Planning to Partner with Nature:

Regenerative Development and Design in North America

Submitted by

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ABSTRACT

A dividing worldview separating people from nature has resulted in development practices that degenerate life-supporting systems. Sustainable development paradigms to date have attempted to lessen the impact of human development, but have failed to gain the momentum needed to generate a new worldview and evolve into radically changing mainstream development practices. This research explores how the paradigm of Regenerative Development and Design (RD&D) can better enable human development to partner with living systems to co-create conditions for promoting healthy and thriving built environments for all forms of life. Particularly, the research examines what role professional planners can play as active participants of RD&D. Through a literature review and precedent case studies, the work identifies RD&D principles and how they are applied in practice. Key informant interviews with practitioners and theorists of RD&D contributed further knowledge about the benefits and challenges of RD&D, as well as the responsibility of planners for such projects. The research concludes that a new worldview, which considers people as members and participants of natural systems, is necessary in order to create successful RD&D projects. More specifically, there is a need to identify and document the influence of such a worldview in future built RD&D projects. It was further determined that planners are well positioned to contribute to the long-term and dynamic vision required in RD&D projects. Planners also have a key role to play as champions for the policy transformations required for RD&D to progress as a paradigm. Recommendations are offered to planning professionals as to how they may become more knowledgeable and involved participants in the RD&D process.

Keywords: Regenerative Development and Design, Sustainability, Sustainable Development, Planning, Worldview, The Willow School, The Bullitt Center, UniverCity

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Kayla

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Chapter 1: Introduction

Bill Reed has said that sustainability is a journey, not a destination. As navigators of this journey, people have full responsibility and control of its course. Since people have learned many of their behaviors and practices threaten the delicate balance of life on Earth, there has been a struggle to do things a different way. One path is for people to continue to live the dangerous and destructive lifestyles that have damaged Earth, and the living systems their lives depend on. Another path offers a new understanding of the delicate and interconnected nature of these systems, and a way to live harmoniously and sustainably within the limits of the planet's finite resources. For the latter to be chosen, people will have to shift their worldviews, accept their roles as equal members of the natural world, and consciously restore their relationship as a species within nature. Regenerative Development and Design (RD&D) has been proposed by several researchers (Cole, 2012a, Hes & du Plessis, 2015; Lyle, 1994; Mang & Reed, 2011; McLennan & Reed, 2013; and Williams, 2012) as a paradigm that can enable people to reconnect with their living communities, and actively co-participate in their positive development. Specifically, RD&D offers a new framework with which planners may learn to interpret the world, and provides a variety of tools they may apply in the pursuit of creating built

environments that are holistic, healthy, equitable, and truly able to sustain all forms of life.

1.1 Problem Statement

Despite numerous warnings over the past five decades, little has been able to sway people's minds or alter their actions away from a dangerous course. A detached relationship with the living systems people rely on, a society that promotes consumption beyond its worldly limitations, and developmental practices that weaken and destroy the ecosystems comprising the web of life, still dominate our world. Developmental paradigms to date have failed to effectively address these issues, and planners have generally been obliged to operate within these detrimental and unsustainable frameworks. A new approach needs to be taken to restore balance between people and other living systems, and promote and sustain life in all its forms. RD&D purports to offer an alternative path, which may enable planners to view themselves, and their roles on this planet, in a new way. Furthermore, RD&D provides a methodology with which planners may co-create with natural systems to reveal a greater potential in every place. This research hopes to promote the development of the built environment as an essential component of greater living systems, bring additional attention to RD&D as a progressive paradigm in the evolution of

sustainable development, and explore the potential application of RD&D within the field of planning.

1.2 Research Questions

The research was guided by the following two questions:

1) What are the principles associated with RD&D, and how are they being applied in practice?

2) What role do planners play in the process of RD&D, and how might they contribute to its future as a successful paradigm?

1.3 Significance of Research

Firstly, this thesis aims to increase the awareness of RD&D within the planning profession, as a paradigm that has the potential to guide people to a new form of co-evolution between us and natural and built environments. In a world where a long-established way of life is being disrupted, design professionals, policy makers, scientists, environmentalists, and governments, in particular, will require the knowledge and tools to help us navigate toward an alternative future.

This work also attempts to position RD&D as a paradigm within the spectrum of sustainable development, and offers an overview of RD&D theory and principles published to-date. Though the basic principles of RD&D have been acknowledged and developed for nearly fifty years, this research recognizes more recent development of both the theory and application of

RD&D principles have only just begun to break into the mainstream. This work attempts to address this issue by filling gaps in the very limited literature on RD&D, especially pertaining to planning perspectives.

RD&D by its nature involves a long-term process unique to each place in which it is implemented. In order to address this situation, I provide three examples of RD&D in practice, as precedent project studies ranging in location, completion date, typology, and scale. RD&D theoretical concepts are applied to the precedents to further clarify how these theories may be used in practice.

The Canadian Institute for Planner's (CIP) *Policy on Climate Change* states, "planners think holistically and for the long term…planners educate and learn from communities, and in turn, provide links among politicians, residents, developers, and other professionals" (CIP, n.d.). As planners are well suited for comprehending and undertaking the long-range, social, and political considerations (CIP, n.d.), which coincide with the work of RD&D, they will need to be informed about how to integrate RD&D concepts into their practice. This research contributes to preparing planners to fulfill these roles by investigating the implications of RD&D for the planning profession, as well as the roles planners may play in the process, through the use of semi-structured interviews. The recommendations I propose may assist anyone involved in RD&D related

work, however, they are particularly addressed to planners, who may find them useful when attempting to position themselves within a RD&D process.

1.4 Assumptions, Limitations, and Biases

There were few assumptions made during this research. A key assumption made the reader would have an interest in, and understanding of, basic sustainability issues and why it is necessary to address them. It was also assumed there is limited research on projects that employ RD&D principles. Many projects do employ a number of RD&D principles, but their responsible agents do not explicitly acknowledge their place within the paradigm.

There were several limitations to this project. A key limitation was the limited body of literature on RD&D due to the novel nature of the subject, which has made it difficult to collect data from secondary sources. Also to date, very few completed projects have attempted and are recognized as incorporating RD&D principles, and only some have been implemented at a community scale. The prolonged nature of implementing a project based on RD&D principles also limits the availability of knowledge to be gained from these projects, since they are never technically "completed"; rather, they continue to evolve over time.

Eligibility, time and location were also factors in completing interviews for this research. Some of the potential interviewees identified as the most knowledgeable or experienced on the subject did not respond, or were not

available, resulting in a less balanced group of interviewees than originally hoped for. The International Living Future Institute's Living Future unConference 2014 provided the opportunity to meet with some interviewees in person, but other respondents located around the continent were interviewed by telephone.

As a bias, I have personally been a passionate and active advocate for sustainability issues. I completed my undergraduate degree in Environmental Studies, and became well-versed in general environmental concerns. I have had numerous jobs and hobbies related where I experienced first hand the benefits of having a close connection to the natural environment.

1.5 Research Methods & Analysis

I saw the emergence of RD&D being a potential paradigm for sustainable development as an opportunity to investigate its applicability to the planning profession. To achieve this, I first undertook a thorough review of literature on the topics of: a history of sustainable development, the relationship between people and nature, the worldview required to understand and achieve RD&D in practice, and the basic principles and methodology of RD&D. The literature review also revealed an opportunity to engage professionals closely involved with RD&D in their work to better learn how RD&D principles are applied in practice. Following the literature review, key informant interviews were used to position the role of the planner within the process of RD&D projects. Finally, to

round out the application of RD&D in practice three precedent studies of the Willow School, the Bullitt Center, and Simon Fraser University's UniverCity were undertaken.

Literature Review

Research began with a review of relevant and pertinent literature. Denney and Tewksbury (2012) suggest the literature relates the proposed research to the greater body of literature on the topic, and establishes the overarching themes and offers a possible framework. The literature review may also be an opportunity for the researcher to dig deep into a more creative process, and find their own voice within a greater field of study through personal interpretation of current literature (Montuori, 2005). Bui (2009) suggests literature review should examine three main areas of research, with each area being composed of three articles identified as significant contributions to the topic (Bui, 2009).

I began the literature review by identifying three areas of study (as suggested by Bui), which included: 1) issues provoking the RD&D paradigm, 2) current theories and practices associated with RD&D, and 3) professional perspectives on the application of RD&D. It was quickly identified that only the first two areas could be completed in the literature review, and that the third would be determined through an interview process. The literature review was

comprised of journal articles, websites, books, research documents, news and magazine articles, and videos. The two main areas were expanded to the themes of sustainability, ecology, spirituality, worldviews, systems theory, and regenerative development and design. From this review, questions remaining to clarify the first two areas, or to inform the third area of study were generated and executed through semi-structured interviews.

Semi-structured Interviews

Key informant interviews were used to explore the role of planners and current uses of RD&D in practice, which were not documented in the literature. Semi-structured interviews were chosen because they allowed for flexibility to follow more in-depth patterns and responses provided by the interviewees (Bryman & Teevan, 2005). Gray (2009) also states the semi-structured interview allows for the researcher to explore paths that may not have been considered in the initial questions (p. 373).

Following ethics approval, nine potential professionals identified as having a comprehensive understanding of RD&D were contacted by email with a scripted interview request and information sheet. Of the nine, five were interviewed by phone or in person for approximately one hour. Interviewees were sent a copy of the interview schedule, and signed an ethical consent form prior to their interview. With permission, all interviews were recorded using a

voice recorder, and copies of the transcriptions were sent within a month of the interview for approval. Notes were also taken by hand during the interviews. Quotations used from the interviews appear in verbatim, and in some cases have been paraphrased.

