with the architects. The Director of Estates was '**the**' point of contact with the architects, *"You have to be very careful who communicates with who. All the communication from the department and stakeholders went through me.*" (PC8). It was the Director of Estates who consulted with the staff that would use the building on the internal design of the building, and then fed this information to the architects. The architects did not interact directly with the staff. The Director of Estates was a member of the SDEG, which represented a wider group of stakeholders from across the College. According to the chair of the SDEG, the group was becoming more active and they were interested in contributing to the design

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[22] Website for Austin-Smith: Lord - www.austinsmithlord.com/ accessed October 2014.

process (PC6). The SDEG had representatives from the student body, academic and non-academic staff; it was the main mechanism through which a wider representation of views on the design of the building could be presented to the Director of Estates as the conduit to the architects. The SDEG is credited with influencing some general aspects of the design such as the incorporation of bicycle storage on the outside of the building and showers for cyclists on the inside (PC6). This development in the design is also linked to an interest free loan scheme to purchase a bicycle offered by the College.

While the staff and other stakeholders had limited direct access to the architects, the architects did have the opportunity to inform the stakeholders in the College of the emerging design through presentations and through information displays around the College. Prominent displays of the proposed building and of the sustainable aspects of the building were available in the corridors and public areas of the College for student, staff and visitors to see (PC17). Figures 7.2.1 and 7.2.2 are examples of these displays.

Figures 7.2.1: Display board provided by the architects

The Construction and Technology Centre was the first BREEAM Excellent commission for architects Austin-Smith: Lord and the lead architect on the project, Dennis Hellier, admitted to the Director of Estates that achieving the assessment criteria was a steep learning curve for the practice. The Director of Estates also described meeting the Excellent criteria as *"a steep, steep learning curve for everyone"* (PC9) and credited the success to a collaborative effort between the

College and the designers, which involved *"a lot of re-drafting to make sure that the BREEAM was met"* (PC9). This learning relationship was transformational for both the Director of Estates and the architect in terms of bringing a step change to their perspective and their understanding of sustainable building design.

The design process continued through 2007 with the bulk of the construction work being completed in 2008.
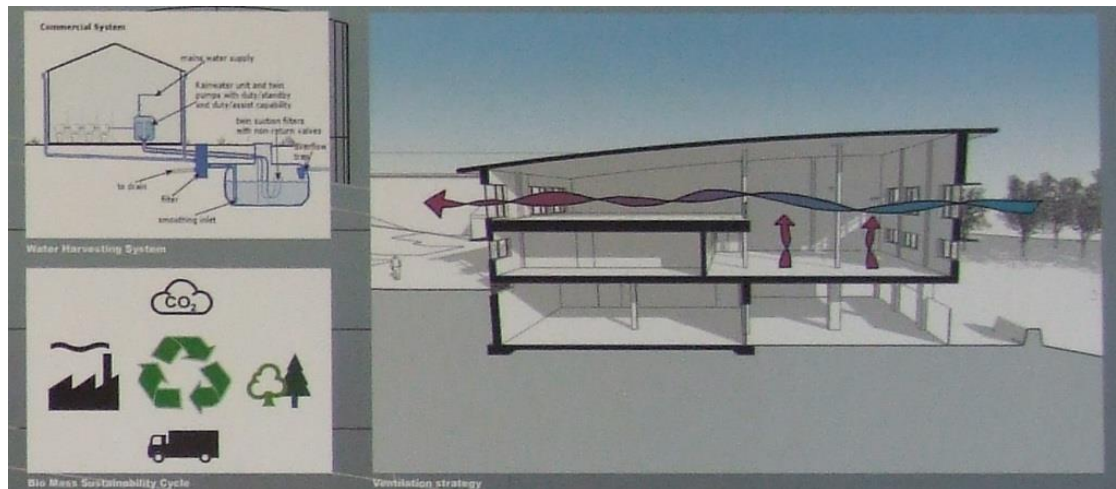
Figure 7.2.2: Detail from display of rainwater harvesting, natural ventilation and
biomass cycle

Making the Design a Reality

The building has a total floor space of almost 2,000 square metres; it provides teaching workshops for construction courses with a particular emphasis on sustainable construction and renewable technologies, offices, classrooms and resource rooms. The cost of the building was £3.5 million, with 70% of this coming from the Welsh Assembly Government and 30% from the Low Carbon Building Programme administered by the Department of Business Enterprise and Regulatory Reform (BERR). As previously mentioned, the WAG's funding was linked to a requirement for the building to meet the BREEAM Excellent standard. This required engaging a BREEAM assessor to monitor and assess the progress of the building in terms of the Excellent criteria.

The Director of Estates described how linking the funding to the environmental sustainability of the building placed the decision-makers in an interesting position when it came to reviewing the budget during the course of construction. *"There were times when we needed to look for savings and it is at that*

stage in a building project that some of the sustainability aspects of the building are often sacrificed. But in this case the funding depended on meeting the BREEAM Excellent criteria and therefore the sustainability aspects of the design had to be protected. The conditions attached to the funding definitely kept the sustainable development on board. It was a challenge to justify the cost to the WAG, because they were saying publicly that making the building sustainable would not cost any more, but we were proving otherwise." (PC12), *"… the cost of going to BREEAM Excellent put £180,000 to £200,000 on the project."* (PC14)

To achieve BREEAM Excellent the Construction and Technology Centre had to score a minimum of 70% overall across the groups of criteria. Figure 7.2.3 is a summary of the buildings assessment which resulted in an overall BREEAM score of 72.54%.
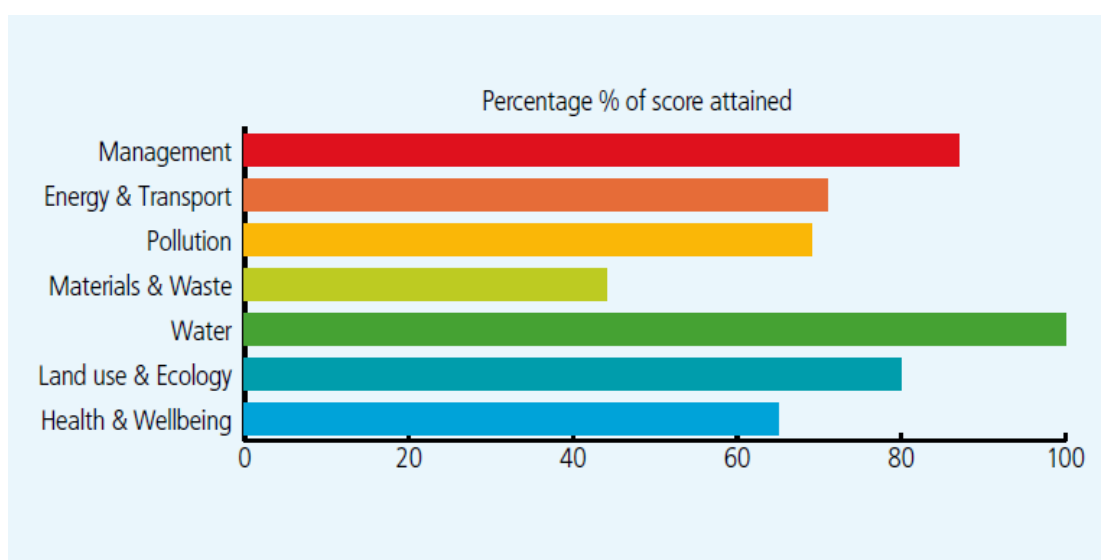
Figure 7.2.3: BREEAM scores for the Construction and Technology Centre

Selection of materials for the walls, roof and floors of the building were governed by the Building Research Establishment's Green Guide and only A-Rated materials were used[23]. A 300KW biomass boiler was installed that would also supply heat to neighbouring buildings with potash from the boiler being used as a fertilizer on the College gardens. Solar thermal panels assist with providing hot water to the building. A rainwater harvesting system supplies water for non-potable uses and

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[23] The BRE Green Guide is a series of webpages and downloadable documents covering a wide range of building materials. It is regularly updated and it is available at: www.bre.co.uk/greenguide/podpage.jsp?id=2126 accessed 8 October 2014.

there is a sophisticated lighting control system. FSC certified timber is used throughout the building and there are high levels of insulation to reduce heat loss. The ventilation system is based on natural airflow and the whole building is subject to a building management system that allows for thermal zoning to accommodate the different uses of the separate areas in the building at different times of the day. The planting in the landscape around the building was restricted to native species which would not require irrigation other than natural precipitation. The biomass boiler, the thermal solar panels and the high levels of insulation all contributed to the College achieving its lower carbon emission targets that were set following the energy audit in 2003. This achievement was recognised by the winning of a Green Gown Award[24] for Carbon Reduction in 2010.

Figure 7.2.4: Cycle storage outside the Construction and Technology Centre

The construction work on the building was completed by Dawnus Construction Limited of Swansea. The company has a section on its website devoted to sustainable development, which includes the following statement *"The company will strive for continuous improvement in our methods of promoting sustainable development"*[25]. This statement is supported by a series of bullet points relating to practical actions including waste minimisation, reducing carbon emissions, employing a workforce from communities local to a project, and sustainable

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[24] The Green Gown Awards are administered by the EAUC and are open to FE and HE institutions. Further information at: www.eauc.org.uk/2014_green_gown_awards accessed 12 October 2014.
[25] Dawnus Construction Website www.dawnus.co.uk/ accessed 10 July 2014.

procurement. During the construction process there were presentations given by the architects and construction managers for some of the construction students in the College. These were one off events rather than the process being seen as a 'live learning resource' that could be incorporated into courses for the duration of the build. Other members of staff from across the College were given the opportunity to have a guided tour of the construction site, this was designed to raise awareness of the new building and its sustainable credentials across the College. The chair of the SDEG acknowledges that *"there was potential for taking more members of staff around during the construction period."* (PC11).

The main construction was completed by December 2008 and the internal fitting out completed in early 2009. The building was officially opened in July 2009 by the WAG's Minister for Sustainability.

A presence on the campus

The new building transformed the teaching and learning environment for the College's construction courses and the sustainable design features of the building brought a sustainability focus to the construction courses as reported by Eifion Rees (2009) in The Ecologist magazine. "*The building was designed specifically to accommodate carpentry and brickwork students, and the green innovations they see all around them are part of the message that is gradually seeping into the industry: that sustainability in the way we build, teach and live is the way forward. The lessons they learn here will inform a new generation of more environment-conscious architects, carpenters and construction workers.*" (Rees, 2009).

Live readouts of rainwater harvesting and carbon emissions have enabled the Construction and Technology Centre to be used as a resource for students across the college in two ways. All full time students completing an induction programme visit the Centre to investigate questions about its sustainability, and students following the Welsh Baccalaureate, which includes sustainable development as a topic, also use the Centre as a learning resource. The building has also proved a resource for staff training on carbon reduction and sustainability, which was all part of the whole institution follow-up to the 2003 energy audit. Teaching and learning about modern construction practices, including sustainable practices, in a modern sustainable environment was a completely different experience for construction staff and students compared to working in an unsustainable environment. Equally, all staff and

students could experience a tangible manifestation of the College's commitment to sustainability, which supports the College's strategy and the activities of the SDEG.

The chair of the SDEG and the Director of Estates agree that, in addition to the physical presence of the building, most of the increased awareness of sustainability associated with the building has resulted from the awards the College has gained since the building has been completed (PC13). The building won the BREEAM Bespoke Award for Wales in 2008 and it won a Green Gown Award for the College in the Sustainable Construction and Refurbishment category in 2009. The chair of the SDEG believes that "t*he external awards have had a big impact in the College as well as raising the external profile of the College."* (PC13)

The SDEG was responsible for many other small sustainability initiatives before and during the development of the Centre, but the new building *"has supported other initiatives in the College and got the momentum up to another level."* (PC23). In 2009 the Principal 'upgraded' the SDEG to become an official committee within the management structure with direct reporting lines to the Senior Management Team. The new Sustainable Development and Environment Committee (SDEC), which retains its broad membership of students and staff, receives reports from across the College, because sustainable development is now a standing agenda item for all team meetings. This change has embedded sustainability within the management structure of the College.

Influencing the future

The Director of Estates believes that *"the building has contributed hugely* (to the sustainability of the College) *because it is not just the building in isolation, the building is part of the campus and the College is on a sustainability journey"* (PC23). In 2012 the College will be developing another new building using the lessons learnt from the Construction and Technology Centre. The College achieved Green Dragon Environmental Management System[26] level 3 in 2008 and level 5 in 2010. There has been continued success in the Green Gown Awards with another win in the Carbon Reduction category in 2010 and a highly commended for Space Efficiency in 2011.

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[26] Further information on Green Dragon EMS at: http://www.greendragonems.com/ accessed 12 October 2014.

As a result of the Construction and Technology Centre raising the profile of the College in terms of sustainability, the local authority planning department is using the building as a benchmark for future planning applications that have sustainable technologies as part of their design. The College has become a resource for other colleges that are commissioning sustainable buildings and the Director of Estates was asked to become the chair of the Welsh FE Estates and Environment Committee. He believes that *"if it had not been for what I had done* (with the building) *I would not have been able to do that"* (PC24). The chair of the newly upgraded SDEC sees the sustainability journey of the College as a process of *"continuous improvement",* which she sees as the *"mind-set for sustainability"* (PC24). She believes the building has been a catalyst for increasing the rate of change, *"we were going down that* (sustainability) *journey, but in a more modest way before this* (the building) *happened"* (PC23). The building has had an impact on the institution, bringing specific changes in perspective to some staff and providing present and future students with a resource that raises the profile of sustainability. It has supported the College in implementing its strategy of making the College more sustainable.

7.3 Example 2: The Biography of the SmartLIFE Centre, Cambridge Regional College

Introduction

The SmartLIFE Centre building at Cambridge Regional College has an unusual genesis for an FE college building. Its conception came about as a result of the College being drawn into a European project initiated by Cambridgeshire County Council. This biography starts by introducing the context of the College immediately prior to its involvement in the European project in 2004 and concludes in 2011, four years after the completion of the building.

The main source of data for this biography is the records of semi-structured interviews with key stakeholders at the College involved with the development of the building, namely the Vice Principal and Director of Finance; the Sustainability Officer, who has a cross-college brief for sustainability, and the Sustainability Manager, who is the Curriculum Leader for sustainability at the College. The responses from these interviews can be found in a data table in Appendix B and the individual responses are attributed to specific interviewees. These interviews were

supplemented by secondary resource material from other stakeholders including the architects Annand and Mustoe[27] and Cambridge County Council along with documents from external agencies including Ofsted (the body responsible for inspecting FE in England) and the news media. The interviews were conducted in July 2011 approximately four years after the construction phase of the building was completed.

Cambridge Regional College is the FE college for Cambridge and the surrounding region. It has around 10,000 students on roll each year with approximately 70% of these being part time students. The College has one main campus on the outskirts of Cambridge with small centres in the surrounding villages and the city centre. The college offers a broad range of courses from entry level through to degree level in fifteen sector subject areas and it has five Centres of Vocational Excellence (CoVEs) in Care, Construction, Manufacturing, Developing Managers and Sports and Fitness Coaching. In the College's May 2008 inspection report, Ofsted awarded the College a Grade 2 (i.e. 'Good') in all categories including leadership and management; quality and effectiveness of provision; achievement and standards; and capacity to improve (Ofsted, 2008).

The narrative starts with an external stimulus

The majority of new campus buildings emerge as a result of strategic planning within the institution and the possibility of access to capital funding. The building that became the SmartLIFE Centre was unusual in that the need for it was first conceived outside the institution as part of a European Interreg[28] funded project.

The 2003 Cambridgeshire and Peterborough Structure Plan identified the need for 47,500 new homes to be built in the Cambridge sub-region by 2016; in meeting this target the Structure Plan suggested that up to 50,000 jobs could be generated (Cambridge CC and Peterborough CC, 2003). Cambridgeshire County Council had concerns over the skills capacity in the region to deliver this target, especially in relation to modern methods of construction including sustainable methods of construction. Their response was to apply to the European Union Interreg Fund for the resources to develop training facilities in the region to boost construction skills (CRC1). Cambridgeshire County Council's European partners in

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[27] Further information on Annand and Mustoe Architects at: www.amarch.co.uk/ accessed April 2012.
[28] Interreg is a European Union fund for the interregional sharing of knowledge and experience.

the project were to be the local authorities in Malmö in Sweden and Hamburg in Germany, with each partner focusing on a different aspect of construction. Cambridge Regional College was accredited as a Centre of Vocational Excellence in construction and had been identified as a potential provider of training for the Cambridgeshire section of the project, but it was not until the funding had been secured that the College was approached to become a partner with the County Council in the project. This happened in 2004 and at this point the Vice Principal of the College, who was also Director of Finance, joined the Joint Board managing the project in Cambridgeshire *"Everything was signed off by a joint board, which I* (the Vice Principal) *was a member of."* (CRC6). This placed a senior manager, with a leadership role in the College, in a position to influence the future direction of the project.

By the time Cambridge Regional College was officially part of the Interreg project, certain features of the project were already fixed, including the fact that a new training centre for modern methods of construction would be built in Cambridgeshire and that the new centre would be a sustainable building in its own right, although no criteria had been set to indicate what was meant by sustainable in this context. One of the first issues concerning the building was its location, the County Council wanted to locate it in the centre of the region, which meant a rural setting to the north of Cambridge. The Vice Principal successfully argued the case for the new building to be located on the main College Campus, referred to as the Science Park Campus on the north side of Cambridge City (CRC12). The Science Park Campus, as the name suggests, has the appearance of a modern technology park and supports the image of the College as a business oriented technical institution. Securing this location was a turning point in terms of the potential influence the development of the building would have on sustainability across the College. Being located on the main campus meant the building would be visible and accessible to the students and staff who occupy the College on a daily basis (CRC20).

Up until 2004, to quote the Vice Principal, *"this College was not doing anything specific on sustainability, some recycling, but it was not a major part in the College's thinking."* (CRC4). In terms of the FE sector context, this was prior to the Learning and Skills Council strategy for sustainable development entitled "*From Here to Sustainability*" (LSC, 2005), so at this point, as far as the Vice Principal was concerned, "*there was no sector driver to do anything* (about sustainability)."

(CRC3). The criteria of the Interreg project, which required the provision of a sustainable building that would be a training centre for modern methods of construction including sustainable construction, became a driver for the Vice Principal to engage with sustainability. As a result he officially assumed overall responsibility for sustainability in the College *"we appointed a director to be in charge of sustainability, which was me* (the Vice Principal). *Fairly standard in change management terms, we needed a senior manager to sponsor and put resource into it."* (CRC5). One of his first actions was to appoint a Sustainability Officer for the College at Associate Principal level. Until the SmartLIFE project got underway there was no leadership for sustainability in the College and now with these two posts in place, the College had established strong leadership in sustainability at senior levels (CRC5), which was a further turning point associated with the development of the building. The Vice Principal and the Associate Principal were the College representatives on the project's Joint Board along with representatives from Cambridge County Council. The Joint Board had control over all the main decisions associated with the building, including the choice of architects and the design of the building.

The experience of taking the lead on this project on behalf of the College and fully engaging with the need to develop a sustainable building transformed the perspective of the Vice Principal in relation to sustainability and was a turning point in bringing about change for sustainability across the institution.