As suggested by the literature on semi-structured interviews, unpredicted themes emerged as the interviews progressed, requiring that research questions be adjusted from the original interview schedule. The flexibility of the semi-structured interview allowed a more relaxed discussion, and for the interviewee to delve further into topics they felt were important to the conversation, but not necessarily on the interview schedule.

International Living Future Institute's Living Future UnConference 2014

I had the opportunity to attend the Living Future UnConference 2014 in Portland, OR in May, 2014. The conference offered workshops, lectures, and tours surrounding leading-edge sustainable practices in the built environment. To better understand the concepts and application of RD&D, I attended a workshop hosted by the consultant group Regenesis, titled *Making the Difference that Makes a Difference: Projects and Processes as Catalysts for Regenerating Life*. I also attended several lectures on regenerative-related subjects and met professionals who are engaged in sustainable development. To capitalize on time, budget, and availability, I was also able to conduct two of

the semi-structured interviews while at the conference. The conference provided a better understanding of the professional practice of RD&D, as well as current perceptions on the future direction of the sustainable development movement.

Precedent Studies

Precedent studies were also conducted to connect the literature to the practice of RD&D. The Willow School is a small private institution in Gladstone, NJ. The Bullitt Center is a commercial office building in downtown Seattle, WA. A master plan for *UniverCity*, a community on the Burnaby campus of Simon Fraser University was also reviewed. The three precedents were selected because of their range in scale, their state of completion, and their location. Although the site visit was not identified as a formal research method in the proposal, I visited UniverCity at Simon Fraser University and Seattle's Bullitt Center, to better understand the context and function of these precedents. While at UniverCity I completed one of the semi-structured interviews, and also toured the site for approximately one hour to better understand the context and scope of the project, and to take photographic documentation. A two-hour long site-visit at the Bullitt Center included a building tour by the University of Washington Center for Integrated Design (CID), and photographic documentation of the building and its site.

Data Analysis

The data was analyzed using the method of grounded theory. Through an iterative process of data gathering and analysis, information was coded, and the categories identified were used to develop the general theory of the thesis (Gray, 2009; Bryman & Teevan, 2005). Selective coding was chosen because, as Gray (2009) explains, it allows the researcher to identify a core category and sub categories through which a story can be told (p. 508). For example, data on the precedent cases such as project features, goals, and development process was first complied. Following this composition, RD&D project categories identified by the literature review were then used to analyze the data on the precedent studies, and verify their regenerative qualities in the third chapter.

The phenomenological review, as explained by Randolph (2009), was particularly applicable to my thesis. Interviews with those who experienced the phenomenon first hand provided sufficient material to inform the research findings (p. 10). The research process followed in a phenomenological review involves: positioning the researcher within the phenomenon, collecting data, identifying meaningful statements, giving meaning, and thick, rich description (Randolph, 2009). This was achieved through the semi-structured interviews as described in Chapter Four.

Ethics

Throughout the research, I practiced ethically sound methods in an attempt to "treat participants with respect, minimize their risk of harm, and protect their rights for confidentiality" (Bui, 2009, p. 78). I closely considered the four principles suggested by Gray (2009) regarding how to avoid the harm of my participants, ensure their informed consent, respect their privacy, and avoid deception (p.73).

I avoided the deception of my participants by fully disclosing the objectives of the research, informing them about why they had been asked to participate in the study, and how long the interview was expected to take.

To ensure informed consent, all information on the study was disclosed to participants through a consent form that was signed by the participant and myself before the interview began. The form outlined: that only myself would be conducting the study, contact information, the purpose of the study, the potential risks involved, and the benefits of the study.

I also avoided any physical, psychological, emotional, professional, etc. harm of the participants during the study. Participants were able to pause for a break or could stop the interview at any time. In an effort to reduce the risk of any social or professional harm that could be done, the anonymity of interviewees was assured (unless permission was granted for names to be

disclosed), and certain information could be requested to remain off the record. To respect the participants' privacy, all information recorded electronically or by hand has been destroyed upon completion of the thesis.

1.6 Overview

This document is organized into five chapters. Chapter One introduces the topic and research questions, and discusses the significance of the research, assumptions, limitations, and biases associated with the project, and research methodology. Chapter Two reviews the literature regarding: the implications of a dominant worldview on sustainability, the worldview required to discern and execute RD&D, the human relationship with nature, how the principles of RD&D differ from those of conventional development, and specific concepts of RD&D. In Chapter Three, the details and analysis of the precedents are reviewed. The concepts of regenerative development and design, regeneration, place, pattern, literacy, story, and potential, as discussed in Chapter Two, are also applied to the precedents. Chapter Four presents an analysis of the key informant interviews, whose themes highlight current and future sustainable paradigms, worldview, policy, and planners. Finally, Chapter Five summarizes key findings from the preceding chapters of the document, and provides recommendations to planners and those working in the area of RD&D.

Chapter 2: Literature Review

RD&D is considered by experts such as Cole (2012b), Hes and du Plessis (2015), and Mang and Reed (2012) as a step forward in the evolution of sustainable development. As a paradigm still in development, only a small body of literature on the subject exists, with only a handful of examples of RD&D in practice, though interest in and contributions to, this work are growing. This literature review is intended to add to this body of knowledge, and raise further awareness of the paradigm-shifting work being done, with particular emphasis on the field of urban planning. The first three themes of this literature review focus on fundamental issues of the predominant economic, political, and social systems that are driving the emergence of RD&D: a need for development to sustain life, a need for a shift in worldview, and a need to reconnect to nature. The fourth theme of this literature review centres on RD&D principles and techniques, which offer a response to the issues of the first three themes. This chapter builds on work completed for a term paper in the 2013 CITY 7460 "Urban Ecology" course of the City Planning program at the University of Manitoba.

2.1 Sustainability

The concept of sustainability has gained considerable popularity in recent years, particularly within development professions, and many have come to

realize the impact of the built environment on the planet and its inhabitants. As a profession that is mindful of the impact of the design and function of development on both people and their life supporting systems, the field of planning is inexorably linked to sustainable development.

Scholars have discussed the history of the sustainable development movement and sustainable planning issues at length (Edwards, 2010; Hough, 2004; Mang, 2009; Newman, Beatley, & Boyer, 2009). The most acknowledged definition of sustainable development (described by the World Commission on Environment and Development (WCED) in 1987) states: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition has been highly criticized for being too ambiguous and open to interpretation, and therefore misuse (Harris, 2013).

I believe WCED's definition has been misused and taken advantage of by Western society, and an alternative definition, repositioning people as part of nature, should be adopted. One such definition, offered by Curwell and Cooper (as cited in Pedersen Zari & Jenkins, 2010, p. 3), describes sustainable development as being comprised of three key areas:

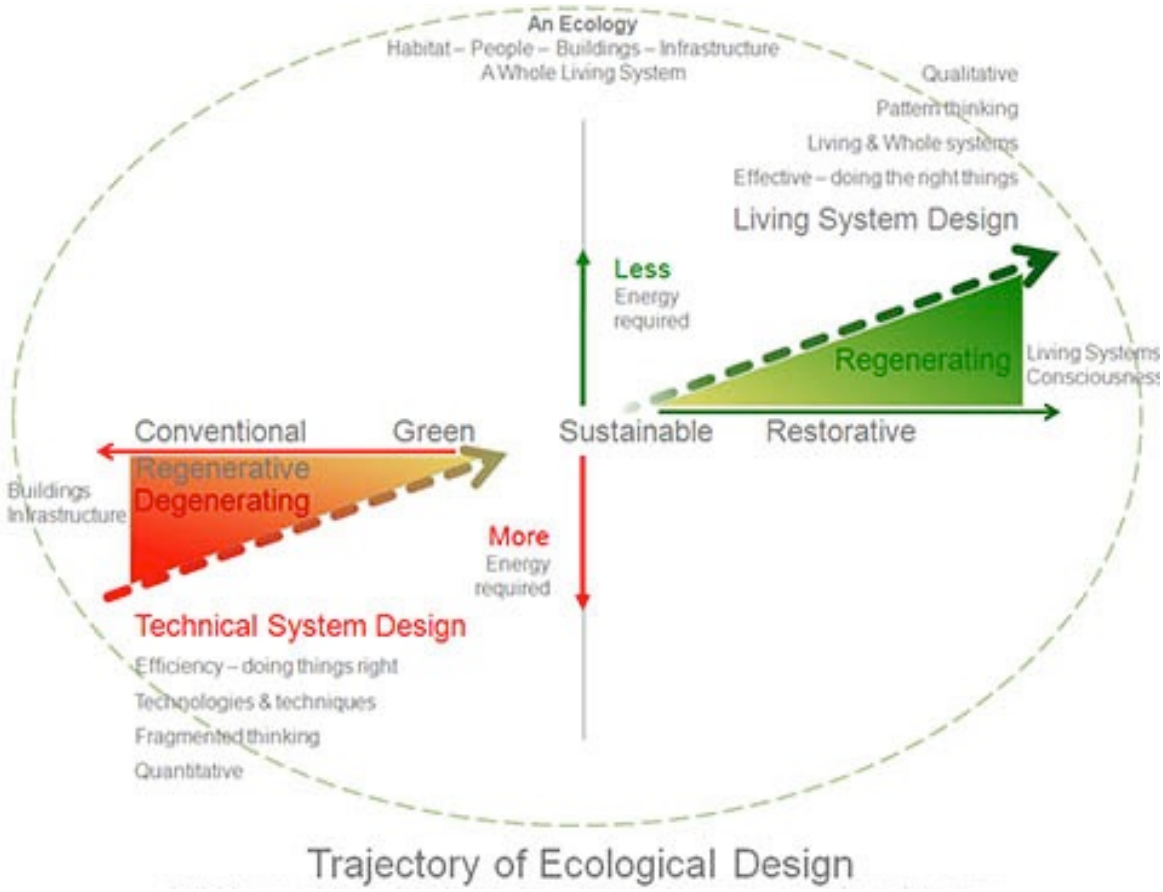
> 'environment', refers to the preservation of local and global ecosystems to sustain all life; 'public participation' acknowledges the need for all humans to participate in positive change; and 'equity' refers to the fair sharing of global resources for both human and non-human life. (p. 3)

This description acknowledges the integrity of the living systems, which enable the needs of all life on Earth to be met. As well, the above description positions people as equal members of the ecosystems, and as such, suggest they contribute to their systems in a positive way. For these reasons, Curwell and Cooper's definition has been adopted as the standard of sustainable development for the purpose of this thesis.