The Design Process

The European Union Interreg funding required the Joint Board to put a series of 'work packages' out to tender for international bidding, and Work Package 1 was the design and construction of the building (CRC6). The brief was to build *"a highly sustainable building, but it was up to the architects to determine what this meant"* (CRC6). At this early point of the College's sustainability journey, the College had relatively little experience in sustainability and they were relying on the architects to bring sustainability expertise to the project. The process to select the architect for the new building involved the Joint Board running a design competition. The Board reviewed all the proposals, and selected Cambridge-based architects Annand and Mustoe.

Chapter 3 of this thesis discusses the nature of sustainable design and it identified the design process employed by architects as having the potential to contribute to the sustainability of the design through the breadth and depth of stakeholder involvement in the process. Annand and Mustoe Architects subscribe to a consultative approach according to their 'design philosophy', which is published on the company website. Their philosophy has three stages with the second stage being "*Importance of Dialogue*", which they describe as follows, "*Creating a continuing dialogue with clients throughout the project and after completion is a vital element in the success of Annand and Mustoe Architect's design*" (www.amarch.co.uk accessed 11 April 2012).

In the design of the SmartLIFE Centre the breadth of the consultation extended only as far as the Construction Department, which would be the main permanent occupier of the building, although the building would also be used by other staff and students from across the college. Within the Construction Department the depth of consultation extended from the Head of the Construction Department to Course Leaders and on occasions all of the Construction Department staff had the opportunity to sit in on design meetings. The Sustainability Officer was a former head of Construction and he encouraged the involvement of construction staff in the design process because he saw it as professional development for the staff, providing them with the opportunity to extend their understanding of current and future sustainable building methods. As a result *"Construction staff attended live design team meetings, which was CPD for them."* (CRC11). In this respect the design process provided an opportunity for staff learning and had the potential to influence their teaching.

Through their original proposal and the initial designs the architects brought a level of expertise in sustainability well above that which existed among staff in the College at the time in 2004. However, according to the Sustainability Officer, the staff involved in the design process engaged in a rapid learning process, which was stimulated by the project and the architect's designs. Both the Vice Principal and the Sustainability Officer believe that the College staff made a significant contribution to developing and enhancing the building's sustainable design in collaboration with the architects *"we had a really good opportunity right through the design process, we were able to put forward ideas, we were able to propose changes, we were able to undertake a number of concepts which influenced the final outcome of the*

building……we were able to influence the design, it was an iterative process.”
(CRC8). A by-product of the design process was the development of a perspective on sustainability by the two senior managers, which was to have an impact on the institution in relation to both sustainability policy and practice.

Although the County Council was the lead partner for the European Interreg project as a whole, the College acted as the main voice of the client as far as the building was concerned and the dominant relationship in the design process was between the architects and the Vice Principal and the Sustainability Officer. The members of the Construction Department were drawn into a relationship with the architects mainly through the Sustainability Officer (CRC6, CRC8).

Making the design a reality

The building is effectively split into three related sections. There is a large space approximately 24 metres by 24 metres and the full height of the building, for the teaching of practical construction skills. The space is capable of accommodating a two storey house. This space is covered by a tented fabric roof made from recyclable UPVC, which allows the students to work in natural light and helps to simulate a real building site environment. The walls extend up to 12 metres high and are constructed from an FSC certified timber frame clad with aluminium sheets; aluminium was preferred to steel on environmental and sustainability grounds. The second section has a conference room, office space and a visitor centre with a viewing area looking into the practical training space. It is constructed using a laminated Glulam timber frame and the majority of the external wall finishes are untreated Western Red Cedar cladding from FSC certified sources. The 150mm thick insulation for these external walls is Warmcel recycled newsprint, the roof insulation is CFC free polyurethane foam. The third section contains a student area and a block of classrooms constructed from pre-fabricated wall, floor and roof panels made from solid laminated timber panels. All doors and windows throughout the building are constructed from FSC certified timber.

Other features in the building which reflect the sustainability input in the design include under-floor heating, rainwater harvesting, lighting sensors, flushing sensors, solar hot water, solar shading and natural ventilation.

Figure 7.3.1: The SmartLIFE Centre with the visitor centre, conference room and teaching rooms in the foreground

Figure 7.3.2: The area for teaching practical construction skills

The main construction of the building was completed in 2006 and the Sustainability officer described the construction phase as a *"live learning platform for the students"* (CRC11). A viewing platform was installed along with webcams so that all aspects of the construction process could be observed and recorded for teaching purposes, *"we tracked the whole progress of the building."* (CRC11). Staff and students attended progress meetings and engaged with the contractors. This experience has influenced an on-going change in the institution, because the College has now made this standard practice for any construction projects on the campus. There was some initial reluctance from the Estates Department to adopt this policy, but the involvement of a senior manager in the form of the Vice Principal overcame

any doubters and now it is fully accepted and it happens automatically. This initiative connects non-teaching staff directly with the institution's core business of learning. The contractors involved in the projects do not have a choice, they have to accept it as part of the contract. As the Vice Principal said *"We want our staff and students to have a sensible involvement with any project we have on site, why wouldn't we?"* (CRC11). The Sustainability Officer agreed that *"the partnership between teaching and non-teaching staff has now gelled and works for the benefit of the learners."* (CRC11).

This policy, which was a direct result of the development process for the new building, brought a cultural change in terms of recognising the contribution that can be made to students' learning by people outside the classroom. It has achieved this by developing relationships between non-teaching and teaching staff and with professionals in companies that form part of the wider community.

The relationship with the architects, which developed in the iterative design process, continued through the construction phase, with the design of the practical skills area being amended by the staff in the Construction Department as it was nearing completion. The original design had tutorial rooms on the edge of the training area, but the teaching staff decided that it was better to incorporate these into the open space and use the corners of the practical area as spaces where they could call the students together to simulate a site meeting (CRC8).

While the whole College was aware of the building during the construction phase, at this stage the influence of the construction process and the influence of the project as a whole were limited to the senior managers and the Construction Department staff and students. The Construction Department staff and students had the benefit of observing and questioning the external professionals on site, something which is not available once the construction phase is complete. This experience influenced future teaching in the Construction Department in relation to content and to the use of the new space. As a result of the SmartLIFE building all Construction students in the College at all levels have sustainable development integrated into their courses, even though in most cases it is not a requirement of the qualification (CRC22). The main influence on the institution of the construction phase of the building was the impact on the thinking of senior managers. The senior management in the College identified the benefits of integrating sustainability as a priority across

all aspects of the College as a result of their experiences of developing the building (CRC23).

A presence on the campus

The building was ready for use at the start of the 2007/08 academic year and it had a positive impact; according to the Sustainability Officer the building generates an emotional response, *"staff and students love being in this building"* (CRC20). During the 2007/08 academic year further physical developments associated with the building took place which emphasised the presence of the building to all staff, students and to visitors to the campus. A wind turbine was erected adjacent to the building as part of the project. The Vice Principal acknowledges that as an energy generator it is not commercially viable, but it is a prominent feature on the campus and it drew the attention of staff and students to the sustainable nature of the new building (CRC20).

This is an example of a renewable technology being used in a symbolic way and as an educational resource. The wind turbine has helped to establish the SmartLIFE Centre as a tangible sustainability presence on the campus (CRC25). A display panel inside the building provides data on the energy produced by the turbine and the carbon dioxide saved compared to burning fossil fuels.

Figure 7.3.3: The wind turbine

Figure 7.3.4: Display for the wind turbine

A second additional development relates to the landscaping around the building. The Science Park Campus is dominated by buildings, paved areas and some limited car parking, there is very little in the way of green space. David Orr (2007) emphasises the need for education buildings to reconnect students with nature, which was difficult to achieve in this context. However, on the east side of the building a Sensory Garden has been established as part of the development for all the College staff and students to enjoy, but it is particularly aimed at those with disabilities or sensory loss.

Figure 7.3.5: Sensory Garden developed on the east side of the SmartLIFE building

Once the SmartLIFE building was operational the impact on the construction curriculum was felt immediately both in terms of content and pedagogy. As well as the practical skills space there is an integrated viewing area for students and visitors to observe activities in the practical area. Webcams are available in the practical area so that live demonstrations can be presented through the Smartboards in the classrooms. Video-conferencing facilities are available, initially these were to link with partners in Malmo and Hamburg, who are working on different aspects of sustainable construction and sustainable communities, but they are also available for general use (CRC16).

With the conference room and the classrooms now available the senior management in the College used the building for staff development sessions. These sessions were not all linked to sustainability, but every session did highlight the sustainable nature of the building in which the training was taking place. With the building as both a teaching resource and a venue for training, the senior management in the College used it to start rolling out sustainability initiatives across the College (CRC17). The College has used the building as a focal point for staff development in sustainability (CRC21).

Figure 7.3.6: Viewing platform looking into the practical area

All external contracts let by the College now have sustainability criteria and all tenderers have to demonstrate how they intend to address these, which has led to significant changes in cleaning practices, catering provision and waste management. This change has happened comparatively rapidly because the Vice Principal involved in the SmartLIFE project is responsible for all procurement in the College and was able to transfer the learning from the procurement of materials for the building. This has resulted in the College receiving an Association of Colleges (AoC) Beacon Award[29] for procurement (CRC24).

2008 saw another turning point resulting from the experience of developing the SmartLIFE Centre when the senior management in the College committed itself to replicating the way sustainability had been integrated into the Construction curriculum across all vocational areas (CRC22, CRC28). A Sustainability Manager with a curriculum brief was appointed to support the curriculum areas in integrating sustainability into existing courses, to develop new courses and to establish 'champions' in all departments. To support this work the Vice Principal backed the introduction of sustainable development into the lesson observation reports. Lesson observations are conducted by senior members of staff as part of the evidence gathering in the College for the inspection process. Introducing sustainable development into the report means that lesson observers must report on whether sustainable development was addressed in the lesson and how it was addressed. The Sustainability Manager has also worked directly with students in establishing a student Sustainability Group in 2010, which is now run entirely by the students through the National Union of Students (NUS) in the College (CRC29). The Group organises and promotes sustainability-related activities and can communicate its views back to the College management through the Sustainability Manager.

Sustainability was entirely missing from the institutional plans in 2004 and by 2010 it had become a primary objective and it was in all the College's strategic documents, *"it has all the plans and resourcing that any other primary objective would have"* (CRC29). The initiatives in sustainability being rolled out across the college were supported by training sessions and events in the sustainable context of

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[29] The AoC Beacon Awards promote interdependence between FE colleges and business, professional and voluntary organisations. Further information at: http://www.aoc.co.uk/beacon accessed 20 January 2015.

the SmartLIFE building, adding to the credibility of the changes being introduced (CRC21, CRC28).

Reaching beyond the campus

"The publicity, and the reputational and political impact to the College has been ten times more than the practical impact, and the practical impact has been a big thing. Our reputation has increased hugely" (Vice Principal, CRC28).

The publicity the building has attracted from high profile visitors and the use of the conference room by professional bodies, local authorities and local companies has raised the profile of the College generally, and particularly in respect to sustainability (CRC18). In 2007, when the College was inspected, Ofsted produced two Best Practice Guides for Sustainable Development based on practices resulting from the development of the building, including one on how the building was being used to change staff attitudes (CRC13, CRC23). In 2008 the Vice Principal was invited to join the AoC Sustainable Futures Group to help share and drive best practice in the FE sector (CRC24). In 2009 the SmartLIFE building also became a case study entitled *Construction and Strategic Sustainability at Cambridge Regional College* on the SORTED website, which is a sustainability resource for the sector run by the EAUC (EAUC, November 2009a).

This external profile resulting from the development of the building has the potential to support change within the institution as it can influence both the staff's perception and the students' perception of the institution. The Sustainability Officer sees a shift in attitudes in the institution among staff and students because of the reputation gained in sustainability, but recognises that *"changing hearts and minds takes longer"* (CRC28) .

Influencing the future

There has been a programme of organisational change in respect to sustainability at the College. The catalytic effect of the SmartLIFE building has worked in conjunction with other initiatives such as the Investment in Excellence staff development programme aimed at changing habits and attitudes (CRC21). By 2011 the Sustainability Officer believed that there had already *"been a cultural change and in many respects they were now embarking on the next cultural change"*, which was to be the introduction of the international standard for environmental

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management systems, ISO14001, across all areas of the College (CRC23). Linked to this latest initiative the College has also become a pilot in a Carbon Trust initiative aimed at reducing carbon emission in FE colleges. As a result Cambridge Regional College now has a five year plan to reduce carbon emissions by 40% (CRC29).

To further embed sustainability in the governance of the College the Vice Principal is looking for a governor sponsor to *"escalate Board involvement"* and take sustainability to the highest accountable level in the institution (CRC29).

The planned developments for the College's campus indicate that the influence of this building will extend into the future practices of the College. The success of the SmartLIFE building project has led to a second project, again in partnership with the County Council. This second building will be called SmartLIFE Low Carbon and will extend the College's provision of sustainable skills into the area of renewable energy and low carbon housing (CRC29).

7.4 Summary

These narrative accounts of the development of two FE education buildings have been constructed according to the biographical research process and in line with the biographical structure discussed in Chapter 5 and summarised again at the beginning of this chapter. The biographies have been written from the perspective of the researcher with the research questions in mind and in that respect the influence of the researcher in selecting and presenting the information is a key element in the interpretation of the data.

The filtering and interpretation of the data by the researcher in producing the biographies can be seen as an initial analysis of the data within the research process. The information now present in the biographies is subjected to analysis using the framework of relationships presented in Chapter 6, with a view to addressing the research questions.

Chapter 8
ANALYSIS OF THE BIOGRAPHIES

"You can understand the relative importance of a system's elements, interconnections and purposes by imagining them changed one by one."
(Meadows, 2009:16, *Thinking in Systems*)

8.1 Introduction

The buildings in the two biographies presented in Chapter 7 were initially analysed for elements of sustainable design using the framework developed at the end of Chapter 3. The institutions of which the buildings were a part were analysed for indicators of change for sustainability using the framework developed in Chapter 4. The summary of these initial analyses is presented in Appendices C and D. Having identified these two aspects of the biographies, this Chapter seeks to investigate the extent to which the sustainable designs of the buildings were responsible for influencing the changes towards sustainability that took place in the institutions. This is achieved using the systems framework of relationships introduced in Chapter 6, section 6.5.

The diagrammatic representation of the systems framework of relationships presented in Chapter 6 is reproduced in Figure 8.1.1 below. This analytical framework is underpinned by a systems perspective as discussed in Chapter 2 section 2.3 of this thesis.
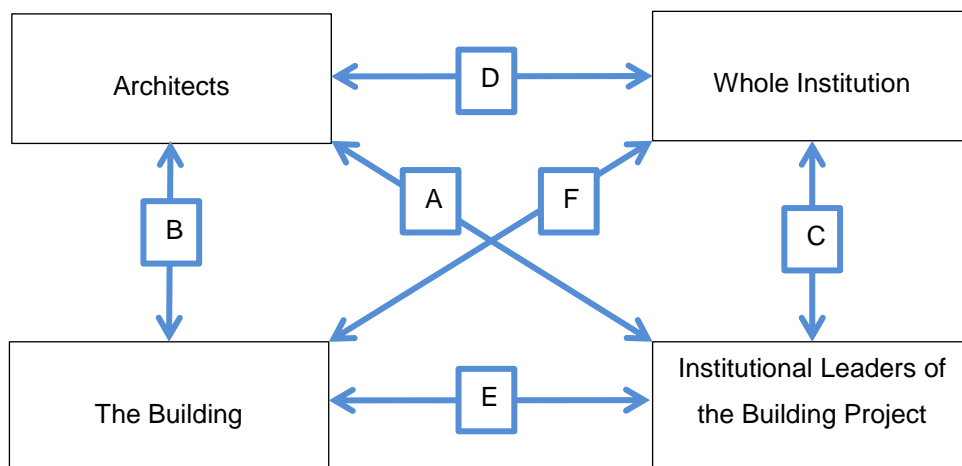
Figure 8.1.1: The framework of relationships (reproduced from Figure 6.5.2)

These two biographies will be analysed simultaneously, allowing them to be compared and contrasted. The analysis will concentrate on the relationships between the elements and the extent to which each relationship can influence change for sustainability in the institution. Within a system all elements and relationships are connected as discussed in Chapter 2. By taking a reductionist approach and examining elements and relationships in isolation key insights may be lost, but as Meadows (2009:6) points out, systems thinking and reductionist thinking should complement each other in order both to manage the information and to provide maximum understanding. Therefore, the approach in this analysis of the biographical narratives will be to review the individual elements in the framework before assessing the contribution to institutional change for sustainability of each relationship in turn, while maintaining a holistic view of the framework through the links each relationship has with other elements and other relationships in the system.

The coding system used in the two biographies to link statements to the evidence recorded on the data tables for each example in Appendices A and B is continued through the analysis in order to link assertions directly to evidence.

8.2 The Analysis of the Elements

In order to explore and understand the relationship between any two elements in the framework it is necessary to first examine the elements themselves. The four elements identified in the framework of relationships are integral features within the two biographies presented in Chapter 7 above. In this section the elements are drawn out from the biographies and comparisons made between the two examples represented by the biographies.

The **whole institution** element refers to the physical campus of each college, the staff and students who occupy the campus on a full time or part time basis, and the systems and activities of the college. A full account of what constitutes an institution can be found in Chapter 4 of this thesis. The analysis is seeking to identify how the various relationships influence change for sustainability within these institutions, therefore understanding the position of each institution in relation to sustainability needs to be taken into account when analysing and assessing the influence of introducing sustainably designed buildings into the context of each college.

At the time the building projects were starting in each example the two colleges were at very different stages of their 'sustainability journeys'. Pembrokeshire College had been working on implementing sustainable development for several years prior to the development of the Construction and Technology Centre (example 1). The College had environmental policies in place and the Sustainable Development and Environment Group (SDEG) brought together staff and students on a voluntary basis to discuss issues and plan activities relating to sustainable development and the environment. The chair of the SDEG described the College as being *"well ahead at the time in terms of addressing sustainability"* (PC4). This was in part due to the geographical and political context in which the College existed with the WAG promoting ESDGC through the publication of *Education for Sustainable Development and Global Citizenship: A Strategy for Action* (DELLS, 2006) in 2006. This gave legitimacy to those with an interest in ESDGC to champion a whole-institutional approach to implementing sustainability.

When the proposal was put forward to build the SmartLIFE Centre (example 2) at Cambridge Regional College, sustainability was not part of the strategic or operational thinking of the College, nor was there any groundswell of interest in sustainability from the staff or students. According to the Vice Principal *"it was not a major part of College thinking"* (CRC4). This was despite of the publication of *From Here to Sustainability* (LSC, 2005) by the LSC and may reflect a difference in the political support for ESD initiatives between England and Wales at the time, and the difference in the relationship between political leadership and policy implementation between national government and devolved government.

Because the Colleges were at such different points on their sustainability journeys at the start of the building projects indicators of institutional change for sustainability have different significances in the two examples. The introduction of sustainability policies and practices in the area of procurement in example 2 represents a major change (CRC23). In example 1 many sustainability policies and practices were in place before the new building was developed. In example 1 a strengthening and deeper embedding of sustainability, such as the upgrading of the SDEG to a formal College committee (the SDEC), is a significant indication of change (PC23).