Many sources note the inability of current practices to embody Curwell and Cooper's definition, and how the majority of development today is not able to sustain all forms of life indefinitely (Eisenberg & Reed, 2003; Newman, Beatley, & Boyer, 2009; Newman & Jennings, 2008; McDonough & Braungart, 2002). Some developments are seen as 'green' or 'sustainable' because they improve on acceptable minimum levels of requirement; however these practices are simply "less bad" because they still allow for some degree of environmental degradation to take place (Hough, 2004; McDonough & Braungart, 2002).

As seen in Figure 1, conventional practices fall within the degenerative category, and focus primarily on individual structures and their separate systems and components, through a relatively fragmented process. This form of

development requires a large amount of energy, based on the use of technical systems, and a heavy reliance on quantitative data.



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Cole (2012c) acknowledges sustainable certification and rating systems, such as LEED, Green Globes, and BREEAM, have made considerable progress in helping to raise awareness about sustainability in the built environment and to push for market transformation. However, these programs still focus merely on

the mitigation of environmental degradation (Cole, 2012c). They are ineffective at connecting projects to the greater systems surrounding a site and have difficulty informing systems-based design (Cole, 2012c).

Some sustainable practices assume it is possible to predict the impact human actions have on nature, often through the use of technical inputs (Lyle, 1994). Lyle (1994) dismisses this notion, saying the complexity of nature - with its dynamic flows, and the lengthy amount of time required before its systems may be understood - ensures absolute prediction is not possible.

Truly sustainable communities require the restoration and regeneration of whole systems, which are human and non-human, dynamic, and interrelated (Pedersen Zari & Jenkins, 2010). Marcotullio & Boyel (as cited in Newman & Jennings, 2008, p. 3) state "Sustainability can only be achieved when cities are approached as systems and components of nested systems."

Knowledge of these delicate systems and the effects of development on them have been observed for over a century by people such as Henry David Thoreau (1854), Aldo Leopold (1949), Rachel Carson (1962), Buckminster Fuller (1968), and Ian McHarg (1969). However, despite this knowledge people have been slow to change their degenerative practices. Newman, Beatley, and Boyer (2009) comment on the failure of many urban developmental processes to account for the complexity surrounding issues of natural systems and

sustainability, as one reason for this shortcoming. Another reason is practices have not been able to deliver significant environmental changes, either conceptually or practically, to really prove the worth of the movement (Cooper, 2012). Eagly and Kulesa suggest negative messaging has also been detrimental to the movement, saying, "…persuasive appeals have consistently stressed the negative consequences of failing to ameliorate them (as stated in Cole, 2012a, p. 2)."

Cole (2012c) observes the majority of sustainable efforts presently focus on issues associated with impacts of our actions and how to mitigate them. Less attention is given to the problematic worldviews and societal structures which perpetuate these problems. Hes and du Plessis (2015) state:

> The real problem lies in the stories we tell ourselves to justify why we dither and procrastinate, and those we tell about sustainability and how strongly they are still being influenced by the worldviews and value systems that created the problem. (p. 17)

If people do not first adopt new worldviews and value systems, the aforementioned struggles of the sustainability movement will persist, and life-sustaining regenerative practices will fail to be relevant.

The importance of people reconnecting with nature has also been established as a primary goal of any future sustainable development. A dominating human-centric worldview has detached us from natural systems and allowed a degenerative paradigm to persevere. Lyle (1994) suggests if people

are to continue to develop as a species, they must join again with nature and correct the imbalance between nature and themselves.

To create and participate in self-sustaining environments, people will have to go beyond their present efforts and shift present worldviews and value systems from human-centric to systems-centric (Hough, 2004). Hough (2004) proposes they should begin by positively contributing to the environments and systems we are involved with.

Robinson (2004) suggests the future of sustainability will integrate "new concepts and tools that are integrative and synthetic, not disciplinary and analytic; and that actively creates synergy, not just summation" (p. 378). Therefore, sustainability should allow the by-products of human development to be repurposed, and to enable other species to benefit (Hough, 2004). Furthermore, Newman and Jennings (2008) call for a process that can bring together the various sustainable efforts made thus far, and provide a framework to guide people towards a regenerative future.

Regenerative projects build on fundamental elements of planning to create places which function at a higher social and ecologically sustainable level than those existing. RD&D is considered a paradigm that requires a new way of seeing the world, and value systems unlike those that govern the world. It is

therefore pertinent to examine how people may shift their worldviews to change the popular dominating culture, as an effort to move into this new paradigm.

2.2 A New View

> "No problem can ever be solved from the same consciousness that created it." - Albert Einstein

For many years the majority of people have seen themselves as separate from the natural systems they depend on, which has led to the unconscious and conscious destruction of life on Earth. Many have acknowledged these mistakes and are calling for efforts to be made to repair some of the damage, and find a more harmonious way to tread on our planet (Hough, 2004). Many economic, political, demographic, and societal obstacles stand in the way of generating a further shift in values in order to see such a vision come to fruition. However, the fragile state of our natural environment heeds us to look for new practices and processes, which will allow us to once again benefit from and contribute to life-sustaining nature (Hough, 2004; Newman & Jennings, 2008).

The present is an interesting time, with many important and deeply rooted problems left unsolved. Long-held worldviews are beginning to crumble under a new understanding that people have reached the limitations of their social, political, and economical constructs. Hes and du Plessis (2015) suggest

the dominating worldview holds three detrimental 'stories', which must change if humanity wishes to continue to evolve on this planet.

The first story is the universe functions as a system, governed by laws that explain and predict natural phenomena, and ultimately allow people to control it (Hes & du Plessis, 2015). The second says living and mechanical systems can be broken down into individual parts whose problems and solutions can be found in isolation (Hes & du Plessis, 2015). The third story is human growth and development can, and should, continue to grow indefinitely, aided by their ingenuity and technological advancements (Hes & du Plessis, 2015).

They argue this collective worldview fosters individual fulfillment, and happiness and success based on quantifiable means, such as economic wealth and possession of objects (Hes & du Plessis, 2015). Through this value system people separate themselves from nature by thinking they are above it, allowing them to perpetuate a cycle of consuming resources beyond their means (Hes & du Plessis, 2015). Fortunately, as Hes and Du Plessis (2015) point out, worldviews continually evolve; as one reaches its limits of success and applicability, a new one emerges to support a greater level of understanding and fulfillment.

Since the planet will not be able to support this predominant worldview in perpetuity, a new worldview must be sought. RD&D offers a step forward on this

journey by requiring people shift away from that thinking and internalize a new consciousness (McLennan & Reed, 2014). This new consciousness will enable people to open their hearts and minds, and help them to find new solutions to truly embrace and implement the political, social, economic, and environmental changes necessary if they wish to thrive as a species.

Some have called it the *Great Turning* (Korten, 2006; Macy & Johnstone, 2012), some call it the *Great Work* (Berry, 1999), and others call it a macroshift (Laszlo, 2001), or humanity's next significant revolution (Meadows, Randers, & Meadows, 2004). Whatever name it goes, these conjectures all recognize there will be significant changes made to the world as we know it, and all people have the ability and responsibility to participate in this change.

David Korten (2006) illustrates the difference between our current worldview, recognized as 'Empire', and the potential worldview of what he calls 'Earth Community'. The 'Empire' is dominated by a masculine hierarchy, under which humans are dangerous, competitive, power-thirsty, and defend only themselves (Korten, 2006). Under an 'Earth' community, a partnership between balanced genders creates a supportive and cooperative order, promoting a love of life, many possibilities, and rights of all living beings (Korten, 2006). By changing the predominantly egocentric, power-driven worldview to one of altruism and cooperation, people may be able to embrace a higher level of

consciousness necessary for them to address the issues they face today effectively (Korten, 2006).

Numerous hypotheses postulate the achievement of an Earth Community-like state through a series of shifts or transformations in society (Berry, 1999; Korten, 2006; Laszlo, 2004; Macy & Johnstone, 2012). These shifts involve conscious changes to cultural, economic, and political systems (Korten, 2006).

The shift will require a cultural and spiritual awakening, permitting people to shift their values away from superfluous materialism to spiritual fulfillment, and embrace the possibilities of their collective diversity and cooperation (Korten, 2006). Korten (2006) suggests an economic shift will see the value in the well being of family, community, and natural environment over material possessions, as well as reestablish qualities of equality and conservancy to the economic system (p. 22). Lastly, a political shift will "turn from a democracy of money to a democracy of people," says Korten (2006, p. 22). Active citizenship, cooperation for a greater good, and the restoration of mutual accountability and responsibility will contribute to a new political future (Korten, 2006).

2.2.1 Social & Cultural Shift

Korten (2006) argues under the social dynamics of Empire people are actively suppressed from achieving their potential. He also suggests, to move

toward an 'Earth Community', people must ascend to a higher level of consciousness – a spiritual consciousness – which views the world as an integral being in which they may actively participate as co-creators (p. 47). This consciousness "approaches conflict, contradiction, and paradox not as problems to overcome, but as opportunities for deeper learning" (Korten, 2006, p. 47). An important step in achieving spiritual consciousness will be for people to take responsibility for their past destructive and arrogant actions, and move forward with the understanding and support of one another (Korten, 2006).

JoAnna Macy, another supporter of the *Great Turning*, describes the ascension of consciousness as a shift to view individual selves as members of the greater human and earth communities (Macy & Johnstone, 2012). The current paradigm favors individualism, a harmful and profligate practice, which pits people against one another and promotes consumerism and personal success over community well being (Macy & Johnstone, 2012). Macy and Johnstone (2012) maintain by embracing roles as integral members within the circles of the greater web of life, people will become more powerful than their individual selves, enabling the desires and creativity of all life to instead be expressed through them. A person may feel more connected to others, and related to the Earth, when they inhabit the various roles of identity including: self, family, community, human society, and the web of life (Macy & Johnstone, 2012).

As people recognize themselves are a part of the web of life, they must embrace a planetary ethic, as Laszlo (2001) suggests, and find a way to live that benefits not only themselves, but all others as well. Arne Naess (2002), the pioneer of Deep Ecology, refers to this interpretation as an "ecosophy", or an individual's own philosophy or wisdom pertaining to the human-nature relationship. After one has developed said philosophy, or shifted their worldview to embrace their role as a participant in the greater web of life, they can be valuable proponents of the change needed to complete the work of this ecological movement (Naess, 2002).

Furthermore, many propose that working to embrace a new worldview begins with developing the spiritual and loving self (Laszlo, 2001; Macy & Johnstone, 2012). "Like air and water, like the love and companionship of our kind, we need spiritual connection," says David Suzuki (1997), "we need to understand where we belong" (p. 184).

Senge, Scharmer, Jaworski, and Flowers (2004) suggest working on the self involves slowing down and cultivating concentration and mindfulness, allowing one to observe and act with purpose. People are then better able to redirect their thoughts, and observe a situation the whole of a situation, and their role within it (Senge et al., 2004). Therefore, people can honestly see how

their actions have affected the planet, feel empathy and compassion for the situation, and become empowered to change.

Nurturing love is also seen as an essential component of the work on self and integral to shifting our worldview. Senge et al. (2004) say, "…the only change that will make a difference is the transformation of the human heart" (p. 67). Meadows et al. (2004) believe individualism and shortsightedness are to blame for unsustainable practices, and developing an ability to love will open doors and present new opportunities for improving the planet. They also point out how difficult it can be for people to become spiritually vulnerable, opening their hearts in a society which often dismisses emotion as invaluable sentiment (Meadows et al., 2004). They offer advice on how people may be able to overcome this shortsighted view, saying:

> It is not easy to practice love, friendship, generosity, understanding, or solidarity within a system whose rules, goals, and information streams are geared for lesser human qualities. But we try, and we urge you to try. Be patient with yourself and others as you and they confront the difficulty of a changing world. Understand and empathize with inevitable resistance; there is resistance, some clinging to the ways of unsustainability, within each of us. Seek out and trust in the best human instincts in yourself and in everyone. Listen to the cynicism around you and have compassion for those who believe in it, but don't believe in it yourself. (Meadows et al., 2004, p. 282)

2.2.2 Economic Shift

In its traditional form, capitalism is "a financially profitable, nonsustainable aberration in human development," according to Hawken, Lovins, and Lovins (2010). Bill McKibben agrees, saying, "our current economic growth model is associated with environmental decline, limited happiness, and social inequality" (as cited in Edwards, 2010). Since the Industrial Revolution people have made impressive technological progress alongside the development of the economy, but this progress has come at a terrible cost to the natural capital of the planet (Hawken, et al., 2010).

Although resources appear to be abundant today, Hawken, Lovins, and Lovins (2010) argue people don't feel the appropriate level of concern because the economy fails to recognize the true value of natural capital. For example, services such as flood control, water storage, and clean air are all provided by forests, however people only continue to pay the price for the lumber harvested from them (Hawken et al., 2010). Furthermore, the built environment requires an enormous amount of resources for their construction and maintenance, and local natural systems are expected to address the waste and pollution produced by them (Newman & Jennings, 2008). Newman and Jennings (2008) also note this has led to an unprecedented flow of resources; more energy is being taken from natural systems than is being replaced, resulting in significant environmental

degradation. Lyle (1994) also acknowledges the problem, and suggests people should be living off the interest of Earth's resources, instead of killing the capital. Therefore, valuing both social and natural processes appropriately will be a necessary step in the future of economics, in order to avoid an economic collapse, and safeguard a rich and prosperous future for the planet (Hawken et al., 2010; Mbohwa & Mudiwakure, 2013).

2.2.3 Political Shift

The governing political systems have been criticized as being inefficient, top down institutions unsuccessful at resolving societal problems, such as human rights, environmental degradation, and wealth inequality (Korten, 2006). A true democracy of high-functioning participation of local processes, as defined by Roseland (2005), has yet to be achieved, but is a vital goal of the forthcoming transformation.

In lieu of a system based on power and authority, Korten (2006) suggests a model of partnership should be adopted, empowering communities to closely connect with local situations, and create the potential for more creative problem solving. He argues for a more organic process, saying, "life has learned over billions of years the advantages of cooperative, locally rooted self-organization. Perhaps humans are capable of doing the same" (Korten, 2006, pp. 14-15). Roseland (2005) agrees, citing bottom-up, self-reliant, and scale-appropriate

actions should be employed through extensive community participation. Furthermore, a new process should address greater social, environmental, and economical issues (Roseland, 2005).

Laszlo (2001) carries this concept further, proposing political structures be designed such that "decisions are made on the lowest level at which they are effective" (p. 117). He proposes the flow of goods, money, and knowledge, as well as the integrity of the biosphere would be best addressed at the global scale (Laszlo, 2001). The regional scale should direct social and political ambitions and concerns of nations, providing a platform for negotiation and resolution of issues between nations and their citizens (Laszlo, 2001). Lastly, Laszlo (2001) suggests the local level be made of delegates from community organizations, which coordinate their justice systems and social and political actions in accordance with the will of the public.

Although these theories may seem sentimental and utopian, they offer conceivable clues as to how we may begin move forward toward a regenerative future. Meadows et al., (2004) says,

> Of course no one knows how to bring about such a revolution. There is not a checklist…the burden of making it happen is not on the shoulders of any one person or group. No one will get the credit, but everyone can contribute. (p. 269)

RD&D offers a way people may act to bring awareness to the root issue of worldview and value systems, and ultimately to inspire positive change toward a truly sustainable future.

2.3 A New Relationship with Nature

> "The human mind is nature's consciousness, not its master."
>
> - John T. Lyle

Another significant barrier preventing people from addressing these root issues is related to their profound, yet often ignorant disconnection from nature (Hes & du Plessis, 2015). Lyle (1994) says, only by repairing this relationship can people then begin to address the larger issues of their society. Likewise, Hes and du Plessis (2015) urge, reconnecting to nature is "a vital step in restoring physical and psychological health to human society and accepting our true role and responsibilities in the co-creation of our environment" (p. 64). As people are an interconnected part of the natural world, the way in which they view nature should concern all, therefore each individual has responsibility to envisage a relationship with nature in new ways (Hough, 2004).

People depend on the Earth's natural processes for their survival, however, since the advent of the industrial age their reliance on these natural systems has gradually shifted toward more mechanized and economical processes (Hes & du Plessis, 2015; Hough, 2004; Lyle, 1994). Hough (2004)

notes people no longer have as intimate a relationship with nature as they once did. Furthermore, people predominantly relate to natural systems because they depend on their resources to maintain the status quo of their societal values (Hough, 2004).

This contradictory relationship between "man" and nature has been increasingly documented over the past twenty years (Hough, 2004; Lyle, 1994; McHarg & Steiner, 1998). Christopher Alexander (2002) explains that human action is driven by concepts and visions, and that it has become more difficult for us to live in harmony with nature because these concepts may, or may not, value the *wholeness* of nature. This wholeness is found in the varying degrees of life within nature, which the act of human development can add to or take from (Alexander, 2002). He says, "Life will increase, or it will degenerate, according to the degree in which the wholeness of the world is upheld, or damaged, by human beings and human processes" (p. 295).

Through the mechanization of human systems, and subsequent separation from nature, much knowledge regarding how natural systems function has been lost. This schism has diminished the ability for people to consider how natural systems will be able to react and adapt to the changes human existence brings (Lyle, 1994). Eisenberg and Reed (2003) explain this is

partly because our human-created systems reduce the capability of natural systems to self-organize and heal through their own regenerative processes.

Many recognize people must once again see themselves as a part of nature; to learn from it in order to repair the damage done to our vital natural systems, and continue to thrive on this planet (Berry, 1999; Macy & Johnstone, 2012; Senge et al., 2004; Suzuki, 1997). Reconnecting with nature will help them understand and identify a role within these systems, and enable them to participate as co-creators in a harmonious and mutually beneficial relationship (Reed, personal communication, May 22, 2014). This reconnection will require people discover again how to see, listen, and learn from nature as we once did, which will also require a different worldview from the one that has governed in the recent past.

2.3.1 The Way We Were

With regards to a previous relationship people had with nature, Thomas Berry (1999) offers,

> Human activities were integral with the larger community and its functioning. Every being possessed its own life principle, its own mode of self-expression, its own voice. Humans, animals, and plants and all natural phenomena were integral components of the larger Earth community. (p. 22-23)

As people lived in close and constant contact with nature, they gained intimate knowledge of different existing systems, and the interrelationships

connecting them (Edwards, 2010). David Suzuki (1997) reiterates the knowledge gathered by communities on the local flora, fauna, climate and geology over generations was not only essential for their survival, but also formed the basis of their worldview.