The **buildings**, which are at the centre of the narrative in both biographies, are part of their respective institutions. However, their central importance to this

research requires the buildings to be identified as separate elements within this analytical framework. From the systems perspective each building can be seen as a system which is located within the larger system of the college. This is in line with the view put forward by Orr (2007) and discussed in Chapter 3 of this thesis, that buildings should be designed as systems to be nested within the larger systems of their campus, their community and their landscape. Each building in the two biographies has multiple connections with the wider institution through specific teaching departments (PC6, CRC8) and whole college functions such as professional development (PC20, CRC17). The procurement policy that emerged in example 2 as a result of the building project supported a development of the relationship between the campus and the community, demonstrating the wider influence of the building in bringing about change. The key sustainability features of the buildings are recorded in the biographies and in Appendix C.

In both biographies the **architects** were chosen by a process of competitive tendering and in both cases the contracts went to established practices. The SmartLIFE Centre at Cambridge Regional College was designed by a local firm, Annand and Mustoe Architects, with experience of working in the education sector and with experience of aspects of sustainable design. Pembrokeshire College employed Austin-Smith: Lord, a national company with offices in Cardiff, Glasgow and Liverpool, to design the Construction and Technology Centre, with the project being managed out of their Cardiff office. Although this meant that there was a team of designers contributing to both buildings, in reality one architect led each project. In each case it was the lead architect who formed the relationships with the other elements represented in the framework. There were contrasts in the selection processes for the architects between the two examples, which raised an issue about the extent to which the selection process can have an impact on relationship A. This is taken into account when discussing relationship A in section 8.3.

The **institutional leaders of the building projects** held similar levels of status within their respective colleges in both biographies. A senior manager reporting directly to the principal took responsibility for the project in each example. However, there was a significant difference between the senior managers from the examples in terms of their experience of sustainability at the start of the building projects.

At Pembrokeshire College the lead role on the project was taken by the Director of Estates, who had a track record of engaging with sustainability through other developments at the College including a previous building project (PC2). At Cambridge Regional College the Vice-Principal and Director of Finance was the senior leader on the project for the College. In this example the building project to develop the SmartLIFE Centre was the Vice-Principal's first serious engagement with sustainability in a professional context (CRC4, CRC5) and proved to be a transformational experience in terms of his perspective on sustainability. In both examples the senior leaders recruited staff to help lead on the development of the buildings. These additional leaders either already held a sustainability role or were given sustainability roles in their respective colleges. At Pembrokeshire College the Director of Estates worked closely with the existing chair of the cross-college SDEG, who was a member of the academic staff as well as holding the whole-college SDEG role (PC5). The Vice-Principal at Cambridge appointed two members of staff with cross-college roles in sustainability. The Sustainability Officer who was appointed at associate principal level to help lead the project was a former head of department in the College and as the building neared completion he was joined by a manager appointed to embed sustainability in the curriculum (CRC5). The senior managers identified in the biographies, along with the additional leaders in sustainability roles in the colleges, constitute the institutional leaders of the building project element in this analytical framework.

8.3 The Analysis of the Relationships

Relationship A in this analytical framework could be described as a 'service provider – client' relationship in which the architect provides the design of the building and the institutional leaders of the building project act as the client on behalf of the college. Service provider – client relationships take many forms as identified by Huth (2004) in his PhD thesis *Trust in Client – Service Provider Relationships*, with these relationships varying from a simple cash nexus to a long-lasting partnership. In the case of both biographies the relationship could be described as a partnership that worked to address the challenges of achieving a common goal of creating a sustainable building. The partnership lasted for the duration of the development of each building over approximately a two year period, but had ceased

by the time the buildings had been completed and in use for one year. There was no post-occupancy work by the architects in either example.

In both biographies relationship A was initially established as a result of the institutional leaders selecting the architects through a tendering process. Selecting who to have this relationship with is a factor in how the relationship will develop and there was a key difference between the two examples in how the selection criteria were applied. In example 1 the architect was selected purely on the basis of the architect's presentation of their vision for the design, their proposed working practices and the extent to which the proposed design met the needs of the college. The fees associated with each design were not considered prior to the decision being made. The fees for the selected design were checked to confirm they were within the available budget once the decision had been made. None of the fees for the competing designs were viewed at any stage (PC7), therefore there was no argument put forward in the selection process based on comparative costs. This was in contrast to the selection process in example 2. The fees associated with each bid to design the SmartLIFE Centre were considered 'up-front' and they were a prominent part of the decision-making process (CRC7). The manner in which the architects were selected could have a significant influence on the resulting relationship with the leaders in the institution, and impact on the outcomes from the development process and the finished building. Giving weight to selection criteria relating to the approach of the architects and their willingness to collaborate, in addition to the vision of the design and the price, could lead to a more productive relationship.

In the first biography a strong driver for developing a close working relationship was the need to achieve the BREEAM Excellent standard for the building. It was the first BREEAM Excellent college building to be developed in the FE sector in the UK and it was the first BREEAM building in any category for the architect. Both the architect and the leaders in the college described the experience as a *"steep, steep learning curve"* (PC9). This relationship in example 1 was developed around an iterative process of design and it was characterised by the Director of Estates as a close, learning relationship to which both parties contributed and from which both parties gained (PC9). The Director of Estates was able to draw on the practical experience of incorporating sustainability into previous building projects on the campus. However, these were not built to the BREEAM Excellent standard, which he described as moving to another level compared with previous

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developments (PC2). The architect was able to contribute through his experience of sustainable design drawn from other projects outside the education sector. While the institutional leaders of the building project (particularly the Director of Estates) were influenced by the learning that took place through relationship A, these institutional leaders controlled the extent to which this relationship impacted on the whole institution because they were able to control the flow of information through relationship C, particularly through the SDEG which was a key aspect of relationship C. The Director of Estates used relationship A to control the development of relationship D and the level of interaction between the architect and the whole institution as shown in Figure 8.3.1. This limited the broader stakeholder involvement in the design process, which was identified in Chapter 2 of this thesis as a key aspect of sustainable design.

The scenario of relationship A being driven by the common objective of meeting the challenges of developing a sustainable building is repeated in the second biography where the SmartLIFE building needed to meet the brief for a sustainable building set by the European project that was providing the funding for the development (CRC2, CRC6). This was also a learning relationship, but with a different dynamic to relationship A in example 1. In example 2 the institutional leaders of the building project did not bring the same level of experience in sustainability to the start of the relationship, they were relying on the architect to bring the knowledge of, and the expertise in, sustainability to the project. However, the institutional leaders used the relationship to develop their own expertise in sustainability and by the end of the relationship they felt that the knowledge gained, combined with other research they had conducted led to them having at least as good an understanding of sustainability as the architect (CRC9, CRC10).

In terms of influencing change for sustainability in the institution relationship A had a direct impact on the awareness and professional practice of the leaders who were directly involved in the relationship. In example 1 the Director of Estates applied his learning to future developments in the College and the work of the chair of the SDEG strengthened the position of the Group by contributing to its transformation into an official committee within the corporate structure (PC29; PC23). In example 2 the Vice-Principal developed a new perspective on sustainability as a result of working with the architect to achieve their common goal of designing a sustainable building. The Vice Principal saw the benefits in

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transferring the sustainability practices that emerged during the relationship A to other areas of his responsibility in the College, particularly around procurement and estates management (CRC28; CRC29).
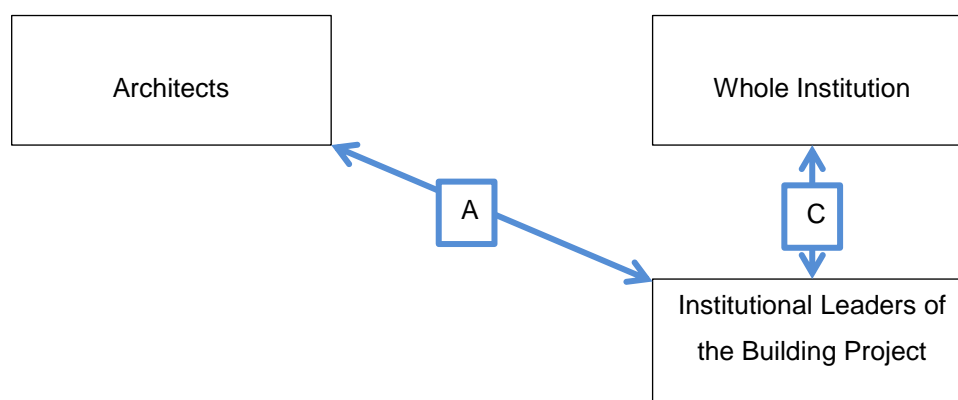
Figure 8.3.1: The influence of relationship A on the whole institution is dependent on the role that the institutional leaders of the building project play in relationship C

Within these building projects relationship A is a key area for generating learning around sustainability that has the potential to benefit the whole institution. Therefore understanding the factors that can maximise the learning taking place through relationship A has a significant contribution to make in terms of the influence sustainable buildings can have on institutional change for sustainability. However, as demonstrated by both examples the real impact of relationship A on the whole institution is also dependent on the nature of relationship C as demonstrated in Figure 8.3.1.

Relationship C is the relationship in the framework that is most influenced by historical structures that pre-date the development of the building. In terms of existing structures that supported sustainability within the institutions, example 1 had a voluntary group, the SDEG, which had been engaging the whole institution to promote sustainability through disseminating information and organising activities. The SDEG was a link between the institutional leaders of the building project and the whole institution through the membership of the Group including students, teaching and non-teaching staff.. The leaders used the SDEG in a consultative capacity and as a result adopted some design suggestions from the SDEG, which included the bicycle storage and showers, and this encouraged a wider degree of ownership of the

building project (PC6). The chair of the SDEG was a key agent in developing this relationship, but as a voluntary group the SDEG was primarily reaching members of the whole institution who were motivated by an interest in sustainability. However, the role of the SDEG in helping to facilitate relationship C did lead to a change that had an impact on the whole institution. The status of the SDEG was raised and it was embedded within the corporate structure of the institution. It was transformed from a voluntary group into an official College committee (the SDEC), which had implications for how the members of the group represented their various constituency stakeholders groups. This raised the profile of sustainable development across the institution and resulted in sustainable development becoming a standing item on all department meeting agendas and reports flowing from departments through the SDEC to the senior managers in the college as well as departments receiving reports and information from the SDEC (PC23).
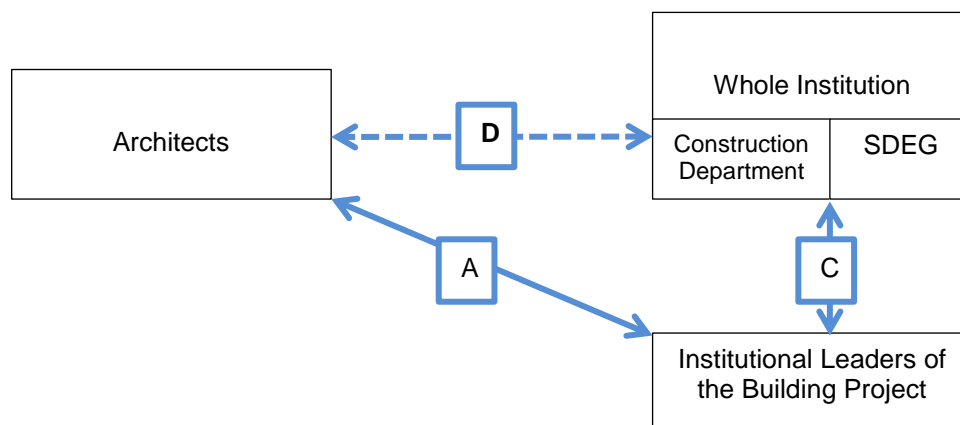
Figure 8.3.2: To engage with the whole institution in example 1 the architects had to use relationships A and C rather than relationship D

The other part of the whole institution that was engaged in relationship C was the Construction Department, which would be the main occupiers of the completed building. This relationship was important for the Construction Department because in example 1 their interaction with the architect was via relationships C and A rather than relationship D (see Figure 8.3.2). This allowed the leaders of the building project to retain control of the information flow to and from the architects. In example 1 some of the learning that was generated in relationship A was disseminated to the whole institution through relationship C. However, more could have been done to maximise the benefits from the productive relationship between

the architect and the leaders of the building project (PC17). In terms of influencing institutional change for sustainability, this raises questions about how the internal control and communication of information and learning are used to bring about change.

In example 2, relationship C provided a route for the learning from relationship A to be transferred to the Construction Department, because there was a strong link between that Department and the Sustainability Officer, who was a former head of the Construction Department and one of the institutional leaders of the building project (CRC11). However, relationship C had a broader influence on the whole institution than just the Construction Department. The Vice-Principal transferred his learning from relationship A to other areas of the College through relationship C. This resulted in significant changes in policy and practice across the management of estates, procurement and the curriculum (CRC23). This included the appointment of the Sustainability Manager to implement a rolling programme of embedding sustainability in courses (CRC5).

Using the experience of curriculum developments in the Construction Department, the Sustainability Manager worked in collaboration with departments to identify opportunities to bring about pedagogical change, to embed sustainability and to make use of the physical resource of the building. The Sustainability Officer also worked with the students in the institution through the NUS to initiate actions for sustainability from the student body's perspective. From being a college that had not engaged with the sustainability agenda prior to the building project, the whole institution moved towards having sustainability at the centre of its strategic development and made rapid progress in terms of its sustainability journey. The process of developing the building had triggered change across the whole institution.

Relationship D presents an opportunity for the architect to engage in a broader relationship with the whole institution. In example 1 this relationship was restricted by the decision to control contact with the architect through relationship A. There were limited opportunities for the architect to provide information to the whole institution, which was done mainly through displays of images and drawings posted in corridors around the College (PC8). Making use of the expertise of the architect as a learning resource in terms of sustainability for the whole institution was not fully exploited. Equally, the opportunity to consult a wider audience in the institution and engage them in the sustainability aspects of the project was not taken.

In example 2 the architect developed a strong relationship with the Construction Department in the College, but not with the College as a whole. The relationship with the Construction Department was facilitated by the Sustainability Officer as described above. The Construction Department staff were involved in decision-making in respect of the new building and extensive use was made of the architect as a learning resource for the construction students in the College (CRC8). While the relationship between the architect and the whole institution was extremely limited beyond the Construction Department, this relationship did lead to one institutional change in example 2. The College recognised the benefit of the relationship between a service provider (i.e. the architect) and a particular academic department and decided to replicate it with other service providers. It is now the policy of the College that all contracts over a certain size that involve external contractor activity on the campus must consider the learning opportunities that this offers for the students of relevant courses (CRC11) and write the arrangement into the contract. While this does not mean that all contracts will involve sustainability issues directly, the sustainable procurement policy should mean that sustainability will have been considered in the letting of the contract, and this experiential approach to learning is commensurate with ESD.
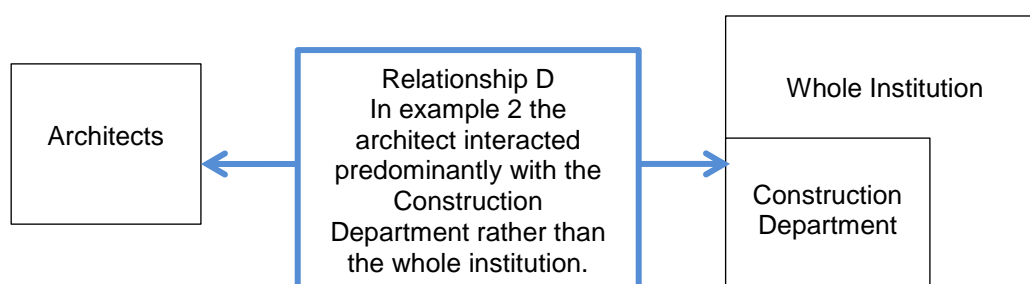
Figure 8.3.3: Relationship D, in Example 2

With both of the building projects in the two examples having sustainability as central to their design brief it was essential that the architects selected in each case could bring a level of expertise in sustainability to the projects. Relationship D has the potential to use the external expertise of the architect to contribute to learning and change at a broader level across the institution, but neither biography indicates that this expertise was used as a resource to inform the wider institution about the sustainable aspects of the building or about sustainable design in general.

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In the discussion of what constitutes sustainable design in Chapter 3 of this thesis, the consultation with, and involvement of, stakeholders is identified as a characteristic of sustainable design, as is the educational contribution that the architect can bring to the client. In the case of a college building relationship D represents the engagement of staff and students by the architect, with the potential for greater influence than is manifest in the two biographies. Relationship D could be influential for both the architect in terms of developing the design, and the whole institution in terms of gaining knowledge from the architect. It is a relationship that was under-exploited in both examples.

Relationship B between the architect and the building provides the opportunity for the architect to make a physical statement about sustainability to the whole institution through the visual aspect of its design and in the way the building functions. The wind turbine, the wood cladding and the sensory garden in example 2 are illustrations of this. Taken in isolation relationship B has little direct influence on institutional change for sustainability, but when relationship B is considered in conjunction with other relationships in this framework, the potential for its indirect contribution to institutional change can be identified. The architects combined their own expertise with information and learning from relationships A and D to deliver the designs for the buildings. They have the opportunity to enhance the presentation of the sustainable elements of the design, for example, by installing readout displays of energy produced or carbon saved, in order to make them more accessible and influential as educational resources through relationship F. Sustainable management practices demonstrated by the development and functioning of the building can influence the institutional leaders of the building project through relationship E, resulting in policy changes such as adopting an environmental management system (CRC24). While recognising that all the relationships are two way connections, viewed in this systemic framework there is a process occurring through relationship B that draws information and learning from relationships A and D, which is then incorporated into the physical building that can influence the whole institution through relationship F and through relationships E and C. Therefore the main influence of relationship B is moving in the direction shown in Figure 8.3.4.
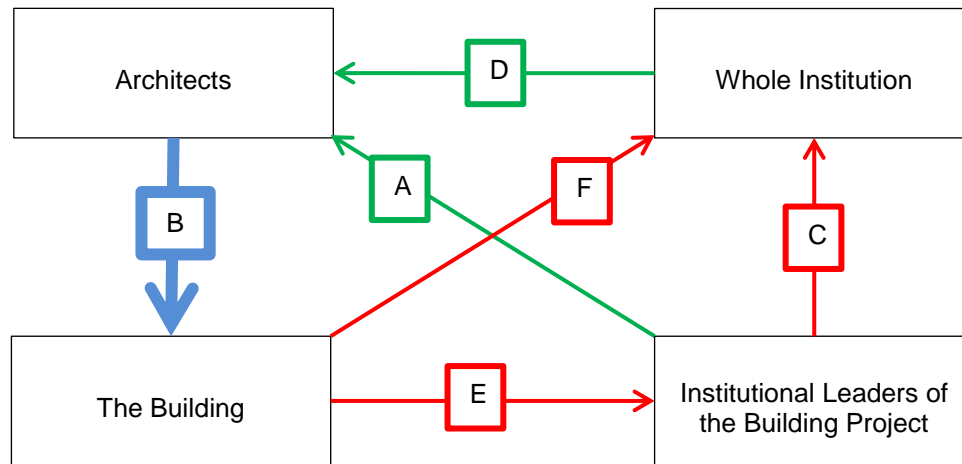
Figure 8.3.4: The role of relationship B in influencing change in the whole
institution

Through the design of a building an architect can also influence individuals in
terms of their emotional response to the physical building. This response was
mentioned by the Sustainability Officer in example 2 when referring to the fact that
people *"love being in the building"* (CRC20). It demonstrates the further potential of
the architect to use the building to influence individuals through relationships E and
F. A phenomenological research approach is more appropriate to investigating these
types of responses as discussed in Chapter 5 of this thesis. The potential to elicit
responses in the affective domain through design, and the potential links between
these individual responses and institutional change is an area that could benefit from
further research, as discussed in Chapter 9.

The influence of relationship B on the architect is likely to manifest itself in
other building projects as the architect takes the learning from the development of
this building and applies it to future projects (PC30, CRC19).

The influence of **relationship E** is primarily in the direction towards the
institutional leaders of the building project. The chair of the SDEG in example 1 used
the presence of the building to raise the status of the Group and its cross-college
sustainability activities (PC23). The Director of Estates in example 1 has used the
building to influence further campus developments and to use the experience gained
from the building in forums beyond the College (PC23, PC24). The Vice-Principal in
example 2 has used the SmartLIFE building to support policy changes in
procurement (CRC23). As agents for change in the institution these leaders can use

the building to support further change for sustainability through relationship C. In both examples this relationship was presented as being a practical relationship with no reference to the emotional response that the building may have invoked.

The physical building has an on-going presence on the campus and an on-going influence on the whole institution through **relationship F**. Only example 2 indicates that the building had a positive emotional response from the staff that used it, but once the buildings were completed both of the biographies indicate that the pedagogical potential of the buildings started to be realised. The presence of the buildings resulted in the construction courses in both colleges introducing elements of sustainable construction even though this was not a requirement of the course specifications. The buildings provided an environment that supported the principles of sustainable construction that were being taught. It was a manifestation of the pedagogy of a building as described by Orr (2002). In a similar vein, the buildings hosted a range of staff development sessions in both colleges and even if the staff development was not specifically about sustainability references were made to the sustainability aspects of the venue. In example 1 the building was used as a means of introducing sustainability to all students as part of their induction programme (PC22) and as a resource for the teaching of the Welsh Baccalaureate, which was part of the curriculum for full time students.

To make the sustainability of the buildings more accessible, both buildings had live readouts relating to energy production or the saving of carbon emissions. However, compared to what was available at the time these buildings were constructed, the readouts were limited. Far more sophisticated displays were available providing a greater range of data that could be used as a learning resource as demonstrated in Figure 3.4.2 in Chapter 3. Additional interpretation techniques were also available such as exposing examples of sustainable building materials and external information panels as shown in Figures 3.4.3 and 3.4.4 also in Chapter 3.

There is a further dimension to relationship F present in both the biographies, which relates to the kudos gathered by both buildings through external awards and favourable reviews in the media (PC13; CRC16). This kudos was based on the sustainability of each building and it reflected favourably on the standing of the institutions as a whole. This presented sustainability in a positive light to the staff and students of the colleges, it helped to raise the profile of sustainability in the colleges and it supported an openness towards further changes for sustainability in

the institutions (CRC22). In example 1 it has strengthened the embedding of sustainability in the management practices of the institution. In example 2 the College has moved from having virtually no engagement with sustainability to adding it to the College's brand through the further development of sustainably designed buildings, expanding courses around sustainability issues such as carbon reduction and implementing policies such as achieving ISO14001.This contributes to the general debate about the value of awards and accreditations such as the Green Gown Awards and BREEAM.

To what extent is the achievement of an award or an accreditation a driver for institutional change for sustainability? In the cases of the two examples in this research the awards and the recognition associated with developing the buildings do not emerge as primary drivers. The BREEAM Excellent accreditation was a condition of the funding in example 1 and it did ensure that elements of sustainability remained a priority in the building in spite of the additional financial costs. Once complete, the building project helped to create the opportunity for Pembrokeshire College to apply for the Green Gown Award for carbon reduction, rather than the Award being a primary goal or driver for change. Similarly, with regard to the recognition from AoC and Ofsted in example 2, the College took the opportunity to exploit the potential offered by the sustainable elements of the SmartLIFE building. However, the awards and accreditations, which mainly resulted from the development of the new buildings, can be seen to have added momentum to the institutional change for sustainability in both cases.

8.4 Summary

There is a significant difference in the potential of the relationships in this framework in terms of their contribution to institutional change for sustainability. In both biographies relationship A was a learning partnership at the centre of the development process, but its influence on institutional change could only be realised in conjunction with the other elements and relationships, emphasising the importance of applying a systems perspective. While all the relationships had influence in both directions, in terms of institutional change for sustainability the evidence indicated influence moving in specific directions as shown in Figure 8.3.4, raising the question as to whether these particular flows could be enhanced or whether more could be

done to exploit influences in the reciprocal direction such as the contribution the architect could make to the whole institution through relationship D.

A further dynamic in the relationships relates to their longevity. The biographies cover the conception, construction and initial use of the buildings, but once the buildings were handed over at the end of the construction phase relationships A, B and D with the architect diminished, while relationships C, E and F continued into the future. The value of extending the relationships with the architect is another area to be explored in terms of influencing whole institutional change for sustainability.

While neither of the examples can be said to have fully exploited the opportunities for change presented by this system of relationships, in analysing the relationships in this way it is possible to identify the potential that the relationships around the development of a new building have for influencing institutional change for sustainability. This analysis has revealed a number of issues relating to the lessons that can be taken from these examples including how the relationships are developed and controlled, and the role that existing management and communication structures play in exploiting the potential for change. The final Chapter will explore these issues and suggest how the full potential for institutional change for sustainability could be gained from these relationships.

Chapter 9

RESEARCH OUTCOMES

"Contemporary narrative inquiry can be characterised as an amalgam of interdisciplinary lenses, diverse disciplinary approaches, and both traditional and innovative methods...." (Denzin and Lincoln, Eds., 2005:651, *The Sage Handbook of Qualitative Research*)

9.1 Introduction

The overall aim of this thesis was to add to the understanding of how sustainable elements of design provided by architects can contribute to institutional change for sustainability in FE colleges. It has explored the relationships between a new building and its wider institution with a particular focus on how leaders in a college can maximise the potential of the development of a building as a catalyst for institutional change for sustainability. The practical purpose of the research was to produce outcomes that have the potential to inform future capital developments in FE colleges on how to maximise the benefits from sustainably designed buildings. In responding to these aims and purposes the need to break new ground in terms of the research approach became a prominent element of this thesis.

This concluding Chapter reviews the outcomes of the research both in terms of the findings from the research and the contribution made by the innovative research approach. The findings from the research are reviewed against the original research questions and are used to develop a series of key points for architects and leaders in FE colleges, which could be applied to future building developments.

The lessons learned from the research, the contribution made by the research approach, the limitations of the research and the potential for further research are all reflected upon in section 9.3.

9.2 Key Findings in Relation to the Research Questions

The three research questions originally presented in Chapter 1 are repeated below. The responses to the questions are interlinked in order to contribute to a fuller picture of how the sustainable design of education buildings can be a catalyst for institutional change for sustainability. In the following sections specific points in the

research questions are addressed, while recognising that the responses to one question have relevance for the other two questions.

The research questions:

1. How is sustainable building design being used to influence management practices and pedagogy?
2. How can leaders in an education institution use sustainable building design to influence institutional change towards sustainability?
3. How can mapping the relationship between the sustainable building design and institutional change inform the work of building designers and educators?

The final question is linked closely to the systems perspective and to the biographical approach in this research. In conjunction with responses to questions one and two, it generates the practical outcome of proposing key points for architects and educators to consider in order to achieve the full potential that a sustainably designed building has for catalysing institutional change for sustainability in an FE college context. These key points are presented in section 9.2.5.

The research questions were formulated after carrying out pilot investigations and developing the research proposal, but this was still early on in the overall study. The questions focus on sustainable design as a catalyst and while this might immediately bring to mind physical aspects of the building, Chapter 2 in this thesis establishes the design process as a key element of sustainable design. The process element became a prominent feature in the influence that the sustainable design of the buildings had on the institutions in terms of change for sustainability.

9.2.1 Influences on management practices

The extent to which the buildings in the two examples influenced management practices differed markedly, primarily because of the history of the two institutions in terms of the length of their engagement with sustainability. In example 1 the senior managers were already committed to sustainability and wanted a building that was accredited as being sustainable, while in example 2 the College was drawn into the sustainability agenda through their external partnership and the senior management saw an opportunity to capitalise on the sustainability aspects of the building.

Pembrokeshire College, in example 1, had responded to the political drive from the WAG aimed at the education sector generally, and presented in *ESDGC: A Strategy for Action* (DELLS, 2006). As a result, by the time the project to build the Construction and Technology Centre was underway, the College had already started to respond to the sustainability agenda, including carrying out a sustainability audit and establishing a voluntary group for staff and students, the SDEG. The main impact of the building project in terms of management practices was to formalise sustainability within the management structure and to give the sustainability perspective an official 'voice'. By changing the SDEG from a voluntary group to the SDEC and by placing sustainable development as a standing item on all team meeting agendas, with the obligation for teams to report to the SDEC, sustainable development was embedded in the decision making structure of the institution.

The physical presence of the building on the campus was not the only driver that brought about this change. The design and construction process had an influence through the relationships identified and discussed in the analysis in Chapter 8. The relationship between the architect and key leaders in the College extended the understanding of energy management and reinforced the approach to sustainability. The increased profile for the College that the building attracted through external awards including a Green Gown Award and the BREEAM Bespoke Award for Wales also raised the status of sustainability in the College and supported the raising of the status of the SDEC.

The design and construction process associated with the SmartLIFE building had a significant influence on the policies and practices of Cambridge Regional College in example 2. The potential for change towards sustainability in this College was far greater than in example 1, because there was no track record of engaging with the sustainability agenda, and no overt sustainability activity. In addition, in example 2 the building had a direct influence on a senior leader in the College, who, through his position as Vice Principal, could in turn exert leadership and influence across all department in the College.

The Vice Principal identified the elements of the design and construction process that could be replicated in other College practices. This resulted in changes to procurement policies and practices across the College in terms of integrating sustainability in procurement decision making. Associated with procurement and the use of resources was a drive to raise awareness of energy use across all staff by using

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the building as a venue and as a learning resource for staff development. On the basis that empowering individuals to take responsibility in their own areas would be a good contribution to managing energy use across the institution, the building was used to inspire the training initiative.

Chapter 3 of this thesis argued for the sustainable design of buildings to be defined not only by the physical elements of the design, but also by the nature of the design process, in particular the level of engagement between the architect and the client in terms of consultation, collaborative working and the exchanging of information. The evidence from the research suggests that a collaborative relationship between architect and client developed as part of the broader design process of a new building can be a significant influence on the management practices of colleges in relation to sustainability. For example, relationship A in example 1 provided the Director of Estates with information to support his carbon reduction initiative and the Vice Principal in example 2 used the procurement process for the building as a model for the whole College.

Although the two examples differed markedly in terms of the extent of the influence the buildings had on management practices, the nature and the routes of the influence through the relationships was similar.

9.2.2 Influences on pedagogy

The evidence on changes to pedagogy from the research is limited to reports from leaders in the institution as opposed to primary research data which would have required observations of teaching and learning before and after the development of the building. However, there is evidence of the way that the physical presence of these buildings in the two Colleges has been used as a practical resource for learning, echoing points made by Orr (2002) and Rohwedder (2004).

In the case of example 1 the full time students are directed to engage with the design of the building as part of their induction and as part of the Welsh Baccalaureate. The students investigate the building on their own, without a teacher present and so relying mainly on what Orr (2002) refers to as the pedagogy of the building.

In both examples construction students are now taught sustainable construction knowledge and skills in an environment that reinforces what they are being taught, as opposed to being taught about sustainable construction in an

unsustainable environment. This is a major pedagogical step forward if the assertion made by Rohwedder (2004) is correct that the dynamic between what is taught and the environment in which it is taught is extremely strong. The same principle holds for the staff development training on sustainability held in the SmartLIFE Centre in example 2.

Example 2 illustrates how the design and construction process of a building can become a learning experience for the students, something that was acknowledged as not being fully exploited in example 1. The development of the SmartLIFE Centre in example 2 was a 'real world' project that was used as a learning resource for students both through the observation of design and construction practices and through engagement with design and construction professionals. The Vice Principal realised the potential of the development process for the core business of the College: teaching and learning. This experience with the SmartLIFE Centre triggered the policy of putting the potential for teaching and learning opportunities into all external contracts above a threshold size. This immediately involved the managers of non-academic departments in the core business of the College in a way that they had not been involved previously.

The development of both buildings supported further curriculum development in relation to sustainability in the respective colleges. In example 1 it strengthened the chair of what became the SDEC who had the lead role in the College for embedding ESDGC in the curriculum. The impact was more of a step change in example 2, because the College was starting from a base of non-engagement with sustainability. In example 2 the interest in sustainability in the construction curriculum triggered by the building project led to an appointment of a Sustainability Manager with the specific responsibility of embedding sustainability in subject areas across the College. This was backed up by senior management introducing sustainable development as a category on lesson planning documents and on lesson evaluation documents.

The evidence from the two examples suggests that the presence of a sustainably designed building provides a teaching and learning resource that can be used to support learning for both students and staff. The evidence for the extent to which the presence of the buildings changed the learning experience of the students is limited. The lack of primary data from cohorts of students both before and after the buildings were developed restricts the extent to which wider conclusions on the

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influences of the buildings on pedagogy can be drawn and generalisations made. However, it is possible to suggest that in both examples there was potential to develop further what Orr (2002) refers to as the pedagogy of the buildings by adding more interpretation of the building materials and more sophisticated displays of the energy production and use, water harvesting, and carbon emissions. As with the influences on management the process of developing the buildings has triggered as much change to pedagogy as the physical incarnation of the buildings on the respective campuses.

9.2.3 How leaders use sustainable building design to influence institutional change towards sustainability

Appendix D presents a table identifying institutional change for sustainability indicators for examples 1 and 2. The research challenge was to establish the extent to which the indicators of change were directly or indirectly linked to the sustainable design of the buildings. The relationship analysis in Chapter 8 attempted to reveal these links. The institutional leaders of the building projects in the two Colleges were pivotal in enabling many of the changes discussed in sections 9.2.1 and 9.2.2 above. In terms of the systems framework of relationships presented in Figure 6.5.2, relationship C is the key path for influencing whole institutional change and relationships A and E are the routes by which the leaders will be influenced by the sustainable design of the buildings.

In both examples it is the senior managers who have been the most influential in transferring learning from the buildings to the wider institutions. In example 1, relationship A embedded a deeper understanding of sustainability at senior management level through the experience gained by the Director of Estates from a productive learning relationship with the architect. This strengthened, rather than initiated, policies and practices across the college. It strengthened the leadership role of the chair of the SDEC and provided a mechanism for students and staff to have a legitimate voice in decision making. The involvement of the Director of Estates in achieving the BREEAM Excellent award for the building had a direct impact on his standing within the FE sector, which in turn reflected on the perception of the College as a sustainable institution.

The Vice Principal in example 2 used his experience from the development of the new building to drive significant change for sustainability across the institution.

At the time of the research some of these changes had already been embedded, such as the sustainable procurement policy and the appointment of two sustainability leaders at Associate Principal level and middle management level in the management hierarchy. Other initiatives, such as embedding sustainability across the whole curriculum, were in the early stages at the time of the research. The policy of incorporating the potential for learning opportunities into larger contracts was a significant institutional change, not least because it brought the non-academic staff into partnership with academic staff in delivering the core business of teaching and learning. The Vice Principal drove this through on the basis of his experience with the SmartLIFE Centre, and he overcame initial resistance to achieve what has been accepted as a positive change.

Overall, the SmartLIFE Centre building appears to have been more influential in bringing about institutional change, but this is in large part as a result of the greater potential for change in the Cambridge Regional College, which was starting from a very low base in terms of the sustainability agenda.

9.2.4 Mapping the influences between sustainable design in the buildings and institutional change for sustainability

Not all the changes relating to sustainability that were recorded in the two examples could be attributed to the influence of the design of the buildings. This was particularly true in the case of example 1, Pembrokeshire College, because it had a track record of working towards implementing sustainability. The systems perspective adopted for this research enabled the analysis to focus on the connections between the different elements involved in the development of the building and trace the influence of the building through those connections. The aim was to differentiate the influence of the building from the other influences on change for sustainability in the institution. First, the detail of the connections had to be revealed and the biographical approach was used to produce narrative accounts that gave a full picture of the story of the building and the people involved with it. The systems framework of relationships was used to analyse the relationships that were revealed in the biographies and to trace the influence of the sustainable design of the buildings to specific changes taking place in the institutions.

The practical purpose of this research was to identify information that could maximise the development of a sustainably designed college building as a catalyst

for institutional change for sustainability. In mapping the influences and understanding the potential of the relationships as described above it is possible to identify some key points for architects, and for education professionals involved in commissioning a building, to consider when developing future education buildings. These key points are presented in the next section

9.2.5 Implications for leaders in colleges and architects involved in future capital projects in the FE sector

The commissioning and development of a new building within an education institution has well established legal and funding processes associated with contractual arrangements. Equally, there are independent criteria for determining the sustainability of a design and for assessing the sustainability of the completed building, which have been discussed in Chapter 2 of this thesis. The following key points do not replace any aspects of these processes or assessments; rather, they are additional considerations for institutions that are interested in moving forward with the sustainability agenda.

These key points are grounded in the findings of the research, they represent essential learning from the research and as such they are a fundamental output from the research. If these points are taken into account prior to the development of a new building, they can help to maximise the impact of the building project in terms of institutional change for sustainability.

Points for leaders in an FE College to consider when commissioning a sustainably designed building:

- Develop a vision of how the building will be part of the whole college system and how it will contribute to the sustainability journey of the institution.
- In selecting an architect, think in terms of the architect as a resource: primarily as a designer, but also as a source of information on sustainability for staff and students. Explore the potential of the working relationship with the architect as part of the selection process.
- Have a clear plan for managing the relationship between the architect and the College staff leading the building project. What will be the

communication strategy? How can the knowledge from this relationship be used to benefit the whole institution?

- Have a strategy for facilitating engagement between the architect and the whole institution. In the early stages this will be partly to enable the architect to gain information to develop a design that complements its context (designing a system to fit within a system (Orr, 2007)). In the later stages it will be an opportunity for staff and students to gain an understanding of the building that has become a part of their institution.

- Identify the opportunities in the process of developing the building to develop leaders for sustainability at different levels within the institution.

- Put in place protocols for identifying and facilitating learning opportunities for students and staff at every stage of the design and construction process, from taking part in design charrettes to observing construction techniques.

- Identify features within the design that need to be interpreted in order to give the building its own pedagogy and benefit learners across the college, not just in construction related courses. This could include cut-away sections to reveal specific construction materials and live readouts of a building's performance.

- See the development of the building as an opportunity to develop a closer working relationship between academic and non-academic staff.

- Identify local organisations with an interest in sustainability and explore ways to share learning during the development process in order to strengthen links and raise the college profile in the local community.

- Commit the architect to a post-occupancy visit or visits in order to reflect on the performance of the building and extract further learning from the development process.

Points for architects to consider when being commissioned to design a sustainably designed building for an FE college:

- Be aware of the sustainability strategy of the institution and consider:
  - how the building can contribute to the strategy;
  - and how your engagement with the institution can contribute to the strategy.
- Have a strategy for consulting widely within the institution to gather information for the design and to test designs.
- Consider the potential learning opportunities for the students and staff that will occur at different stages of the design process.
- Think of the building as a potential learning resource and test ideas for interpretation of the sustainability features with college staff and students.
- Be prepared to:
  - take part in a post occupancy visit to reflect on the performance of the building;
  - offer a training session to staff on using the building;
  - gain additional learning from the building.