In the past, the connection to the greater universe was embedded and expressed in people's daily lives. Over time the stories of the natural landscapes have blended with stories of our own; shaping cultures and traditions, and creating what is now identified as "place" along the way (Berry, 1999). Berry (1999) explains how this powerful connection has been revered and expressed by cultures through ceremonies, rituals, architectural structures, art, and stories.

Place has become a compass by which people are able to find themselves and reaffirm their relationships to all other things (LaDuke, 2014). Although this fact is commonly forgotten by modern Western society, the Indigenous people of the world still maintain the close connection to the Earth and the places in it. Winona LaDuke (2014) says, "Everywhere there are Indigenous people, there are sacred sites, there are ways of knowing, there are relationships" (p. 87).

This worldview intimately connects the spiritual and physical worlds, offering guidance about how people could honor the Creator and live as caretakers of the Earth (Suzuki, 1997). The spiritual realm is cloaked in anonymity

and holds distinctive meaning for every individual, making it difficult for language and science to distill its essence into a quantifiable method (Berry, 1999). This makes spirituality neither less powerful nor meaningful, but without evidentiary support people become more uncomfortable with the mystery still surrounding it (Berry, 1999). Therefore, the disconnection with the planet's living systems will remain until people realize and validate them as connected to the systems at an emotional level.

2.3.2 A Disconnection from Nature

> "We've taken the world apart but we have no idea what to do with the pieces." - Chuck Palahniuk, Asfixia

The unraveling of this connection can be attributed to the evolution of the human mind, which has happened in a relatively short amount of time. Lovelock (1991) suggests, until the nineteenth century, scientists were comfortable recognizing Earth as a living and connected being (p. 11). Berry (1999) contends, "we lose our intimacy with the natural world once we take on a secular life attitude" (p. 24). The further people broke down the processes of the natural world, the further they separated themselves from the mystery and spirit of it, allowing the Earth to become a series of objects for use and exploitation (Berry, 1999). As they continued their search for logic and answers, the

systematic inquiry that became the field of science, unintentionally separated people from nature.

Unfortunately, as an understanding of the natural world grew, so did an understanding of how to exploit it (Berry, 1999). As Berry (1999) explains, people learned they could exert 'control' over nature, and there was a financial benefit to doing it. The industrial era saw new manufactures created, therefore new chemicals were invented, more machines were built, and the population was eager to use them with little thought to the consequences (Berry, 1999). The result, says Berry (1999), is a terminal economy that has permanently damaged the delicate geobiological systems of the planet.

Interestingly, the human psyche may not be entirely to blame; it may also have to do with biology. Stanley and Loy (2014) propose when people lived in harmony with nature, so too did the right and left hemispheres of our brain. The left hemisphere was used for language, math, and dominant hand control (tools), and the right hemisphere for intuition, empathy, relationship, and creativity (Stanley & Loy, 2014). They say as we evolved, the left hemisphere assumed dominance over the right, resulting in a separation between the body and mind (Stanley & Loy, 2014). Therefore, the logical left-brain has been behind the steering wheel, driving down a very dangerous road, with the intuitive right brain helpless to argue against it (Stanley & Loy, 2014).

The physical, psychological, and spiritual disconnection from Earth has enabled the human species to ignore universal truths, be distracted by an egotistical quest for success, and cause extreme damage to the planet's processes along the way (Suzuki, 1997). The result, as Suzuki (1997) explains, was a way of seeing the world through experience instead of abstractly (p. 191). It is now possible to break nature down to its specifics through the use of science and technology in order to better understand and eventually control it (Suzuki, 1997).

Berry (1988) further explains how humanity's jump into the shiny industrial future has caused them to forget the story of how the world became, and their place within it. People's stories once gave them knowledge, purpose, and objectivity, and now they are swimming between stories, struggling to stay above the surface (Berry, 1988). If people are able to find their story again, Berry (1988) suggests that it will reveal how they may heal, and discipline themselves to act responsibly toward each other and the Earth.

2.3.3 Reconnecting with Nature

People are slowly finding their way back to nature, and with the assistance of their technical and scientific expertise, they are beginning to understand the importance of restoring this connection. Scientists such as E.O. Wilson and Stephen Kellert refer to this connection as biophilia, or the "innately

emotional affiliation of human beings to other living organisms" (Wilson, 1993). In other words, the human body is meant to be in contact with nature. Laszlo (2001) says,

> …living without conscious forward planning – though it may have been fine in the days of rapid growth when each new generation could ensure a good life for itself- is not a responsible option at a time when the decisions we make today will have a profound impact on the well-being of those who come after us. (p. 70)

Finding ways to reconnect and repair the human-nature relationship is an essential step toward creating the conscious future Laszlo speaks of. RD&D is one method that may facilitate this reconnection, and enable responsible development considerate of a greater quality of life for all present and future species on Earth.

2.4 Regenerative Design and Development

This section presents a brief history of RD&D, defines RD&D within the context of this research, and outlines the main concepts of a regenerative paradigm. An example of a RD&D methodology is also discussed, and finally, the challenges of RD&D are acknowledged.

2.4.1 Defining RD&D

It has become apparent the modern definition of sustainability and actions in evidence so far toward achieving greater sustainability are not enough to guarantee the continuance of life on this planet. In response to this reality, a

movement has begun to redefine how a co-operative and harmonious relationship between people and nature may be achieved. Individual concepts established by investigators from the fields of systems theory, permaculture, ecology and ecological design, and ecopsychology have been enmeshed by Capra (2004), Mollison and Holmgren (1978), Roszak (1995), and van der Ryn and Cohen (1996) over the last four decades to become what is now recognized as the cohesive, yet ever-evolving paradigm of RD&D (Mang & Reed, 2012b).

Through this framework, regenerative efforts aim not only to repair degenerated natural systems, but also to create a co-evolutionary, partnered relationship between people and natural systems (Cole, 2012a). Adherents of RD&D take the position that, as members of living systems, people can positively transform the built environment through conscious participation in the development process (Mang & Reed, 2012b, p. 3). Mang and Reed (2012b) propose this participation can happen in a way that builds the natural and social capital of a place, enabling it to support the highest expression of life in perpetuity. According to Williams (2012), this movement has been gaining popularity amongst practitioners in the design field "…mainly because it has a clear and attractive ethical purpose that its proponents truly believe in" (p. 362).

John Tillman Lyle coined the term 'Regenerative Design' in his book *Regenerative Design for Sustainable Development* (1994). In this seminal work,

Lyle observes most of the human processes relied on for maintaining their lifestyles are based on a one-way linear flow from source to sink, and this activity would eventually deplete the resources that supply it (Lyle, 1994). In lieu of a linear flow, he suggests replacing it with a cyclical process, which continuously recycles energy flows from source to sink and back again (Lyle, 1994). Tillman proposed several design interventions to accompany this problem, including renewable energy, permaculture, and water and waste treatment (Lyle, 1994). Mang and Reed (2012b) also emphasize the greater message of his work was the conscious design of whole ecosystems, and an alternative worldview required to achieve them (p. 8).

Lyle's work drew from the General Systems Theory (GST), which provides a framework for observing the world as a series of dynamic relationships that are all a part of a greater whole (Mang & Reed, 2012b). Charles Krone also contributes to living systems thinking by having developed organizational business processes (Mang & Reed, 2012b). Krone consciously looked for ways to see business as part of a greater whole, and build reciprocally beneficial relationships with natural living systems (Mang & Reed, 2012b).

RD&D also draws heavily from the growing topic of ecological design. Mang and Reed (2012b) point to publications such as Ian McHarg and Frederick Steiner's *Design with Nature* (1969), David Orr's *Ecological literacy: Education*

and the Transition to a post-modern world (1992), Sim van der Ryn and Stuart Cowan's *Ecological Design* (1996) among others, who describe how natural systems are important, and how they may be 'read' and incorporated into the design of the built environment, in order to make them more sustainable (p. 7).

This interdisciplinary collection of theories has formed the basis of RD&D practice for the group *Regenesis*, an architecture and community design, business and development collective (Hes & du Plessis, 2015) located in Santa Fe, New Mexico. *Regenesis* is considered a pioneering firm in RD&D, having established and documented a core theoretical foundation and methodology for applying theory in practice over the past twenty years (Regenesis Group, n.d.). Given the limited literature on RD&D, I felt it was important to review the Regenesis methodology, as it provides the opportunity for a comprehensive application of RD&D theory in practice not found elsewhere. The Regenesis methodology is built on four ecological principles:

1. *Role of humans:* Humans are a part of nature and should realign their activities with natural systems in order to participate in a co-evolutionary relationship, which develops the system's potential and capacity, and positively contributes to the overall health of the system and its inhabitants.
2. *A new mind*: A new way of thinking is necessary to see the world, including our built environment, as a series of interconnected, ever changing processes that shift and shape our surroundings.

3. *A new role*: Those involved in the design professions will have to reconsider their roles and design processes to consciously create and maintain the conditions for healthy natural systems. Like a gardener tending a garden, their work is continuously evolving, requiring a diverse yet intimate knowledge of the place they are minding.
4. *Working developmentally*: Improving the value of the whole through the developmental process, and enabling systems to build the capacity to reach their higher potential. (Hes & du Plessis, 2015, pp. 174-175; Mang & Reed, 2011, p. 26)

Mang and Reed (2012) also highlight how an ecological worldview informs six main concepts (see Figure 2, p. 43) of a regenerative paradigm and the practice of Regenesis: regeneration as a level of work, design and development, place, pattern literacy, story, and potential. These six concepts are described in this section, and are applied to the precedent studies in Chapter Three to determine how they may be considered regenerative projects.