9.3 Reflections on the Research and the Research Process

9.3.1 Lessons from a point in time

This thesis is based on research that takes a reflective look at the influence of capital developments in the FE sector in England and Wales during the first decade of the 21st century. This was a period when the interest in sustainability was growing generally, it was being formalised into strategies and action plans at government level (DEFRA, 2005; WAG, 2004) with subsequent strategies emerging in the FE sector (LSC, 2005; DELLS, 2006; DCELLS, 2008). This was a period of significant capital development in the FE sector estate in England (LSC, 2008:2) and in Wales (Estyn, 2010:4), with much of the funding for these developments linked to new buildings that were required to achieve specific levels of sustainability in their design and operation. Although there are some individual case studies that refer to new buildings (Ofsted, 2007; the EAUC website: www.eauc.org.uk/rb_casestudy) there appears to have been no overall analysis and assessment of how this significant

investment in sustainable buildings could have been harnessed to support the goals of the strategies from the LSC and the WAG, which were directed at bringing about change for sustainability in the FE institutions in England and Wales that were hosting these new buildings.

The two examples presented in this thesis have demonstrated that sustainably designed buildings can influence institutional change for sustainability in the context of an FE college. The research has also revealed that the whole process of developing the building is as potent a catalyst for change as the physical presence of the building. The learning acquired by leaders in the institutions involved with the development of the buildings combined with the example of sustainability provided by the building proved influential in triggering sustainability related change to procurement practices, leadership and management structures, and teaching practices. Because the impact of the building programme in the FE sector at the start of the 21st century has not been systematically reviewed in terms of change for sustainability, the positive lessons have not been recognised and the opportunities to inform future practice have been overlooked. While acknowledging that every FE college will present a unique context to some degree, this research has identified certain key points, from two quite different examples, that can be applied to any future new building development in order recognise the opportunities and to maximise the catalytic effect of the building on change for sustainability in the host institution.

The financial crisis that emerged in 2008 and the change of UK Government in 2010 are factors that contributed to a reduced capital investment in the FE sector in England and Wales. However, new buildings are still being built in the sector, albeit at a much reduced rate, and the sustainability agenda is still a current challenge for the institutions. Therefore, drawing out the lessons from previous projects to inform future developments was a key motivation for carrying out this research. The key points presented in section 9.2.5 are one contribution from this research to improve practice in the development of future buildings in the FE sector.

9.3.2 The contribution of the research approach

The fact that a significant number of new buildings, reputably meeting sustainable design standards, were developed on FE campuses in England and Wales between 2000 and 2010 was a given starting point for this research. However, no

research appears to exist on the impact that these buildings had on institutional change for sustainability in the colleges where they were built. Certainly, no other academic research exists that has adopted a biographical approach to analysing the influence of developing a new building on supporting change for sustainability in the context of an FE college. The driver for developing this original research approach came from the need to find an approach that could address the particular challenges associated with tracing the influences from a building and to link them to changes in the institution of which the building was a part. The fact that sustainability was a key aspect of both the building and of the institutional changes being researched introduced the additional challenges associated with researching the complex concept of sustainability.

Appreciating the interconnected nature of the world is a key aspect of sustainability and leads to much of the literature highlighting the need for a systems perspective in order to understand sustainability as a concept (Jucker, 2002; Capra, 2003; Sterling, 2003; Orr, 2007; Strachan, 2009). The importance of systems features in the model of sustainability presented in Figure 1.2.3 in Chapter 1 of this thesis. The fact that this research needed to identify sustainable design and institutional change for sustainability, and then focus on the connections between these two aspects of sustainability were strong factors in adopting a systems thinking perspective in conjunction with the biographical approach.

Other factors that present challenges to researching sustainability issues include its trans-disciplinary nature, as described by Sachs (2008) in Chapter 1. Sustainability issues cross established, reductionist discipline boundaries and topic areas, and researching sustainability issues requires an approach that can accommodate diverse disciplines and topics. This, coupled with the epistemological and ontological questions associated with sustainability regarding the emergent nature of knowledge, determined the need for a particular methodological approach.

Although no examples of applying the biographical approach to researching the sustainability of buildings or institutions were found, there was sufficient evidence to suggest that such an approach would be legitimate, as discussed in Chapter 5. The evidence included the fact that biographical methods were applied in different fields of study. Biographies of inanimate objects, including buildings, have been written (Rybczynski, 2011) and combining this with the concept of agency in

inanimate objects from the field of anthropology provided a unique approach that addressed the challenges of researching this sustainability related topic.

The biographical narrative account is far more than a list of facts and as Chamberlayne et al (2004) point out, it provides details of activities linked to the main subject of the biography, including relationships, which was ideal for a systems perspective. The narrative accounts in the biographies presented the data in a format that allowed the relationships that formed around the development of the buildings to be identified and analysed.

This thesis opens up for debate the possibility of the biographical research approach being adopted in contexts where buildings have the potential to have agency over people and institutions.

9.3.3 The limitations of the research

The research is limited in a number of ways. The focus was on just two examples from almost 400[30] colleges in England and Wales at the time of the research (HEFCE, 2009), although the number of general FE colleges with new sustainably designed buildings would have been substantially lower. However, while the two examples were both representative of medium sized general FE colleges, the two buildings and the institutional contexts of which the buildings were a part provided interesting contrasts in several respects. These contrasts included: the prior experience of sustainability in the two colleges; the motivation for developing a new building; the way in which the buildings were assessed as being sustainable; and the difference between English and Welsh policies to sustainability. In spite of these contrasts common factors emerged indicating that basic principles relating to the influence of the buildings on institutional change for sustainability applied in both examples, and raised the possibility that these principles might apply more widely.

Both of the buildings were linked to the teaching of aspects of construction. This gave an immediate connection between the development of the building and the staff and students who would be some of the main occupiers. Although it would have been interesting to have had contrasting disciplines as the main occupiers of the buildings, both of the buildings did house other activities and both of the buildings

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[30] This figure had declined to 352 colleges by 2014, as a result of mergers, of which 230 could be considered general/tertiary colleges. (AOC statistics from http://www.aoc.co.uk/about-colleges/research-and-stats/key-further-education-statistics (accessed 10 February 2015)).

were used by non-construction students and staff, allowing the assessment of the buildings on wider college activities such as professional development.

A further limitation was the retrospective view of the two examples which meant that reliance was placed on the memories of a limited number of key people. A wider sample of the college community could have been drawn into the data collection, but the students present at the time of the development of the buildings had all moved on from the college. The research focused on the key decision makers within the network of relationships around the new buildings. Hence the framing of the research questions around management and leadership. A stronger evidence base could have been collected if the researcher had been a participant observer of the building projects for the period covered by the biographies, but this would have required regular involvement in the institutions for several years and prior to the conception of this research project.

The response of individuals in the institutions to the designs of the buildings in terms of an emotional response has not featured in depth as it would have required an additional approach to the data collection to assess the visceral responses and engagement with the affective domain of individuals. The extent to which an emotional response to a building has an influence on individual learners and the professional practice of staff in the colleges in terms of change for sustainability would add another dimension to this area of research.

Having selected one example from England and one from Wales an analysis and assessment might have been made in respect of any differences resulting from the contrasting policies to sustainable development between the two administrations. However, this would have widened the scope of the study and diluted the focus on the relationship between the buildings and institutional change for sustainability.

While these limitations may have restricted the veracity of this particular piece of research, the consistency of the findings in relation to the two contrasting examples provides an insight into how the implementation of sustainable design can be used as a catalyst for institutional change. The limitations do not affect or detract from the innovative research approach which makes a unique contribution to research in the area of sustainable design and institutional change for sustainability.

9.3.4 Areas for future research

All research raises more questions as well as attempting to answer questions and this thesis is no different. While it has cast some light on the relationships between the buildings and institutional change for sustainability, the limitations of the research in particular point towards additional investigations that could affirm the outcomes of this study and extend the understanding of the role of sustainably designed buildings in bringing about change in education institutions. In this respect two areas of research seem appropriate. One would be to identify a proposed capital project involving the construction of a sustainably designed building on an FE college campus and to engage in researching the project prior to the commissioning of the design and construction of the building, and to apply and assess the key points that are the outcomes from this thesis. This could include assessing pedagogical practices before and after the building is constructed. Further research could also assess the emotional response of individuals to the completed building and investigate whether this is limited to the initial engagement with the phenomenon of the new building, or whether the emotional response declines over time as the building becomes more familiar. It could also explore whether emotional responses to the building are an indicator of the degree of its agency.

A second area would be to conduct similar research to this in the schools sector and in the HE sector to determine whether or not the principles identified in the outcomes of this research apply across other education sectors. If this were to be the case it would strengthen the notion that institutional change for sustainability is underpinned by a specific set of transferable principles.

A further quite separate question that warrants further investigation relates to the contribution that biographical research methods can make in relation to researching other aspects of sustainability. For example, the interaction between people and specific environments is often a central feature of a sustainability challenge. Could a biographical approach from the perspective of the environment, subjected to a systems analysis, provide a greater understanding of sustainability challenges? The scope here is potentially extremely wide, but also exciting in terms of opening up new perspectives on complex issues associated with sustainability.

9.4 Final Summary

This concluding chapter has reviewed the findings of the research and reflected on their capacity to address the initial research questions. It has encapsulated the learning from the research in the key points for FE college leaders and for architects to consider when developing new buildings. The chapter has also reflected on the research process as a whole and identified the limitations of the research as well as recognising the unique contributions of the research.

There are two main contributions made by this PhD thesis. Firstly, the findings from the research have contributed to the understanding of how sustainable design in buildings in the FE context can be both a catalyst and an on-going resource for change for sustainability across the institution. The learning encapsulated in the key points listed in section 9.2.5 represents the ways in which future capital development projects in the FE sector can maximise the potential for change for sustainability in FE institutions.

The second area of contribution, which emerged from engaging in the research for this thesis, related to the research approach adopted to address the research questions. It has both extended the use of biographical methods into a new context and it has offered an additional research approach to studying an aspect of the complex and interconnected nature of sustainability.

These two areas of contribution have provided some learning, but as Bateson, quoted earlier in this thesis, argues, "learning denotes change" (Bateson, 2000:283) and the change that this thesis has delivered has led to the potential for more research in the field of institutional change for sustainability and the potential use of biographical research methods.

References

Alberti, S.J. (2005) Objects and the Museum. *ISIS* volume 96, number 4, pages 559-571. Chicago: University of Chicago Press.

Allen, R. E. (Ed) (1990) *The Concise Oxford Dictionary of Current English*, eighth Edition. Oxford: Clarendon Press.

Ali Khan, S. (1996) *Environmental Responsibility: A Review of the 1993 Toyne Report.* UK: The Welsh Office, Dept. of the Environment and Dept. of Education and Employment.

Alvesson, M. and Skölberg, K. (2000) *Reflexive Methodology: New Vistas in Qualitative Research.* London: Sage.

Apitzsch, U. and Siouti, I. (2007) *Biographical Analysis as an Interdisciplinary Research Perspective in the Field of Migration Studies.* York: University of York Research Integration Project,

Appadurai, A. (Ed) (1986) *The Social Life of Things, Commodities in Cultural Perspective*. Cambridge: Cambridge University Press.

Aspinall, S., Sertyesilisik, B., Sourani, A. and Tunstall, A. (2012) How Accurately does Breeam Measure Sustainability. *Creative Education*, volume 3, supplement 1-8. California: Scientific Publishing.

Atkinson, A. (1998) The Compass of Sustainability: A Framework for a Comprehensive Information System. *In:* Leal Filho, W. (Ed) *Sustainability and University Life*. New York: Peter Lang.

Bain, M. and Lowenstein, O. (Eds) (2008) *Architecture in Scotland 2006-2008: Building Biographies*. Edinburgh: The Lighthouse and the Scottish Government.

Baines, J. and Cohen, J. with Brannigan, J and Strachan, G. (2005) *CoVEs Focus on Future Skills: Sustainable Development in Construction, Agriculture and Food Technology*. London: Learning and Skills Development Agency.

Bartlett, P. and Chase, G. (Eds) (2004) *Sustainability on Campus: Stories and Strategies for Change.* Cambridge: Massachusetts, MIT.

Bateson, G. (2000) *Steps to an Ecology of Mind*. Chicago: University of Chicago Press.

BERA (2004) *Revised Ethical Guidelines for Educational Research (2004)*. Endsleigh Street, London: British Educational Research Association.

BERA (2011) *Ethical Guidelines for Educational Research*. Endsleigh Street, London: British Educational Research Association.

Blewitt, J. (2008) *Understanding Sustainable Development*. London: Earthscan.

Bolden, R., Gosling, J., Marturano, A. and Dennison, P. (2003), *A Review of Leadership Theory and Competency Frameworks.* Exeter: University of Exeter Centre for Leadership Studies.

Bornat, J. and Walmsley, J. (2008) Biography as Empowerment or Appropriation: Research and Practice Issues. *The Innovation Journal*, volume 13, number 1. Online www.innovation.cc/index.html accessed 10 July 2012.

Brandt, W. (1980) *North-South: A Programme for Survival*. London: Pan Books.

Braungart, M. and McDonough, W. (2009) *Cradle to Cradle: Re-Making the Way We Make Things*. London: Vintage Books.

BRE (2008) *BREEAM Education 2008 Assessor Manual*. BES 5051, issue 3.0. Watford, Hertfordshire: Building Research Establishment Global Ltd.

BRE (2008) *2008 BREEAM Award Winners for Wales*. Watford, Hertfordshire: Building Research Establishment Global Ltd.

CABE (2009) *Successful School Design, Commission for Architecture and the Built Environment*. 1 Kemble Street, London: CABE.

Calhoun, C. (1995) *Critical Social Theory*. Cambridge: Blackwell.

Cambridge CC and BRE (2008) *Smartlife: Progress Review Training and Skills Audit*. Shire Hall, Cambridge: Cambridge County Council.

Cambridge CC and Peterborough CC (2003) *Cambridge and Peterborough Structure Plan 2003*. Shire Hall, Cambridge: Cambridge County Council.

Cao, G., Clarke, S. and Lehaney, B. (2000) A Systemic View of Organisational Change and TQM. *The TQM Magazine*, volume 12, number 3, pages 186-193. Bradford, UK: MCB University Press.

Capra, F. (1975) *The Tao of Physics: An explanation of the parallels between modern physics and eastern mysticism*. Boston: Shambhala Publication.

Capra, F. (1982) *The Turning Point: Science, Society and the Rising Culture*. London: Flamingo.

Capra, F. (1996) *The Web of Life: A new scientific understanding of living systems*. New York: Random House.

Capra, F. (2003) *Hidden Connections.* London: Flamingo.

Cartwright, P., Moulinier, E., Saran, T., Novakovic, O. and Fletcher, K. (2008) *Smartlife – Lessons Learned*. Watford, Hertfordshire: Building Research Establishment Global Ltd.

Castenada, C. (1972) *Journey to Ixtlan: Lessons of Don Juan*. New York: Simon and Schuster.

Cavana, R. and Elias, A. (2001) *Stakeholder Analysis for Systems Thinking and Modelling*. New Zealand: Victoria University of Wellington. Online, http://portals.wi.wur.nl/files/docs/ppme/BobCavana.pdf accessed 28 March 2011.

CEL (2006) *Leadership for Sustainability: Making Sustainable Development a Reality for Leaders.* London: Centre for Excellence in Leadership.

Chamberlayne, P., Bornat, J. and Wengraf, T. (Eds) (2000) *The Turn to Biographical Methods in Social Science*. London: Routledge.

Chamberlayne, P., Bornat, J. and Apitzsch, U. (Eds) (2004) *Biographical Methods and Professional Practice.* Bristol: The Policy Press.

Chapman, J. (2005) *Emotionally Durable Design*. London: Earthscan.

Charmaz, K. (2006) *Constructing grounded theory: A practical guide through qualitative analysis*. California: Sage.

Checkland, P. (1985) From Optimizing to Learning, a Development of Systems Thinking for the 1990s. *Journal of the Operational Research Society* (1985) number 36, pages 757-767. Basingstoke, UK: Palgrave Macmillan.

Cohen, L. and Manion, L. (1989) *Research Methods in Education,* third edition. London: Routledge.

Corcoran, P. B. and Wals, A. E. J. (2004) *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice*. The Netherlands: Kluwer.

Creswell, J. W. (2007) *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. California: Sage.

Crossan, M., Lane, H. and White, R. (1999) An Organisational Learning Framework: From Intuition to Institution. *Academy of Management Review* (1999) volume 24, number 3, pages 522-537. New York: PACE University.

Crutzen, P. (2006) The Anthropocene. *In:* Ehlers, E. and Krafft, T. (Eds) (2006) *Earth System Science and the Anthropocene*, pages 13-18. Berlin: Springer.

DCELLS (2008) *Education for Sustainable Development and Global Citizenship: A Strategy for Action – Updates January 2008*. Information Document No. 055/2008. Cardiff: Welsh Assembly Government.

DCELLS (2008a) *Education for Sustainable Development and Global Citizenship: A Common Understanding for Schools.* Information document 065/2008. Cardiff: Welsh Assembly Government.

DCELLS (2008b) *Education for Sustainable Development and Global Citizenship in the Further Education Sector in Wales*. Information document 067/2008. Cardiff: Welsh Assembly Government.

De Mille, R. (1976) *Castenada's Journey: The Power of Allegory*. USA: Capra Press.

DEFRA (2005) *Securing the Future: The UK Government Sustainable Development Strategy*. Norwich, UK: The Stationery Office.

DELLS (2006) *Education for Sustainable Development and Global Citizenship: A Strategy for Action*. Information Document No. 017/06. Cardiff: Welsh Assembly Government.

Department for Education and The Welsh Office (1993) *Environmental Responsibility: An agenda for further and higher education*. London: HMSO.

Denzin, N. (1989) *Interpretive Biography: Qualitative Research Methods Series.* California: Sage.

Denzin, N. and Lincoln, Y. (Eds) (2005) *The Sage Handbook of Qualitative Research*, third edition. California: Sage.

Doppelt, B. (2010) *Leading Change Toward Sustainability*. Sheffield: Greenleaf.

Dovers, S. (2001) Institutions for Sustainability. *TELA, Environment, Economy and Society,* Issue 7. Economics and Environment Network Paper 0101. Canberra: Australian National University.

Dunphy, D., Griffiths, A. and Benn, S. (2007) *Organisational Change for Corporate Sustainability: A Guide for Leaders and Change Agents of the Future*. London: Routledge.

EAUC (November 2009a) *Saving Money and Energy at Pembrokeshire College*. EAUC Case Study. Online, www.eauc.org.uk/sorted/construction_and_strategic_sustainability_at_ca accessed July 2014.

EAUC (November 2009b) *Construction and Strategic Sustainability at Cambridge Regional College*. EAUC Case Study. Online, www.eauc.org.uk/sorted/construction_and_strategic_sustainability_at_ca accessed 3 July 2014.

Estyn (2006a) *Establishing a Position Statement for Education for Sustainable Development and Global Citizenship in Wales*. Cardiff: Estyn.

Estyn (2006b) *A Report on the Quality of Work-based Learning and Job Centre Plus Programmes in Pembrokeshire College*. Cardiff: Estyn.

Estyn (2010) *The Quality of New Build in Further Education and its Impact on Learning.* Cardiff: Estyn.

Estyn (2011) *Report on Pembrokeshire College*. Date of inspection February 2011, Cardiff: Estyn.

Finnis, I. (2003) A Plea for Biographical Research as Insight into Smaller Firm Marketing Theory Generation. *Journal of Enterprising Culture*, volume 11, Issue 1, pages 25-45. London: World Scientific Publishing Company.

Foot, M. (1973) *Aneurin Bevan: A Biography, Volume Two: 1945-1960.* London: Faber and Faber.

Freeman, R. E. (1984) *Strategic Management: A Stakeholder Approach*. Boston: Pitman.

Fullan, M. (2005) *Leadership and Sustainability: System Thinkers in Action*. California: Sage.

Gardiner, M., White, H., Munzinger, M. and Ray, W. (2011) *Low Carbon Building Programme 2006 – 2011: Final Report*. London: Department of Energy and Climate.

Gell, A. (1998) *Art and Agency: A New Anthropological Theory*. Oxford: Oxford University Press.

Gribbin, J. (2007) *The Universe: A Biography*. London: Allen Lane.

Griffiths, M. (1998) *Educational Research for Social Justice*. Buckingham: Open University Press.

Grober, U. (2012) *Sustainability: A Cultural History*. English edition translated by Ray Cunningham. Devon, UK: Green Books.

Guba, E. and Lincoln, Y. (1994) Competing Paradigms in Qualitative Research. *In:* Denzin, N. and Lincoln, Y. (1994) *Handbook of Qualitative Research,* pages 105-117. California: Sage.

Guy, S. and Moore, S. A. (2005) *Sustainable Architecture: Cultures and Natures in Europe and North America*. Abingdon, UK: Spon Press.

Hansen, S., Bucki, J., and Lee, J. (2011) Engaging the Campus Community Through Participatory Sustainability Strategic Planning. *Sustainability: The Journal of Record*, volume 4, number 2, pages 75-79. New York: Liebart.

Hargreaves, A. and Fink, D. (2006) *Sustainable Leadership*. San Francisco: Jossey-Bass.

HEFCE (2009) *Supporting Higher Education in Further Education Colleges: Policy Practice and Prospects*. March 2009/05. Bristol: Higher Education Funding Council for England.

Helling, I. (1988) The Life History Method: A Survey and a discussion with Norman K Denzin. *Studies in Symbolic Interaction*. number 9, pages 211-243. Bingley, UK: Emerald.

Heron, J. and Reason, P. (1997) A Participative Inquiry Paradigm. *Qualitative Inquiry,* volume 3, issue 3, pages 274-294. California: Sage.

Holmes, R. (2008) *The Age of Wonder: How the Romantic Generation Discovered the Terror and Beauty of Science.* London: Harper Press.

Horton, J. et al. (2009) *Involving Pupils in School Design.* UK: Arts and Humanities Research Council.

Hoskins, J. (2006) Agency, Biography and Objects. *In:* Tilley, C. et al. (2006) *The Handbook of Material Culture*. London: Sage.

Howard, U. (2009) *FE Colleges in a New Culture of Adult and Lifelong Learning*. IFLL Sector Paper 7. Leicester: NIACE.

Huth, S. M. (2004) *Trust in Client – Service Provider Relationships*. PhD thesis submitted April 2004, Faculty of Social Science and Business, University of Plymouth.

IPCC (2014) *Climate Change 2014: Synthesis Report*. IPCC Fifth Assessment Synthesis Report. Adopted 1 November 2014, Intergovernmental Panel on Climate Change. Online, www.ipcc.ch/report/ar5/syr/ accessed 15 November 2014.

Ison, R. (2008) Systems Thinking and Practice for Action Research. *In:* Reason and Bradbury (Eds) (2008) *The Handbook of Action Research: Participative Inquiry and Practice*. London: Sage.

Jucker, R. (2002) *Our Common Illiteracy: Education as if the Earth and People Mattered*. Frankfurt: Peter Lang.

Jucker, R. (2014) *Do We Know What We Are Doing: Reflections on Learning, Knowledge, Economics, Community, and Sustainability*. Newcastle upon Tyne: Cambridge Scholars Publishing.

Kaplan, R. and Norton, D. (1996) *The Balanced Scorecard: Translating Strategy into Action*. USA: Harvard Business Press.

Kemmis, S., Cole, P. and Suggett, D. (1983) *Orientations to Curriculum and Transition: Towards the Socially Critical School*. Melbourne: Victorian Institute of Secondary Education.

Khisty, C. (1995) Soft Systems Methodology as Learning and Management Tool. *Journal of Urban Planning and Development.* September 1995, No. 3, pages 91 – 107. USA: American Society of Civil Engineers.

Knappett, C. and Malafouris, L. (Ed) (2008) *Material Agency: Towards a Non-Anthropocentirc Approach.* New York: Springer.

Kolbert, E. (2007) *Field Notes from a Catastrophe: A Frontline Report on Climate Change.* London: Bloomsbury.

Kopytoff, I. (1986) The Cultural Biography of Things: Commoditization as Process. *In:* Appadurai, A. (Ed) (1986) *The Social Life of Things, Commodities in Cultural Perspective*. Cambridge: Cambridge University Press.

Kotter, J. R. (1996) *Leading Change*. Harvard: Harvard Business School Press.

Laszlo, E. (1972) *A Systems View of the World: The Natural Philosophy of New Developments in the Sciences*. Oxford: Blackwell.

Laszlo, K. (1998) *Dimensions of Systems Thinking*, unpublished manuscript. February 1998. Online, http://archive.syntonyquest.org/elcTree/resourcesPDFs/Systems_Thinking.pdf accessed 10 July 2012.

Learning and Skills Network (undated) The East of England Sustainable Development Baseline Survey. London: LSN.

Lee, H. (2009) *Biography: A Very Short Introduction.* Oxford: Oxford University Press.

LEED website, *Introduction to LEED*. Online, www.usgbc.org/DisplayPage.aspx?CMSPageID=1988 accessed 28 October 2010

Lipson, J. (1994) Ethical Issues in Ethnography. *In:* Morse, J. (Ed) *Critical Issues in Qualitative Research Methods*, California: Sage.

LSC (2005) *From Here to Sustainability: The Learning and Skills Council Strategy for Sustainable Development,* Coventry. UK: Learning and Skills Council.

LSC (2007) *LSC Sustainable Development Action Plan 2007/08*. Coventry, UK: Learning and Skills Council.

LSC (2008) *Building Colleges for the Future.* Coventry, UK: Learning and Skills Council.

LSC (2010) *Review of the LSC Sustainable Development Strategy*. Coventry, UK: Learning and Skills Council.

LSIS (2011) *Sustaining Our Future: A Framework for Moving Towards a Sustainable Learning and Skills Sector*. London: The Learning and Skills Improvement Service.

MacGregor, N. (2010) *The History of the World in 100 Objects*. London: Allen Lane.

MacKenzie, M. (1991) *Androgynous Object: String Bags and Gender in Central New Guinea*. London: Harwood Academic Publishers.

Malone, K. (2007) The Bubble-wrap Generation: Children growing up in walled gardens. *Environmental Education Research*, volume 13, number 4, September 2007, pages 513-527. Oxford: Taylor and Francis.

Martin, S. et al. (2004) *Sustainable Development in the Learning and Skills Sector: National Baseline Survey*. London: Learning and Skills Network.

Mauss, M. (1954) *The Gift.* London: Cohen and West.

McCann, R. (2005) On the Hither Side of Depth: An Architectural Pedagogy of Engagement. *Environmental and Architectural Phenomenology*, volume 16 number 3 pages 8-19. Albany, NY: State University of New York Press.

McDonough and Partners. (1992) *The Hannover Design Principles for Sustainability*. Online, www.mcdonough.com/principles.pdf accessed 18 January 2011.

Meadows, D. et al. (1972) *Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. London: Pan Books.

Meadows, D. (Ed Wright, H.) 2009, *Thinking in Systems: A Primer*. London: Earthscan.

Merrill, B. and West, L. (2009) *Using Biographical Research Methods in Social Research.* London: Sage.

Murray, P. (2011) *The Sustainable Self*. London: Earthscan.

Ofsted (2007) *Modern Construction Teaching and Learning – Cambridge Regional College*, Good Practice Guide, London, Ofsted. Online, http://archive.excellencegateway.org.uk/page.aspx?o=186858 accessed 3 July 2014.

Ofsted (May 2008) *Inspection Report – Cambridge Regional College*. London: Ofsted.

Orr, D. (2002) *The Nature of Design: Ecology, Culture and Human Intension*. New York: Oxford.

Orr, D. (2007) *The Designers Challenge*. A presentation to the School of Design, University of Pennsylvania on 14 May 2007. Online, www.eoearth.org/view/article/156584/ accessed 12 July 2014.

Panchamia, N. (2012) *Choice and Competition in Further Education*. London: Institute for Government.

Papanek, V. (1995) *The Green Imperative: Ecology and ethics in design and architecture*. New York: Thames and Hudson.

Parkinson, G. (Ed) (1973) *Leibniz: Philosophical Writings*. London: J M Dent.

Payne, L. (2008) *The Evidence Base on College Size and Mergers in the Further Education Sector*. DIUS Research Report 08-19. London: Department for Innovation, Universities and Skills.

Pembrokeshire College. (2010) *Operational Plan 2010-2011*. Wales: Pembrokeshire College.

Peston, R. (2005) *Brown's Britain*. London: Short Books.

Pike, G. and Selby, D. (1988) *Global Teacher, Global Learner.* London: Hodder and Stoughton.

Popper, K. (1963) *Conjectures and Refutations: The Growth of Scientific Knowledge*. London: Routledge.

Reason, P. and Bradbury, H. (Eds) (2008) *The Handbook of Action Research: Participative Inquiry and Practice*. London: Sage.

Rees, E. (2009) *Welsh Construction Centre Leads Field in Sustainability*. The Ecologist, 16 July 2009. Online, www.theecologist.org/News/news_analysis/287645/welsh_construction_centre_leads_field_in_sustainability.html accessed 10 November 2011.

Riessman, C. K. (2000) Analysis of Personal Narratives. *In:* Gubrium J. F. and Holstein, J. A. (2001) *Handbook of Interviewing*. California: Sage.

Roberts, B. (2002*) Biographical Research*. Buckingham: Open University Press.

Robson, C. (1993) *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*. Oxford: Blackwell.

Rohwedder, R. (2004) The Pedagogy of Place: The Environmental Technology Center at Sonoma State University. *In:* Corcoran, P. B. and Wals, A. E. J. (2004) *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice.* The Netherlands: Kluwer.

Rybczynski, W. (2011) *The Biography of a Building: How Robert Sainsbury and Norman Foster Built a Great Museum.* London: Thames and Hudson.

Sachs, J. (2008) *Common Wealth: Economics for a Crowded Planet*. London: Allen Lane.

Schratz, M. and Walker, R. (1995) *Research as Social Change: New Opportunities for Qualitative Research.* London: Routledge.

Scott, G., Tilbury, D., Sharpe, L. and Deane, E. (2012) *Turnaround Leadership for Sustainability in Higher Education*. Sydney: University of Western Sydney and

National University of Australia. Online,
http://ecommunities.tafensw.edu.au/pluginfile.php/12139/mod_page/content/93/VET%20Sustainability%20Conference%20Feb%2013%20Geoff%20Scott.pdf accessed 12 November 2013.

Seamon, D. (2010) Merleau-Ponty, Perception and Environmental Embodiment: Implications for Achitectural and Environmental Studies. A pre-publication chapter *in* Locke, P. and McCann P. (Eds) *Carnal Echoes: Merleau-Ponty and the Flesh of Architure*. Forthcoming 2016. Online, www.academia.edu/948750/Merleau-Ponty_Perception_and_Environmental_Embodiment_Implications_for_Architectural_and_Environmental_Studies_forthcoming_2016_   accessed 5 June 2015.

Seamon, D. (2014) A Phenonmenological and Hermeneutic Reading of Rem Koolhaas's Seattle Public Library: Buildings as Lifeworlds and Architectural Texts. A pre-publication chapter *in* Dalton, R. and Hölscher, C. edited volume on interdisciplinary research perspectives in architecture, forthcoming 2016. Online, www.academia.edu/8852338/Architecture_Phenomenology_and_Hermeneutics--A_Phenomenological_and_Hermeneutic_Reading_of_Rem_Koolhaas_s_Seattle_Public_Library_Buildings_as_Lifeworlds_and_Architectural_Texts_forthcoming_2016_ accessed 5 June 2015.

Senge, P. (1990) *The Fifth Discipline*. New York: Doubleday Currency.

Senge, P. (2000) *Schools that Learn*. London: Nicholas Brealey.

Senge, P. (2010) *The Necessary Revolution: How Individuals and Organisations are working together to Create a Sustainable World*. London: Nicholas Brealey.

Shaw, C. (1966) *The Jack Roller: A Delinquent Boy's Own Story*. Chicago: University of Chicago Press.

Silver, N. (1994) *The Making of Beaubourg: A Building Biography of the Centre Pompidou Paris*. Massachusetts: MIT.

Simmons, T. 2009, *Project Genesis*, *Constructing Excellence in the Built Environment*, Warwick House, Buckingham Palace Road, London. Online www.constructingexcellence.org.uk/CE_CASE%20STUDY_PROJECTGENESIS_web.pdf accessed 15 July 2012.

Smith, R. (1979) *East Kilbride: The Biography of a Scottish New Town, 1947-1973*. Building Research Establishment Report. London: HMSO.

Stacey, R. D. (2007) *Strategic Management and Organisational Dynamics: The Challenge of Complexity*, fifth edition. UK: Prentice Hall.

Stake, R. E. (1994) Case Studies. Chapter 14 *in:* Denzin, N. and Lincoln, Y. (Eds) (1994) *Handbook of Qualitative Research*. California: Sage.

Stake, R. E. (2005) Qualitative Case Studies. *In:* Denzin, N. and Lincoln, Y. (Eds) (2005) *Handbook of Qualitative Research*. California: Sage.

Steele, J. (2005) *Ecological Architecture; A critical history*. New York: Thames and Hudson.

Sterling, S. (2001) *Sustainable Education: Re-visioning Learning and Change*. Schumacher Briefing No. 6. Devon, UK: Green Books.

Sterling, S. (2003) *Whole Systems Thinking as a Basis for Paradigm Change in Education: Explorations in the Context of Sustainability*. PhD thesis University of Bath. Online, www.bath.ac.uk/cree/sterling/sterlingthesis.pdf accessed 9 June 2013.

Sterling, S. (2009) Ecological Intelligence. *In:* Stibbe, A. (Ed) (2009) *The Handbook of Sustainability Literacy: Skills for a Changing World*. Devon, UK, Green Books.

Stibbe, A. (Ed) (2009) *The Handbook of Sustainability Literacy: Skills for a Changing World*. Devon, UK: Green Books.

Strachan, G. (2009) Systems Thinking. *In:* Stibbe, A. (Ed) (2009) *The Handbook of Sustainability Literacy: Skills for a Changing World*. Devon, UK: Green Books.

Strachan, G. (2012) *WWF Professional Development Framework of Teacher Competences for Learning for Sustainability*. Godalming: WWF-UK.

The Sorrel Foundation, *Involving Pupils in the Design Element of Building Schools for the Future*. Online, www.hertsdirect.org/docs/pdf/c/participation6.pdf accessed 25 May 2012.

Thiis-Evensen, T. (1989) *Archetypes in Architecture.* Oxford: Oxford University Press.

Thompson, D. (Ed) (1998) *The Concise Oxford Dictionary of Current English*, ninth Edition, fifth reprint. Oxford: Clarendon Press.

Tilbury, D. and Wortman, D. (2004) *Engaging People in Sustainability*. Switzerland and UK: IUCN.

Tilbury, D. and Cooke, K. (2005) *A National Review of Environmental Education and its Contribution in Australia: Frameworks for Sustainability*. Canberra: Australian Government Department of the Environment and Heritage and Australian Research Institute for Education for Sustainability.

Tuli, F. (2010) The Basis of Distinction Between Qualitative and Quantitative Research in Social Science: Reflection on Ontological, Epistemological and Methodological Perspectives. *In: Ethiopian Journal of Education and Sciences*, volume 6, number 1, pages 97-108.

UK Government (1994) *Sustainable Development: The UK Strategy*. Cm 2426. London: HMSO.

UNCED (1992) *Agenda 21*. New York: United Nations.

WAG (2004) *Welsh Assembly Government's Sustainable Development Action Plan 2004 – 2007*. Cardiff: Welsh Assembly Government.

WAG (December 2007) *Promise and Performance: The Report of the Independent Review of the Mission and Purpose of Further Education in Wales in the context of the Learning Country: Vision into Action*. Cardiff: Welsh Assembly Government.

WAG (May 2009) *One Wales: One Planet: The Sustainable Development Scheme of the Welsh Assembly Government*. Cardiff: Welsh Assembly Government.

WAG (2009) *Sustainable Buildings in Wales,* revised 15 January 2009. Cardiff: Welsh Assembly Government.

WCED (1987) *Our Common Future*. Oxford and London: Oxford University Press.

Webster, K. (2004) *Rethink, Refuse, Reduce: Education for Sustainability in a Changing World.* Preston Montford, UK: Field Studies Council.

Weiss, G. (Ed) (2008) *Intertwinings: Interdisicplinary Encounters with Merleau-Ponty*. Albany, NY: State University of New York Press.

Willard, B. (2009) *The Sustainability Champions Guidebook: How to Transform Your Company*. Canada: New Society Publishers.

Williamson, T., Radford, A. and Bennetts, H. (2003) *Understanding Sustainable Architecture*. London: Spon Press.

Wine, J. (2000) *Green Architecture*. Cologne: Taschen.

Woozley, A. (Ed) (1964) *John Locke, An Essay Concerning Human Understanding*. London: Fontana.

Worldwatch Institute. (2013) *The State of the World 2013: Is Sustainability Still Possible*. Washington: Worldwatch Institute and Island Press.

Worrell, F. (2005) *Wayne Rooney: Simply Red.* UK: Mainstream Publishing.

WWF (1997) *Catch*. Issue 2, Autumn 1997. Godalming: WWF-UK.

WWF (2004a) *To Whose Profit?* Godalming: WWF-UK.

WWF (2004b) *Pathways: To Education for Sustainable Development*, first edition. Godalming: WWF-UK.

Zinn, J.O. (2004) *Introduction to Biographical Research*. Social Contexts and Responses to Risk Network, working paper, 2004/4. Swindon: Economic and Social Research Council.

Appendix A – DATA TABLE FOR EXAMPLE 1

<u>Key for the Table</u>

Quotations in the 'Collation of responses' column:

Director of Estates = (DE)

Chair of the Sustainable Development and Environment Committee = (CSD)

Non-italic = Clarification or contribution from the researcher

Numerals in the 'Question Themes' column:

I.	Design driver for change for sustainability
II.	Influence on the design process
III.	Influence on institutional change/learning for sustainability
IV.	Influence of a leadership role in for change for sustainability
V.	External* driver for change for sustainability
VI.	Turning Points

External = outside the institution and outside the design team e.g. the Government, the Sector or the Community

Response No.	Question	Collation of responses (Direct quotes from respondents in italics, non-italics represent comments and summaries from the interviewer.)	Question Themes
PC1	When was the need for the building identified? Why was it needed? Who led the initial idea?	The development of the building was part of the Estates Strategy for the College and part of the masterplan for the site re-development. The Strategy identified the need for a new home for some of the construction courses, *partly due to increasing numbers of students, and partly due to the identified need for an energy centre to link into plumbing. The driving force for a new building was the fact that the existing accommodation was not fit for purpose* (DE). The strategy therefore included the development of a new construction centre. The current accommodation was not fit for purpose to provide high quality training.	II. IV.