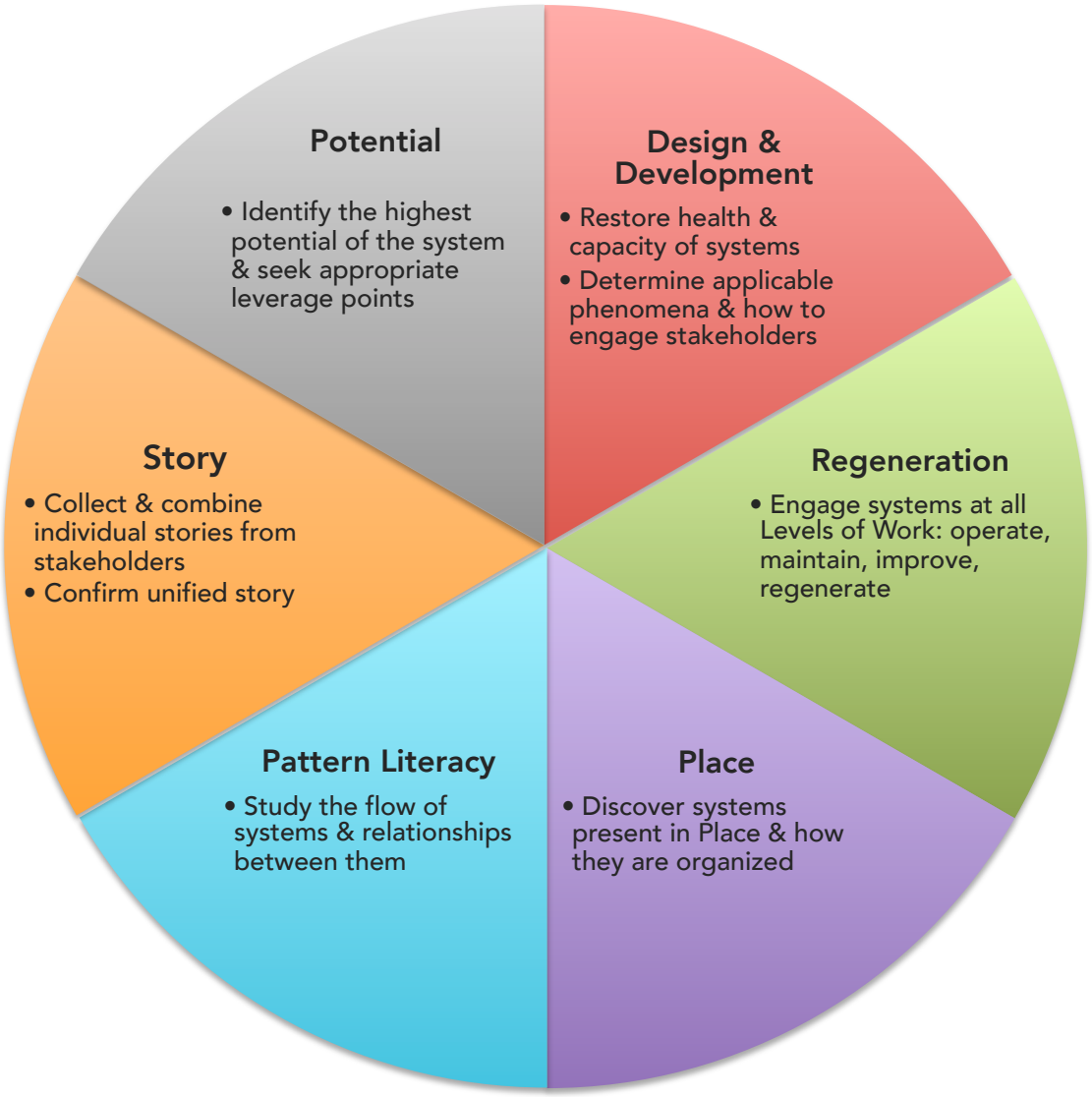

Figure 2. Main concepts of RD&D as proposed by *Regenesis* (Mang & Reed, 2012, pp. 26-30).

Concept of Regeneration: Engaging a system to achieve maximum potential

The goal of regeneration in RD&D, as implied by Regenesis, is to reestablish healthy, natural ecosystems through the use of developmental and design processes (Mang & Reed, 2011). Living systems thinking, as developed by the aforementioned Charles Krone, is employed by Regenesis as a method of achieving a regenerative state in a project (Mang & Reed, 2011). Living systems thinking does not only consider the function of a single entity, such as a building, but rather studies the organization of systems and life processes the entity is a part of.

As depicted in Figure 3 (p. 45), Krone conceived the Levels of Work, which describe the varying levels of engagement a living system must activate to reach its maximum health and capacity, and sustain itself (Hes & du Plessis, 2015). A 'line of expression', as I describe it, denotes a point in time where the health and capacity of a system are already possible, given the conditions present. Engagement of a system can occur 'below' the line of expression where conditions already exist (explicate order), or 'above' the line of expression where the potential of conditions exist, but has not yet manifested (implicate order) (Hes & du Plessis, 2015).

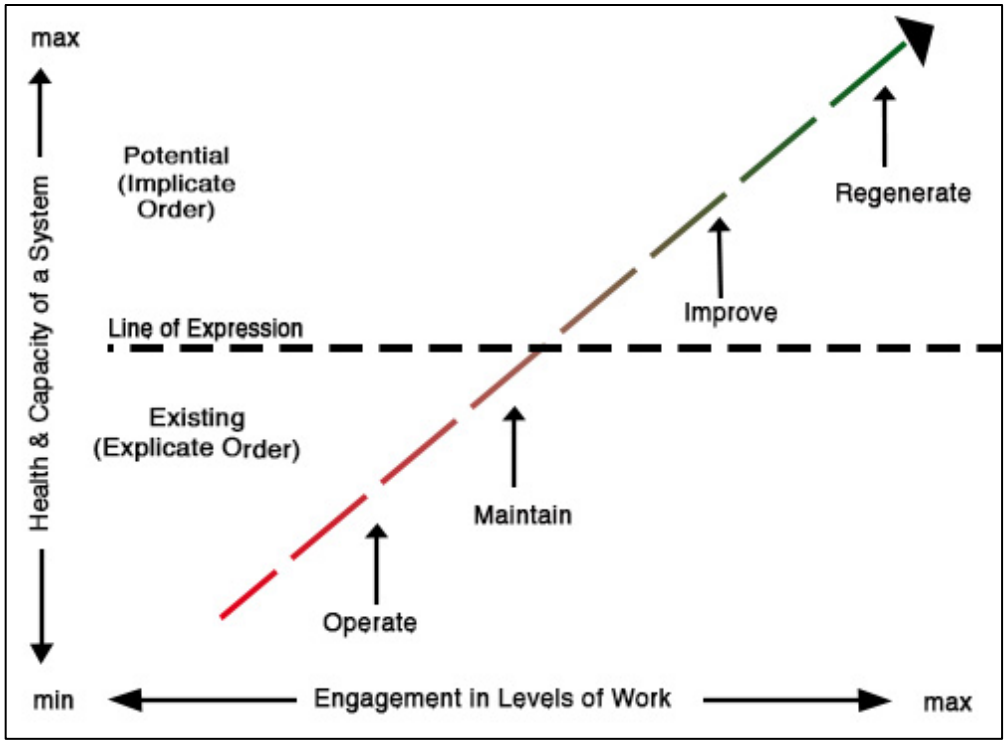

Figure 3. Engaging the Levels of Work to achieve a regenerative state. Based on: Hes & du Plessis (2012). (p. 178).

Work below the line of expression is not sufficient to create conditions for regeneration; however, it builds the capacity and stability of a system necessary for a regenerative state to be achieved (Dias, 2015). Once achieved, maintaining engagement at all levels is critical for a systems health, success, and evolution (Dias, 2015).

Currently, developmental practices function mostly "below the line", at the 'operational' or 'maintenance level' (Mang & Reed, 2011). Work at the level of 'operate', for instance installing green products in buildings constructed using conventional development processes, performs under the mandate of "do no harm". The 'maintain level' operates under the mandate of "do less bad",

exemplified by addressing resiliency issues such as rising sea levels, which are caused by the greater problem of climate change.

Work above the line "aims to develop and increase the potential and creativity of the system, revealing its potential in relationship to larger systems…" (Hes & du Plessis, 2015, p. 178). An example of work at the level of 'improve' could include re-planting native plant species on a site, which restores the natural habitat of a system. An example of work at the level of 'regenerate' could include a project that produces its own energy from solar panels, and sells surplus energy back to the grid.

From this interpretation, Nicholas Mang (2009), a collaborator with Regenesis, describes regeneration as "...an evolutionary process by which a living system, through the enfolding connection with its life source, rebirths into existence a higher order patterning for functioning, relating, and adding value in harmony with the whole (p. 15)." The methodology from Regenesis, as discussed in the subsequent section 2.4.2, attempts to embody this definition in its practice by reading the patterns of a system, determining the greater function and potential of a system, and identifying how human interaction with the system can help it reach the greatest potential.

Concept of Development and Design: Processes and strategies to engage a system

Regenerative development and design are seen as distinct, yet complementary and equally necessary parts making up the equation of RD&D (Hes & du Plessis, 2015). The two goals of regenerative development are to: determine what "phenomena" to work with and how design may be applied to them; assess how to engage stakeholders at a profound level where they are involved as co-designers and lifelong stewards (Hes & du Plessis, 2015). Complementing the development process, regenerative design is about "restoring the conditions for life to self-organize in ecological subsystems (McLennan & Reed, 2013)." Design aims to reverse detrimental conditions, and reestablish the capacity of a system through strategies, and both natural and mechanical technologies (Hes & du Plessis, 2015).