PC2	When was it decided that the building should be sustainable? Who and what drove this decision?	*The building was always intended to be sustainable, but the level of sustainability was driven by WAG, by the requirement for all new buildings to be BREEAM Excellent. This building was probably the first BREEAM Excellent in Wales to have BREEAM Excellent written into the contract* (DE). *Excellent was written into the contract. We had an ethos of building sustainable buildings* (DE) – they had built the Innovation Centre previously, which had sustainability features, *but the level had to be stepped up to meet the BREEAM requirements.*(DE) To get the funding they needed the new building had to meet BREEAM Excellent. Energy rating for new builds had to be A.	II. IV.
PC3	What was the sector context at the time the need was identified in terms of sustainability and capital development?	*The WAG had taken the decision that all new college buildings should be BREEAM Excellent so the commitment to sustainable development was feeding through into the FE sector.* (DE). *The College was ahead of the sector in terms of ESDGC at the time* (CSD).	V.
PC4	What was the institutional context at the time the need for the building was identified in terms of sustainability?	*The college was well ahead at the time in terms of addressing sustainability. We had voluntary committees before that was an external requirement, the sustainability of the design of the new building fitted in quite well with what was going on in the College* (CSD). At the time the need for the building was identified the College had not developed a strategy for sustainability, there was a voluntary group, which had representation from senior management and from across the College. *The College was already on a sustainability journey, but the emphasis on BREEAM showed us what we needed to do and the development of the building pushed the group forward and got more support from staff and enthused them about sustainability.* *We have individuals who have their own passion, but they cannot bring about change on their own* (CSD) *Yes we were on a sustainability journey, but the BREEAM helped push things forward*(DE)	III.
PC5	Who was leading on sustainability in the institution at the time the new building was initiated?	CSD chaired the SDEG = Sustainable Development and Environmental Group, which was a focus for sustainability issues. DE led at senior management level.	II. IV.
PC6	Who provided input into the original design brief? What were the	DE developed the brief for the buildings – the brief for space requirements was developed with staff from the construction dept. – including the operational and teaching requirements.	II.

	sustainable elements in the design brief?	*Communication with the end users is vitally important*(DE). Two stages of design and development: Stage 1 was getting planning permission and looking at external aesthetics, internal layout was where the construction dept. were involved. The 2nd stage *after planning permission, went into detailed design where a lot consideration given to the sustainability of the components – quite a lot dictated by the BREEAM requirements* (DE). Meeting recycled content and U values in terms energy requirements. *There is also a relation with the sustainable function of the building where SDEG had some input in a small way. It was all piecemeal stuff* (CSD). SDEG put forward the proposal for the bicycle storage and showers. SDEG was bringing a wider group of stakeholders into what was going to be a College resource.	
PC7	How and when were the designers/architects selected?	*The Masterplanning went out for competitive fee bids, but we did not go for the lowest bid* (DE) The fees were not looked at prior to the selection decision, 6 proposals were invited to give presentations. *The steering group for this process selected on the basis of the presentations and then they opened the fees. It was more important to get the quality than the fee* (DE). Fees were secondary, it was more important to get the right quality. They did not open the fees from the other proposals. Austin Smith Lord were the architects who were successful bidders for both the masterplan and the new building both through the fee bid process. Detailed design was done with their Cardiff office.	II.
PC8	How was the design process managed? Who was involved in the design process and what was their level of influence? (Including any sustainability group.) What were the key groups/meetings/relationships during the design and build process?	*You have to be very careful who communicates with who* (DE). *All the communication from the department and stakeholders went through me* (DE). *They* (the architects) *did present to the staff and take questions* (CSD). *There was plenty of information out there. There were lots of information boards around the college* (CSD). The key relationship was between the architects and the lead group in the College particularly DE.	II.
PC9	How did the architects/designers add to the sustainability of the building?	*They made people aware of their environment around the college and an awareness of what the environment could be like* (CSD) *I don't want this to sound like a criticism. This was the first BREEAM project for the architects and it was a steep, steep learning curve for everyone. There was a lot of re-drafting*	I.

		to make sure BREEAM was met. The director of the architects practice said after the project you should see how much we lost on this project. But they looked on it as an investment for future projects (DE)	
PC10	How did the architects/designers add to the understanding of sustainability in the institution? How was the design and build process used to influence sustainability developments in the institution?	A collaborative effort driven by BREEAM *The College has picked up a lot of information and shared it with other colleges* (DE)	I. III.
PC11	How was the design and build process used as a pedagogical resource in terms of: a) the physical development? b) making use of the designers and contractors as resources?	*We did tours of the building with construction students while the build was in process(DE) The other thing that has been beneficial to students over the last two years since the building has been open is the tours of the building provided to students. Showing how you can incorporate renewable technologies into buildings.* (DE). Some members of staff are still unaware of the significance of the building. *There was potential for taking more members of staff around during the construction period* (CSD).	III.
PC12	What were the key milestones in the development of the building?	*There were times when we needed to look for savings and it is at that stage in a building project that some of the sustainability aspects of the building are often sacrificed. But in this case the funding depended on meeting the BREEAM Excellent criteria and therefore the sustainability aspects of the design had to be protected. The conditions attached to the funding definitely kept the sustainable development on board. It was a challenge to justify the cost to the Welsh Assembly Government, because they were saying publicly that making the building sustainable would not cost any more, but we were proving otherwise* (DE). *There was some design issues that some people had difficulty understanding and the key example was the biomass boiler* (DE). Bio-mass boilers with gas back-up needed to be justified. *People thought that the biomass was greenwash and we would run off gas. This has not been the case but subsequently we were proved right to have the back-up because the single biomass boiler has gone down on two occasions* (DE).	VI.

PC13	What were the key points in the development of the building which raised awareness of the building being sustainable?	*There has been a gradual increase in awareness* (CSD). *This is going to sound a bit crazy, but most awareness has come from the awards we have won* (DE). After completion the building gained the following awards – Green Gown Highly Commended, Fforwm Award, BREEAM Excellence Award for Wales. *The external awards have had a big impact in the college as well as external awareness of the college* (CSD).	VI.
PC14	Were there any events or influences that resulted in the end product of the building being changed from the original design? Were there any changes to the sustainability elements of the design?	*BREEAM drove the specification up in relation to the materials and components* (DE). *What restricts colleges in going up into the next level of sustainability is the cost. I can give you exact figures, but the cost of going to BREEAM Ex put £180,000 to £200,000 on the project* (DE) Although there will be some pay back from the renewables etc.	VI.
PC15	What changes to the design process would have improved: • the process? • institutional learning for sustainability?	*The BREEAM Assessor could have been appointed earlier at the feasibility stage along with the rest of the design team. That would have avoided some issues and they could have brought other ideas to the project. But it was the first time anyone had gone through this process* (DE). *In terms of day to day operations of the building the staff do not like to have choices taken away from them for example automatic windows, it almost takes the ownership away. For future projects it is something to consider in terms of how much should be automatic and how much should be in peoples control* (CSD). *This is one of the issues with BREEAM, it is a tick box and you have to do some things in order to get the credits* (DE). (Issues for BREEAM and issues of training on how to use sustainable buildings.)	II.
PC16	What are the sustainable elements in the finished building? Why can the building be called "sustainable"?	Biomass boiler, solar panels, passive ventilation. It achieved the BREEAM Excellent rating. *Carbon emissions display not part of BREEAM but we thought it was an important way to get the message to staff and students. We thought it was an important way of getting information over to students about how sustainable the building was in its day to day operation.* (DE)	I.

PC17	How were members of the institution, including the users of the building, informed about the sustainability of the building? Did the designers inform or train the users of the building?	*Through the displays provided by the architects and the interpretation of the building. More could have been done on this* (CSD). No training of the users by the architects.	I. III.
PC18	How has the wider community been informed about the sustainability of the building? Has the building had an influence in the local community?	*On open evenings potential students are taken around the building and told about how sustainable it is. The local Planning Authority visited the building to help them with their understanding of sustainability issues in new applications* (DE). *The building was opened by the Minister for Sustainability* (CSD).	V.
PC19	Have the architects/designers been involved in any post-occupancy evaluation?	*No we have not done post-occupancy reviews* (DE)	I.
PC20	How has the building changed the perception of the institution among • staff? • learners? • Community/employers? • the sector?	*Staff go around with students and are surprised to see the nature of the building* (DE). *We could roll the tours out to staff more* (CSD) *Staff are interested to see how the technologies in the building are working because they are considering doing things at home. It is reaching out into peoples' homes* (DE) For PR – *Images of the building have been used in the College prospectus* (DE)	III.
PC21	How have leaders for sustainability in the institution used the sustainable design of the building to support sustainability across the institution?	*It has been used as a practical example of sustainability for both staff and students* (CSD). *The awards and publicity attracted by the building has raised the awareness and status of sustainability among the staff* (DE).	III. IV.
PC22	How have the sustainable elements of the building been used as a pedagogical resource by users of the building and more generally across the institution?	*Over the last 2 years since the building has been opened students have been given tours of the building as part of their induction, including, showing how you can incorporate new technologies into renewable buildings*(DE) *The renewable energy courses are just starting to picking up now* (July 2011) *there is more and more interest in that area (DE).* *It is a resource for Welsh Bacc students* (CSD).	III.

PC23	What have been the institutional developments in sustainability since the completion of the building? What role has the building played in these developments? How would these have been different if the building had not existed or been sustainably designed?	*It has contributed hugely, because it is not just the building in isolation, the building is part of the campus and the College is on a sustainable journey. There are plenty of other examples of sustainability across the campus* (CSD). *The SDEG has been upgraded to the SDEC. Environment and Sustainability is a standard agenda item now on all team meetings*(DE). *It has supported other initiatives within the college and got the momentum up to another level* (DE). *It has certainly been a catalyst, we were going down that journey, but in a more modest way before this happened* (CSD). *The awards have helped us to go for other awards we would not have gone for previously* (DE) *Green Dragon would be an example of that* (CSD). *Having that prominent sustainability building on the site has really helped* (DE) *It has been a lynch pin really* (CSD).	III.
PC24	How has institutional change for sustainability linked to, or compared with, developments on sustainability in the sector?	*A lot of colleges contact us for information on what we have done* (DE). It has put DE in a position where he chairs the Welsh FE Estates and Environment Committee. *If it had not been for what we had done* (with the building) *I would not have been able to do that* (DE). *It is all about continuous improvement, that is what many of the awards have been for which is the mind-set for sustainability* (CSD). The Carbon Trust is funding a feasibility study into site renewable technologies – the College is in the pilot because of what they have done, they are the first college in Wales to go through the process.	V.
PC25	Reflecting on the influence of the building over the last 2 of years, what changes would you make to the sustainable design elements of the building?	*The BREEAM assessor should have been appointed sooner. The end users like the building* (DE). it is popular with staff, bike shelters, recycling, showers *On a regular basis it has changed attitudes* (CSD). *We could have done more about teaching staff about the building* (CSD).	III.
PC26	What additional information could have been provided by the architects/designers to the institution	Possibly more input to the construction students.	I. II.

		regarding the sustainability of the building?		I.
PC27	What additional information could the institution have provided to the architects/designers in order to improve the "learning for sustainability" impact of the building?	*It was new for both parties and we learnt together. There was a lot of re-visiting the detail of the design* (DE). Not so much a case of additional information, but some information could have been provided earlier.	II.
PC28	What are the main lessons the institution has learnt from the experience of developing the building in terms of institutional change for sustainability?	*More involvement of the staff generally in the development phase (CSD).*	III.
PC29	What is the future strategy for sustainability in the institution and what role will the building play in this strategy?	*Since the construction building was finished we have added a further A rated extension to the estate, which was a new engineering wing* (DE).. *The focus from the sustainability viewpoint is working with the Carbon Trust to look at new technologies which will include a wind turbine, PV and solar thermal and a site wide biomass boiler. We are looking at major investment* (DE). *As part of the engineering investment 15 months ago we incorporated a renewable and sustainable teaching and learning centre* (DE).	III.
PC30	What are the main lessons learnt by the designers/architects from the experience of developing the building in terms of developing future sustainable education buildings?	*The architects learnt a great deal about how to develop a BREEAM Excellent building and while it cost them a lot they looked on it as an investment that they will be able to capitalise on in future projects* (DE).	I. II.

Appendix B – DATA TABLE FOR EXAMPLE 2

Key for the Table

Quotations in the 'Collation of responses' column:

Vice Principal and Director of Finance = (VP)

Sustainability Officer (Associate Principal) = (SO)

Sustainability Manager (Curriculum Leader for sustainability) = (SM)

Non-italic = Clarification or contribution from the researcher

Numerals in the 'Question Themes' column:

VII. Design driver for change for sustainability
VIII. Influence on the design process
IX. Influence on institutional change/learning for sustainability
X. Influence of a leadership role in for change for sustainability
XI. External* driver for change for sustainability
XII. Turning Points

External = outside the institution and outside the design team e.g. the Government, the Sector or the Community

Response No.	Question	Collation of responses (Direct quotes from respondents in italics, non-italics represent comments and summaries from the interviewer.)	Question Themes
CRC1	When was the need for the building identified? Why was it needed? Who led the initial idea?	*In 2003 Cambridgeshire County Council (CCC) bid for a major European project because it thought there was a deficit of skills in modern methods of construction in house building in this area* (VP). The College became involved in the CCC project funded by EU Interreg based on a deficit of skills in modern house building in the region and the identified need for more houses in the	II. IV.

			SE. The European partners were Malmo and Hamburg.	
			CCC wanted a training and conference centre to change hearts and minds with regard to sustainable construction of houses (VP).	
			CCC won the money first and then looked for a partner to host the facility and we came together in 2004. CCC had had views of putting it in other locations but CRC was already a Construction COVE (VP).	
			The building opened in April 2006.	
CRC 2	When was it decided that the building should be sustainable? Who and what drove this decision?		*The project with CCC determined the need for the building to be sustainable and the project drove the sustainability aspects of the building. It was only through that partnership with CCC that the College opened up its mind to the wider issues of sustainability* (VP). This partnership was a catalyst for organisational change for sustainability.	II. IV.
CRC 3	What was the sector context at the time the need was identified in terms of sustainability and capital development?		*In 2004 there was no sector driver to do anything* (about sustainability) *most colleges weren't doing that much* (VP). This project started prior to the LSC developing its SD strategy in 2005.	V.
CRC 4	What was the institutional context at the time the need for the building was identified in terms of sustainability?		*Up until 2004 this college was not doing anything specific on sustainability, some recycling, but it was not a major part of the College's thinking* (VP). No sector driver in 2004, the College was not on a sustainability journey.	III.
CRC5	Who was leading on sustainability in the institution at the time the new building was initiated?		*No one prior to the project* (VP). *When we got the project underway in 2005 we appointed a director to be in charge of sustainability, which was me (VP). Fairly standard in change management terms we needed a senior manager to be a sponsor and put resource into it. I have reasonable environmental credentials from a personal point of view, but I see it fairly straightforwardly as a resource issue* (VP). *So we put a senior manager in to lead on this and then just after that we appointed a Sustainability Officer at deputy principal level to lead on sustainable development in this project and everything around it. So we brought in management resource and we have kept doing that in order to facilitate change* (VP). (2008 Sustainability Manager brought in as	II. IV.

		Curriculum lead on Sustainable Development.) *Sustainability is part of the criteria for every contract. If you put it in everything it does make a difference* (VP).	
CRC6	Who provided input into the original design brief? What were the sustainable elements in the design brief?	*CCC were the main client, CRC were effectively like a joint client. CRC had representation in all working groups and at all the decision-making meetings* (VP). *The International bidding process has this term Work Packages and they had a series of Work Packages. Work Package 1 focused on the building design. Work Package 2 focused on training* (SO). *The original brief for the selection process was to build a highly sustainable building, but it was up to the architects to determine what this meant. We did not set any criteria in the brief on what that should be* (VP). *Everything was signed off by a Joint Board which I was a member of* (VP).	II.
CRC7	How and when were the designers/architects selected?	Competitive bids based on a design competition. *The Joint board saw all the proposals including the costs and although the decision had to go through the official CCC channels they selected the architects recommended by the Joint Board* (VP).	II.
CRC8	How was the design process managed? Who was involved in the design process and what was their level of influence? (Including any sustainability group.) What were the key groups/meetings/relationships during the design and build process?	*I felt we had a really good opportunity right through the design process. We were able to put forward ideas; we were able to propose changes; we were able to undertake a number of concepts which influenced the final outcome of the building. We were able to be consulted through the process, it was not thrust upon us*. (SO). *Consultation was through me down to sector leader level in the construction department, we were able to influence the design it was an iterative process* (SO). *The staff in the Construction Dept. amended the design of the practical skills area during the build process* (SO).	II.
CRC9	How did the architects/designers add to the sustainability of the building?	*Yes, a lot of the features were brought in by the architects. The original brief for the selection process was to build a highly sustainable building, but it was up to the architects to determine what this meant. We did not set any criteria in the brief on what that should be.*	I.

		Architects Ammand and Mustoe won on the basis that they convinced us they could build the most sustainable building within the budget. (VP). It was predominantly the architects who suggested the sustainability ideas.	
CRC10	How did the architects/designers add to the understanding of sustainability in the institution? How was the design and build process used to influence sustainability developments in the institution?	*They added enormously to the understanding in respect of future building projects. The architects did not influence the wider college directly, but the building has done. We learnt more from this project which we have used on subsequent projects* (VP).	I. III.

CRC11	How was the design and build process used as a pedagogical resource in terms of:
	   c) the physical development?
	   d) making use of the designers and contractors as resources?
		It is a dual purpose building with a student entrance and teaching area which is completely separate from the other side of the building which is a visitors' entrance, conference centre and viewing space (VP).
		The project was used as a live learning platform for our students. Throughout the project students visited the site, we even had staff attend site meetings (SO).
		Construction staff attended live design team meetings which was CPD for them. It was mainly to make sure they had access to information. They built files of resources on renewables. It was a live project for the students. We had site visits for the students we had webcams, we had a viewing platform, we tracked the whole progress of the building. We wanted the staff and the students to be involved and we have followed that on with subsequent projects. We have now made that a standard for any construction project on site, it is built into contracts. We want our staff and students to have sensible involvement with any project we have on site and why wouldn't we? If we are tendering now as a college we build in what learning opportunities there are for staff and students into the tender. So the contractor knows from the start we are going to be asking about webcams, viewing platforms, talks from the architect, because of course we would want to do that (VP).
		The Estates Dept is only concerned with delivering a building not the teaching and learning from the process, there was some resistance but as soon as we decided it was all joining up it now happens automatically (VP) *The contractors do not get a choice. The partnership between teaching and non-teaching staff has now gelled and works for the benefit of the learners* (SO).
		N.B. The importance of the relationship between teaching and non-teaching staff.
			III.

CRC12	What were the key milestones in the development of the building?	*CCC won the money first and then looked for a partner to host the facility and we came together in 2004. CCC had had views of putting it in other locations but CRC was already a Construction COVE* (VP). Moving the project from Chatteris to Cambridge. Bringing the project to CRC campus instead of alternative site which was a change achieved by the VP.	VI.
CRC13	What were the key points in the development of the building which raised awareness of the building being sustainable?	*It brought about a major change in established practices. By having this project we were able to use it for our staff to give them staff development Staff development of changes in the wider world especially modern methods of construction. We had a number of staff who did not understand the need or the significance of the changes and by being involved in this project it opened their eyes* (SO). *Look at the OFSTED best practice case studies, one of them is about how it changed our staff attitudes and teaching practices using this project as a catalyst* (VP). *It affected their outlook and habits, it wasn't just this* (sustainable construction) (SO).	VI.
CRC14	Were there any events or influences that resulted in the end product of the building being changed from the original design? Were there any changes to the sustainability elements of the design?	The practical area was changed as the building neared completion. *Because of the nature of the project the sustainable elements had to be included and not lost. We did not allow the sustainability elements to be lost* (VP). Passive ventilation was an issue because of noise transference. *When anything is new you take a risk, if you don't take risks you don't do anything* (SO). *When something is new you don't always have the information to make the right decision, which can be even more justification for not doing something* (VP).	VI.

CRC15	What changes to the design process would have improved:
	    • the process?
	    • institutional learning for sustainability?
		If we were doing it again we would have got more staff and student involvement through the design stage and more awareness. I suspect that staff outside the core group of 10 or 15 who were involved with the building did not know that much about it, I think we have got better at that (VP).
		Another thing we have learnt is that there are a number of consultants and so called experts who are often not experts (SO).
		Having gained the experience of this project we have found on subsequent projects that the M&E from mainstream architects has been limited. Whole lifestyle costings is a public building requirement and they struggled and never really achieved it despite a lot of help
			II.

		from us. Their knowledge of sustainability in practice is pretty limited (VP). *We have become an informed client and have gained a degree of expertise which enables us to get the right information* (SO).	
CRC16	What are the sustainable elements in the finished building? Why can the building be called "sustainable"?	Underfloor heating, ground source heat pumps, solar hot water, solar shading, passive ventilation, wind turbine, newspaper insulation, light sensors, flushing sensors, rainwater harvesting. Smartboards, display from the training area, video conferencing initially for linking with Malmo and Hamburg. The UPVC roof allowing natural daylight in the training area and the cedar cladding. Numerous external awards and interest from Carbon Trust and other colleges.	I.
CRC17	How were members of the institution, including the users of the building, informed about the sustainability of the building? Did the designers inform or train the users of the building?	*Staff development on a variety of topics held in the building. The staff have got to know the building in this way. The building is always mentioned in relation to sustainability* (VP). *Future staff development is planned as part of the next phase for sustainability at the College which is gaining EMS 14001* (SO). No training of staff from architects, although construction teaching staff very involved in meetings etc. through the project, which was CPD for them.	I. III.
CRC18	How has the wider community been informed about the sustainability of the building? Has the building had an influence in the local community?	*We have strong links with schools we have lots of school visits and we provide School masterclasses* (SO). *10 or 12 School Masterclasses a year* (VP). The fact that it was a CCC project has influenced the number of school visits *We have not had a specific open day for the building, but the building is used by a wide variety of organisations connected to sustainability in one form or another, the Chartered Institute of Building, the Chartered Institute of Management* (SO). *Sector Skills Councils come here, we want to be a regional venue* (VP). *We use it on the three College open days per year, lots of the public come through the building* (VP).	V.
CRC19	Have the architects/designers been involved in any post-occupancy evaluation?	*They did come back and used it as a showcase for their own practice, they would bring prospective clients here. They did a range of evaluations, but they were not shared with us* (SO). *Essentially we are designing more sophisticated buildings and it is more important than ever*	I.

		to train the occupants of the building to optimise all its features (SO). (Regarding automatic windows/ventilation) *There is a tendency to put in technology and we need to be training the people to change their behaviour* (VP).	
CRC20	How has the building changed the perception of the institution among - staff? - learners? - Community/employers? - the sector?	The building has a public purpose through conference centre for external use. Viewing platform. *There is an emotional response to this building, staff and students love being in this building* (SO). – *It is this best respected building, behaviour and care of the building is better than in other buildings* (VP). *People see the roof and the wind turbine it separates out the building from all the other buildings around. It is also visible from beyond the campus. Thousands of people see it while travelling on the A14. The SmartLIFE building is distinctive. It attracts interest* (VP). *It is part of student induction* (SM). *As a result of using a regional builders merchants who had an interest in sustainable development, that partnership led to all sorts of opportunities in terms of training and procurement* (SO). *This has been very much based on knowledge sharing* (SM). *This partnership won a National Training Award in 2009* (VP).	III.
CRC21	How have leaders for sustainability in the institution used the sustainable design of the building to support sustainability across the institution?	*With students and staff in the college we have tried to use it as a focal point and a symbol. Most staff will have been in the building for training or conferences. We talk about this building when we do sustainability training. It is a tangible sign of the college's commitment.*(VP). Staff development project The Investment in Excellence, part of this is about cultural change in the institution and about changing habits and attitudes. Opportunities for staff to contribute.	III. IV.
CRC22	How have the sustainable elements of the building been used as a pedagogical resource by users of the building and more generally across the institution?	*All construction students will be taught about sustainable methods of construction using the building as a teaching resource. This is not a requirement in all courses but a decision we have taken. If they want to become a plumber we won't let them become a plumber here without letting them see solar thermal water. It is not required but we want to add that and give them a theoretical and practical exposure to sustainability. The trick for us now is how to replicate that embeddedness in other curriculum areas. For example can we get local*	III.

		sourcing, organic, use of chemicals, air miles etc. as core in catering so that when they go out and work they are thinking about where did the food come from, how was it grown, rather than I always get it from this company (VP).
		Most staff will have been in the building for training or conferences. We talk about this building when we do sustainability training. It is a tangible sign of the college's commitment (VP).
CRC23	What have been the institutional developments in sustainability since the completion of the building? What role has the building played in these developments? How would these have been different if the building had not existed or been sustainably designed?	*This partnership with CCC and this project has genuinely been a catalyst for a whole range of organisational change* (VP). 2008 Sustainability Manager (SM) brought in as Curriculum lead on Sustainable Development. (Leaders at different levels and in different areas.) *We have included sustainability for the last two years in the teaching and learning observations, all the teaching staff are aware that it is something we are looking for* (SM). - *When it started both the teachers and observers needed support, but now it is nice to see staff taking every opportunity to include sustainability* (SO). Ofsted inspection 2007 – Ofsted wrote up two best practice guides. *There has been a cultural change and in many respects we are now embarking on the next cultural change with the EMS* (SO). *Corporately it is now core, it is in all the strategic documents. It is a primary objective in 2004 you would not have seen it anywhere. It has all the plans and resourcing that any other primary objective would have* (VP). *It may be different in other colleges, but I am in charge of estates, IT finances, etc, if you want organisational change on sustainability you need to get me or my equivalent on board because all the spending decisions, all the estates decisions, all the IT decisions, all the transport decisions come through me* (VP). *It has been interesting for me to come in on the curriculum side because the estates activities like cleaning are already in place* (SM). *Sustainability is one of our criteria in all our procurement decisions. When we are talking about change management on this subject or any other the power of procurement is grossly under-estimated. If you keep including sustainability as a criteria you will find that some changes for sustainability are not put in by the college but by a service provider* (VP).	III.

		That is the two elements it is one thing having understanding it is another thing having buy-in (SO).	
CRC24	How has institutional change for sustainability linked to, or compared with, developments on sustainability in the sector?	*It has got to the point now where we are one of the leading colleges on sustainable development* (VP). *The Carbon Trust guy said this last week* (SM). *Ofsted have us in their Best Practice Guide* (VP). *We are part of the Carbon Trust pilot on carbon reduction, we are aiming for 14001 and will be the first college to get this across all departments and we have a National Beacon Award for modern methods of construction* (VP). *We are one of the lead colleges in sustainability and that journey happened really quickly from the partnership in 2004, the building went up in 2006 and what we have done since* (VP). *In 2008 I got invited to join the AOC Sustainable Futures Group* (VP).	V.
CRC25	Reflecting on the influence of the building over the last 5 years, what changes would you make to the sustainable design elements of the building?	*We made two retro fits, we fitted a skirt on the UPVC roof to stop the rain coming in and the wind turbine which is symbolic not practical, it works and it generates a small amount of electricity. It is symbolic and it makes a statement* (VP). *It is a very physical statement and it generates a lot of conversations* (SM). *We would improve the natural ventilation* (VP).	III.
CRC26	What additional information could have been provided by the architects/designers to the institution regarding the sustainability of the building?	*Having gained the experience of this project we have found on subsequent projects that the M&E from mainstream architects has been limited. Whole lifestyle costings is a public building requirement and they struggled and never really achieved it despite a lot of help from us. Their knowledge of sustainability in practice is pretty limited* (VP). *We have become an informed client and have gained a degree of expertise which enables us to get the right information* (SO).	I. II.
CRC27	What additional information could the institution have provided to the architects/designers in order to improve the "learning for sustainability" impact of the building?	*I think we provided as much information as we could and we provided additional information during the development process as it became relevant* (SO).	II.

CRC28	What are the main lessons the institution has learnt from the experience of developing the building in terms of institutional change for sustainability?	*A huge amount. It has influenced the £40m plus developments that have taken place since the Smartlife building. It has led to an integration of sustainability across college activities* (VP). Strong focus and awareness by the VP on organisational change. It is some of the other processes in the College aimed at organisational change that have worked in tandem with developments around the building and sustainability – *On the curriculum side we have introduced a staff development change called Investment in Excellence and part of that programme is about cultural change, organisational change and it's about changing habits and attitudes. While you can change some things quickly as the VP said, changing hearts and minds takes longer and staff development and training is part of that process* (SO). *The publicity and the reputational and political impact to the College has been ten times more than the practical impact, and the practical impact has been a big thing. Our reputation has increased hugely (*VP).	III.
CRC29	What is the future strategy for sustainability in the institution and what role will the building play in this strategy?	*Corporately it is now core, it is in all the strategic documents. It is a primary objective in 2004 you would not have seen it anywhere. It has all the plans and resourcing that any other primary objective would have. At the moment we are particularly prioritising getting 14001 EMS for the whole organisation We are also part of the Carbon Trust pilot to get a carbon management* plan (VP). *We are aiming for a 40% reduction in carbon in five years. Training for staff on the ISO14001 is just being rolled out* (SM). *There is an overall Sustainability Steering Group and the SM runs student groups*(VP). - *The NUS Environmental Officer will take that on next year* (SM). *We are looking for a governor sponsor to escalate board involvement* (VP). *Next year we are looking to have environmental champions in each teaching area working as a network* (VP). The next new building SmartLIFE Low Carbon opens October 2011 this is a follow on project from this project and is a continuing partnership project with CCC. This will take things to a new level and aim at being a national centre.	III.
CRC30	What are the main lessons learnt by the designers/architects from the	*The architects had to engage with staff and students during the design process and they can take this experience forward into future projects. They have used the building as a showcase*	I. II.

	experience of developing the building in terms of developing future sustainable education buildings?	*for future clients and have been able to show how they engaged with staff and students* (SO).	

Appendix C – INDICATORS TABLE FOR SUSTAINABLE BUILDING DESIGN

Analysis of the two college buildings using the frameworks of indicators for sustainable building developed in Chapter 3, section 3.4.

Indicator	Example 1	Example 2
1. Design process, consultation with the education stakeholders and support for the leaders in the institution.	The consultation between the architect and the College community was strictly controlled by the Director of Estates. The SDEG was used by the Director of Estates to achieve wider consultation, but there was extremely limited involvement of the whole institution. Limited communication in either direction between the architect and the wider College. The architect and the Director of Estates formed a productive learning partnership.	The consultation was limited to two senior members of staff, one head of department and a limited number of construction students. There was no engagement in terms of consulting the wider College. Once the project was established the leaders in the College conducted their own research on sustainability rather than relying entirely on input on sustainability from the architect. The relationship did not develop into a productive learning partnership.
2. Links with the physical context and landscape	The new building was part of a master plan for the campus. The building linked existing parts of the campus including a recently completed technology building. The development did take account of the natural woodland to the rear of the building. Tree planting in the landscaping around the building was restricted to indigenous species.	The whole campus was relatively new and there was a master plan. The physical context was a modern technology park in a suburban setting, which the new building complemented. The campus development was also located in the context of the Cambs. and Peterborough Structure Plan. There was limited space around the building for landscaping but this did include a small sensory garden.
3. Links with the socio-cultural context	Signage is bilingual (Welsh is an official language), although the information boards on the design of the building were not. The building design was in keeping with the political	The College serves urban, suburban and rural areas and a wide range of social classes from the academic and high-tech urban area to the low wage rural economy. Developing the building was

		environment for sustainable development.	part of a project linked to the regional Structure Plan.
4.	Physical well-being of occupants	Improved working conditions for staff and students compared to previous accommodation. Encouragement for cycling and other exercise with the provision of showers in the building.	Improved working conditions for staff and students. The design was adjusted to give additional protection to an area of the building that was semi-outdoors.
5.	Emotional well-being of occupants	No particular design features to acknowledge the emotional well-being of occupants.	The Sensory Garden, which is part of the landscaping of the building, is small, but it is a direct attempt to provide a reflective area, with particular relevance for people with sensory deprivation.
6.	Materials used and respect for the Earth's resources	All materials used for the walls, roof and floors were A rated in the BRE Green Guide. All timber was FSC rated.	FSC timber was used throughout, including for window frames and cladding. A newspaper insulation product and CFC free polyurethane foam used to insulate the building.
7.	Reduce, re-use and recycle	Construction waste was monitored and recorded for BREEAM assessment. No record of recycled materials being used in the construction of the building.	Construction waste was kept to a minimum, but no records exist for actual amounts. Insulation of the building made from recycled newspaper.
8.	Energy sources and energy management	Ventilation based on natural airflow rather than mechanical. Biomass boiler with thermal zoning provides the heating for the building. Solar thermal panels are used to supplement hot water. Independent lighting control systems.	Under floor heating, but not from renewable source. Light sensors and non-mechanical natural ventilation. The development included a wind turbine generating a small amount of electricity.
9.	Water use and water management	Rainwater is harvested for non-potable uses such as flushing toilets.	Rainwater harvesting for non-potable use
10.	Transport	The College serves a rural	No direct link between the

	population, priority in the masterplan for the campus is given to public transport and cycling over the use of cars. This is reflected in the positioning and layout of the bicycle racks. The College runs a minibus pick-up system for staff, and offers interest free loans for bicycles.	new building and the transport plan for the College. The layout of the campus favours public transport over car use, parking is very limited.
11. Building pedagogy and teaching resources	The design and construction of the building is used directly with construction students. The building as a whole and the water harvesting and carbon emission display in particular are used as learning resources with staff and students across the College.	The building is used as a teaching resource for sustainability for staff and students. Staff CPD courses make references to all the sustainability features that are not immediately obvious. The wind turbine and its readout are highly visible to all staff and students on the campus.
12. Flexibility of spaces and future adaptability	The specialist teaching spaces for plumbing and electrical related trades have limited flexibility. Other rooms can be used for a variety of teaching.	The construction area is a large open space that can be used flexibly. The conference area has the potential to be used in different ways for meetings and teaching as well as small conferences.

Appendix D – INDICATORS TABLE FOR INSTITUTIONAL CHANGE FOR SUSTAINABILITY

Analysis of the two college buildings using the frameworks of indicators for institutional change for sustainability developed in Chapter 4 section 4.7.

Indicator	Example A	Example B
1. SD/ESD is embedded in the development plans, policies and practices of the institution; these are communicated to all stakeholders; and they are monitored and evaluated regularly	The College had already embedded SD and ESDGC into its policies and practices to a degree prior to the development of the new building. This followed policy initiatives from the WAG. The SDEG was a response to WAG policies with volunteers from across the College community. Policies were reviewed regularly. The process of developing the new building strengthened the embedding across the College.	At the start of this building project the College had not addressed or embedded SD or ESD. The development of this new building initiated a strong commitment to engaging with and embedding SD. In 2004 SD was entirely missing from the College's plan, by 2010 SD was a primary objective within the College Strategic Plan.
2. A distributed approach to leadership is in place, allowing leadership to emerge at all levels, with leaders at a senior level in the institution giving sufficient priority and resources to SD/ESD	The senior management were supportive with the Director of Estates taking the lead at that level. The Chair of the SDEG was the ESDGC leader in the College. The building project strengthened the leadership role of the Chair, but did not encourage broader leadership roles to develop.	Leadership on SD came from the senior management team in the form of the Vice Principal. On his initiative appointments were made to establish leaders at different levels in the College hierarchy.
3. All staff and governors receive CPD/training in relation to SD/ESD	While CPD/training did exist it was not comprehensive for all stakeholders.	All staff training now includes references to SD, but not all stakeholders had received training at the time of this research.
4. ESD knowledge and skills are embedded	Not fully embedded. A curriculum audit had been	As a result of the building project a Sustainability

across curricula and courses, and are monitored and reviewed	conducted and the chair of the SDEG was leading on this. This was work in progress on the back of the WAG ESDGC Action Plan and coincided with the development of the building which raised the profile of the audit. ESDGC became part of lesson evaluations.	Manager was appointed to lead on embedding SD in the curriculum. The Sustainability Manager initiated a rolling programme of working with the different curriculum areas. Monitoring of SD has been integrated in lesson planning and lesson evaluation.
5. There is a collaborative approach to SD/ESD and a sharing of good practice across networks in the sector	As a result of the building achieving BREEAM Excellent rating the College in general and the Director of Estates in particular were sharing their experience of developing the building with other colleges in Wales and England. The Director of Estates was also invited to chair the Welsh FE Estates and Environment Committee.	The local authority was a partner in the building project and has used the building as a focus for raising awareness and sharing good practice. The developments at the College have been shared with the sector through Ofsted Best Practice Guides and an EAUC case study. The Vice Principal joined the AoC Sustainable Futures Group as a result of the building project.
6. Mechanisms are available for learners and other stakeholders to contribute to decision making	The focus is almost exclusively on the SDEG here, which increased its influence as a result of the building project to become a formal committee in the management structure of the College. The SDEG used its internal network to consult staff and students.	No established mechanisms, but the Sustainability Manager was initiating work with the student body in terms of consultation on SD decisions.
7. Sustainable procurement policy and practice extends to all institutional activities and covers ethical issues	This was developed in line with a Welsh FE initiative supported by the WAG.	Previously these were completely missing, following the building project they are fully embedded across all areas of procurement.
8. Resource use across the institution is monitored	Energy and water resources are monitored	This is linked to the procurement policy and

and reviewed	and reviewed. Zonal management systems were part of the new building's design.	practice with a significant level of monitoring on energy and water resource use.
9. The institution has multiple links with the community that it serves and is seen as a community resource including for sustainability	The College serves a rural community and has multiple links with the businesses, public bodies and civil groups in the community. The new building has been used as an example and learning resource by the local planning authority and by groups in the local community.	The College is seen as part of a wider science park and it has links with HE and with business. The building project developed local authority and regional partnerships. The new building hosts school groups to share learning on sustainability.
10. The institution is outward looking in terms of global issues	The College has a number of overseas links through organisations such as Wales Africa, and it attracts a number of overseas students. However, the global perspective is limited in its development.	The building project was part of a tri-partite project with Malmö and Hamburg institutions. The College also has also developed multiple overseas links. There is less evidence of the global perspective present in the curriculum.
11. All new building and refurbishment meet recognised standards of environmental sustainability	A policy of building to internal standards of environmental sustainability already existed prior to the new development. The new building conformed to BREEAM Excellent rating.	Prior to the new development the College did not commit itself to any environmental sustainability standards. The European project that funded the building required it to demonstrate sustainability, although specific criteria were not laid down. The experience of the development of the building has influenced the sustainability of future building developments on the campus.