Concept of Place: Connecting people with spirit of a place to ensure sustainability

Within the context of RD&D, place is considered to involve the interactions of a network of ecological and cultural systems within a defined geographical location (Hes & du Plessis, 2015; Mang & Reed, 2011). It is essential to also involve the people who inhabit a place, to gain an intimate understanding of these interactions (Mang & Reed, 2011). Regenerative

development aims to build the natural, social, and economic capacity of the systems, which it affects in a particular place (Mang & Reed, 2011).

Cole (2012a) states, a connection to the "spirit of place" is essential to stoke innate fires and motivate people to care about, and for, the place they inhabit long into the future. The unfolding place-based process reveals identities, roles, and meanings shared collectively amongst stakeholders, and when brought together, become more meaningful than when held individually (Cole, 2012a). Reed (2007) concurs: "Such processes tap into the consciousness and spirit of the people engaged in a place, the only way to sustain sustainability" (p. 677). The process anticipates that people will be inspired to continually engage in the regenerative processes that return the system to a state supportive of healthy life.

Connecting to place is also important within the greater context of the planetary crisis says Reed (2007), for it "frame[s] and integrate[s] these planetary issues in [a] manageable, meaningful and, literally, grounded context (p. 677)." By discovering the organization of living systems within distinct places, a project can fold within it and become integrated (Mang & Reed, 2011).

Concept of Pattern Literacy: Educating people to read and strengthen system patterns

In order to discover or 'read' the systems within a place, one must be pattern-literate. Pattern literacy is based on understanding the patterns of

relationships among parts of complex systems, and how they are able to self-organize and sustain themselves (Mang & Reed, 2011). Hes and du Plessis (2015) suggest conventional development often considers systems as complicated instead of complex, resulting in site data and information collected as separate entities. This incomplete and often unmanageable data greatly inhibits the ability for development to fully engage with a whole system and enable it to reach a regenerative state (Hes & du Plessis, 2015).

According to Hes and du Plessis (2015), the data gathered through RD&D attempts to: recognize the complex relationships of a place, read the energy flows and patterns of a site, identify the potential of a system, and determine how development may harmonize with these relationships, flows, and patterns (p. 180). Patterns may show "the directionality and strength of flows (wind, water, foot traffic, etc.), the nature of the medium the flows pass through and around, as well as how form emerges" (Mang & Reed, 2011). The resulting knowledge can be used to create human systems, which can echo natural ones, and strengthen the overall wellbeing of the system (Hes & du Plessis, 2015). The precedent studies in Chapter Three provide built project examples of how human systems may be designed to compliment natural systems.

Concept of The Power of Story: Generating connection through shared experience

Stories are hardwired into the human brain; our memories are formed from them, they allow us to learn and configure knowledge, and they can be used to bring about change (Mang & Reed, 2011). Collecting stories is essentially collecting data about the relationships and connections between the different types of information, says Mang & Reed (2011), who propose this data can then be translated into a "deepening connection to and growing harmony with place (Mang & Reed, 2011)."

Regenesis has trademarked their process called *The Story of Place*, which is used to:

> a) understand how best to align human interventions with the processes and relationships already on site;
> b) evoke a sense of caring and ownership of the place; and
> c) provide an ongoing learning process that will support the co-evolution of people and their place (Hes & du Plessis, 2015, p. 181).

By bringing stakeholders together with a unified story derived from their own experience, they are better able to understand the bigger picture, and come together to consciously engage in a project (Hes & du Plessis, 2015). Hes and du Plessis (2015) say this is how an authentic collective purpose is affirmed and lifelong engagement is evoked.

Table 1: Places to Intervene in a System (in increasing order of effectiveness). (Meadows, D., 2008, p. 194. Adapted by K. Penelton).

12. Numbers: Constants and parameters such as subsidies, taxes, and standards
11. Buffers: The sizes of stabilizing stocks relative to their flows
10. Stock-and-Flow Structures: Physical systems and their nodes of intersection
9. Delays: The lengths of time relative to the rates of system changes
8. Balancing Feedback Loops: The strength of the feedbacks relative to the impacts they are trying to correct
7. Reinforcing Feedback Loops: The strength of the gain of driving loops
6. Information Flows: The structure of who does and does not have access to information
5. Rules: Incentives, punishments, constraints
4. Self-Organization: The power to add, change, or evolve system structure
3. Goals: The purpose of the system
2. Paradigms: The mind-set out of which the system—its goals, structure, rules, delays, parameters—arises
1. Transcending Paradigms

Concept of Potential: Aspiring for maximum possibility & transformation

Mang & Reed (2011) note how potential is often defined as "the inherent capacity for coming into being, for growth and development (p. 30)." From a living systems perspective, the potential of a system is then always fluctuating toward or away from its quintessence depending on its state of health (Mang & Reed, 2011). RD&D considers how to help a system reach its higher potential through design and development interventions.

Donella Meadows (2008) discusses how individual leverage points in a complex system may be identified and manipulated to enact a large amount of change on that system. As seen in Table 1 (p. 52), Meadows identified places to intervene in a system (in increasing order of effectiveness).

According to Meadows (2008), we spend a significant amount of time and energy trying to influence a system by changing its parameters. Depending on the system, parameters can include taxes, subsidies, land conservation, air quality standards, etc. (Meadows, 2008). Unfortunately, altering these parameters is fairly ineffective at generating significant change in a system. For example, if a person were to try to address the issue of non-renewable energy consumption, they could practice turning down their thermostat, which runs on natural gas, when they left their home. Although it is a practical intervention, it is too inconsequential to influence the greater system of non-renewable energy. A more influential leverage point would be to use a renewable source of electricity, such as solar energy or passive heating techniques, to completely circumvent the non-renewable energy system.

Still, these interventions only address energy consumption at an individual level. Instead, Meadows (2008) explains, the most persuasive leverage can come from addressing an entire paradigm. She says, "The shared idea in the minds of society, the great big unstated assumptions…constitute that society's paradigm, or the deepest set of beliefs about how the world works" (Meadows, 2008, pp. 162-163). To change paradigms she suggests continuously pointing out the problems and failures of the paradigm in question, advocate

passionately for a new paradigm, and find others to advocate publicly and from places of power (Meadows, 2008). To influence a paradigm shift in the example of energy consumption, governments and countries would have to be convinced to shift their worldview and change all of their energy reliance to renewable sources.

Finally, Meadows (2008) proposes the most influential way to intervene in a system is to believe that no one paradigm is true, and to understand all paradigms are a limited view of the immense power of the universe as a whole. Unfortunately, intervention at the paradigm level is immensely difficult to achieve because the higher the leverage point, the more a system is resistant to change (Meadows, 2008).

Design and development interventions can be incorporated into individual RD&D projects from all the leverage points listed by Meadows, however, Mang (2009) suggests the weakest parts of the living systems hold the greatest leverage points, and should be addressed to unlock the greatest potential for regeneration. As will be discussed in the Chapter Three precedent cases, many interventions in RD&D projects challenge the current paradigm, requiring fundamental changes to policies and practices.

2.4.2 Regenerative Development & Design Methodology

The methodological framework created by the Regenesis Group uses the concepts above to form the foundation of regenerative theory. Technologies and methods are employed simultaneously throughout the duration of a project to help it achieve a regenerative state (Mang & Reed, 2012). I have attempted to synthesize their methodology as succinctly as possible for the purpose of this document, however, due to the intricacy of the topic, for more details I refer the reader to Mang and Reed's *Design from Place: A Regenerative Framework and Methodology* (2011), and Hes and du Plessis's *Designing for Hope, Pathways to Regenerative Sustainability* (2015**)**. The Regenesis Group uses the concepts discussed in Section 2.4.1 as guiding principles in the first tier of their methodology, and weaves together the complementary technologies of living systems thinking, permaculture, and developmental change processes to energize their framework in Tiers Two and Three (Mang & Reed, 2011) (see Figure 4).

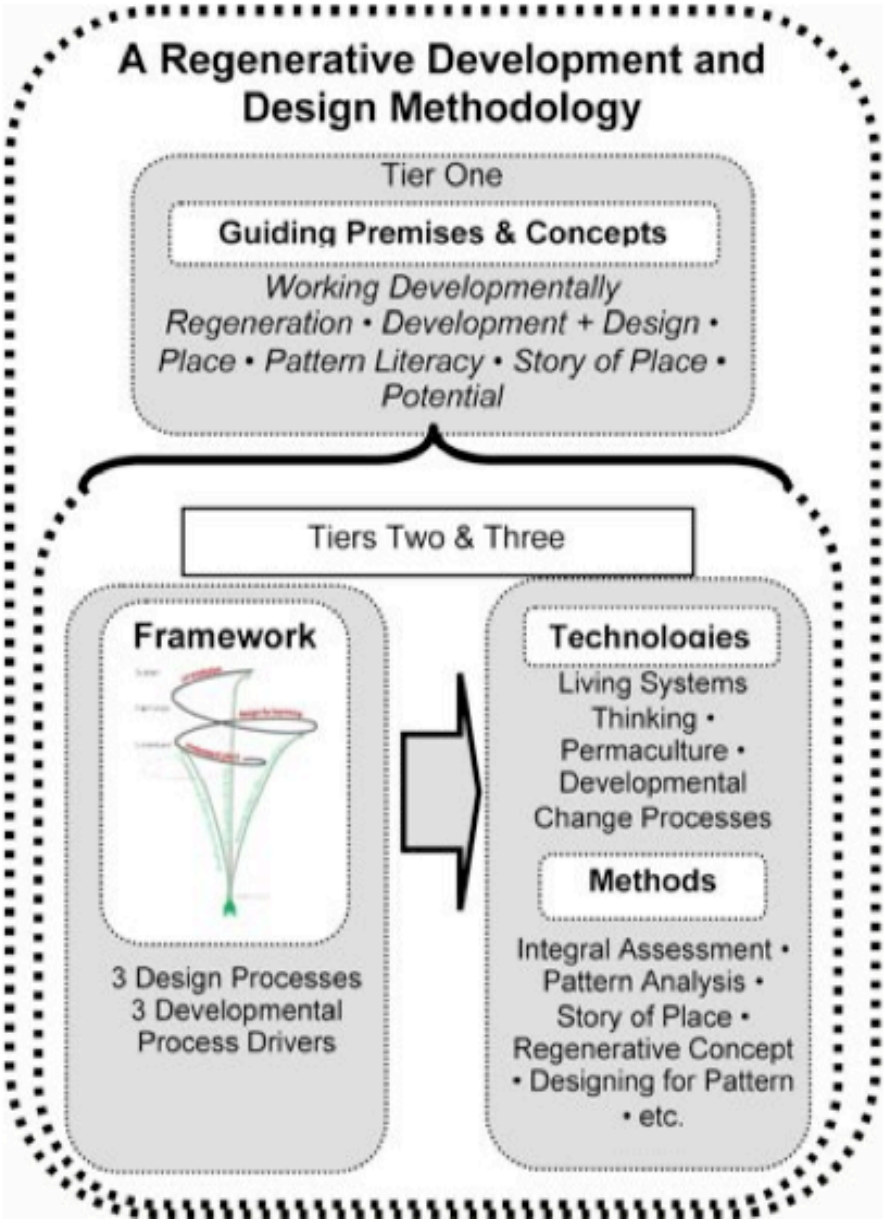

Figure 4: Regenerative practice methodology as proposed by *Regenesis*. Adapted from" Designing from place: A regenerative framework and methodology" by P. Mang and B. Reed, 2012, *Building Research & Information*, 40, p. 13. Copyright 2012 by Regenesis Group, Inc.

Living Systems Thinking contributes to the understanding of a place by studying its living systems as dynamic wholes (Hes & du Plessis, 2015). Living systems demonstrate the greater web of relationships present at a site, and how the

project may be organized to enable the systems to reach their potential (Hes & du Plessis, 2015).

Hes and du Plessis (2015) identify that permaculture, "a system of permanent, self-sustaining agriculture and human culture" (Hes & du Plessis, 2015, p. 127), provides the opportunity for pattern recognition to reveal the essence of a place. Since permaculture incorporates living systems thinking, it can be used to create design solutions and management techniques (Hes & du Plessis, 2015).

Finally, developmental change processes permit the design team and stakeholders to work collaboratively to discover the potential of the whole system through the sharing of stories (Hes & du Plessis, 2015). By processing a system through the Levels of Work (see Figure 3, p. 45) it may be seen how the potential of the system can evolve, what role the stakeholders must play for the system to reach its potential, and how this potential may inform the design and operation of the project (Hes & du Plessis, 2015). Living systems thinking, developmental change processes, and close relationships with stakeholders, all support the methodologies used in each of the three phases of the framework, as shown in Figure 5.

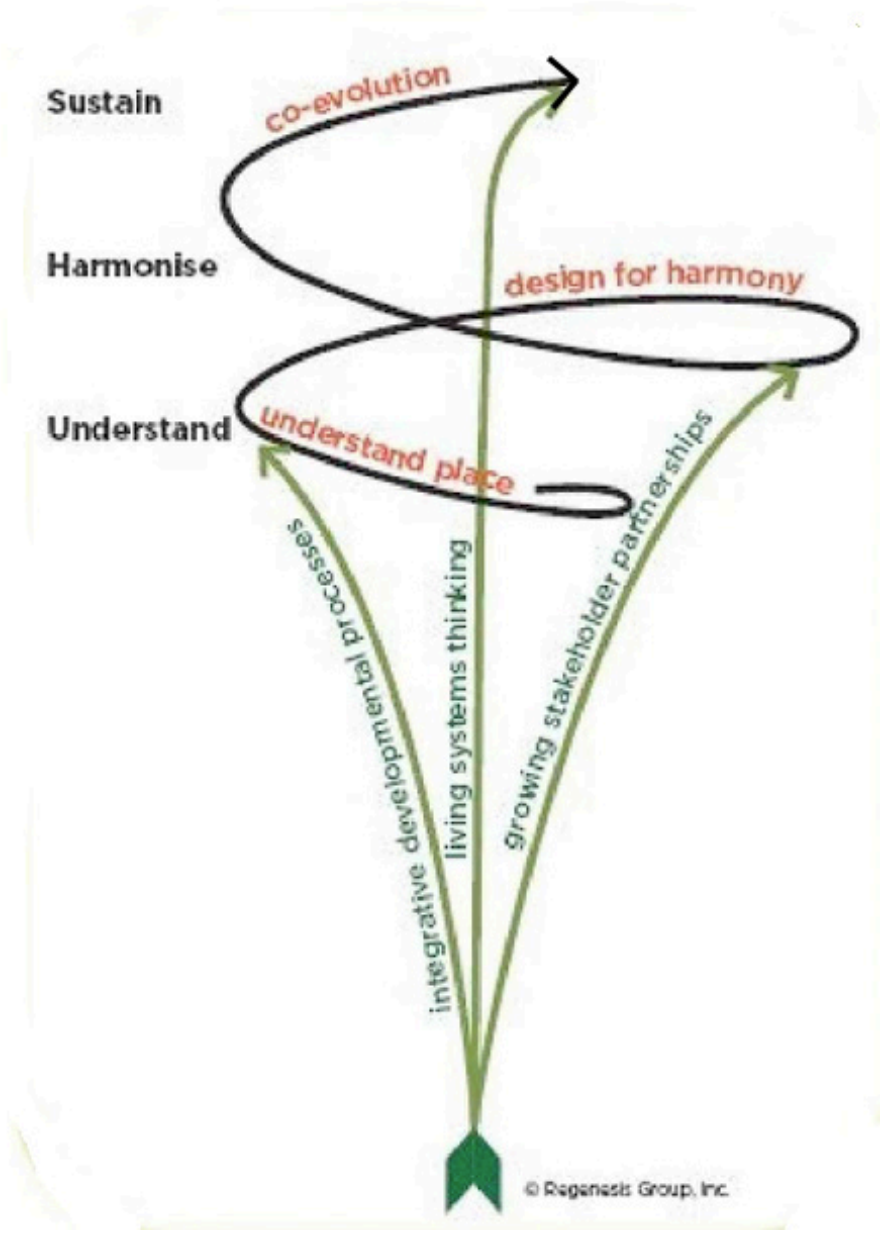

Figure 5**.** *Regenesis'* three-phase process builds system capacity and project stability. Adapted from "Designing for Hope, Pathways to regenerative sustainability," D. Hess, and C. du Plessis, 2015, p. 185. Copyright 2015 by Regenesis Group, Inc.

Phase 1: Understanding and Conceptualizing the Right Relationship to Place explores how to read the unique patterns and systems of a place in order to gain an understanding of a project's potential regenerative role (Hes & du

Plessis, 2015; Mang & Reed, 2011). The study area is defined and subsequently assessed through the collection of data, site visitation, interviews, etc. to establish core patterns that speak to the potential of the place (Hes & du Plessis, 2015).

Hes and du Plessis (2015) also add the *Story of Place*, "takes these patterns and weaves a narrative that enables people to connect to and see themselves in a relationship to the uniqueness and character of the place" (p. 185). Finally, this process is reflected on and discussed between practitioners and stakeholders to uncover the essence and purpose of a place (Mang & Reed, 2011). This establishes the role of a place within the greater systems, and which leverage points would be most effectively incorporated through the project (Hes & du Plessis, 2015).

Phase 2: Designing for Harmony builds on the knowledge obtained in Phase 1 and seeks to find a way to harmonize the goals and desires of the project with the vocation of the place (Hes & du Plessis, 2015). Mang and Reed (2011) clarify this means the built environment will enhance the natural landscape, while the living systems will also contribute to the infrastructure and people who reside in the place (p. 33). Phase 2 also reinforces the original project objectives by forming a core team of stakeholders who become

guardians of sorts, remembering, defending, and advocating for the project to always stay true to its main goals and values (Hes & du Plessis, 2015).

The final phase, *Phase 3: Co-evolution* continues beyond the completion of any built environment, "building the structure, capacity and commitment in the community to support the ongoing function and evolution of the project and its place" (Hes & du Plessis, 2015, p. 184). Mang and Reed (2011) recognize both naturally occurring systems and human-built systems are always evolving. One of the goals of RD&D is to ensure both systems can co-evolve in a mutually beneficial way (Mang & Reed, 2011). The process builds the capacity of stakeholders through education about concepts such as Living Systems Theory, and enforces their shared commitment through Story of Place, in an effort to prepare them to take over the ongoing maintenance of the dynamic and unpredictable future of their projects (Hes & du Plessis, 2015).

2.4.3 Challenges of RD&D

Despite the mounting evidence about the benefits of RD&D, some challenges and concerns are emerging from the literature and practice, next outlined . These challenges include: time involved with changing a social worldview, the complexity of regenerative principles, scales of application, and the actual results of the professional practice are sources of apprehension (Cole, 2012; Cooper, 2012; Williams, 2012).

The difficulty in transforming the design and application of regenerative methods from *theory* into *practice* has been noted as one of the greatest challenges of RD&D (Brown, 2008; Williams, 2012). It is noted the broad and complex theoretical knowledge required to fully implement regenerative principles may not outweigh the benefits of the practice, which are still relatively unknown (Clegg, 2012; Mang & Reed, 2012; Williams, 2012). Cole (2012c) echoes this sentiment, and explains, although the principles may be understood, execution in practice is less obvious (p. 4).

Without a solid framework, indicators of successful regenerative projects are hard to quantify (Cooper, 2012; Williams, 2012); however, some argue the qualitative components are equally as important, and therefore cannot be distilled into the framework of a simple checklist (Mang & Reed, 2012). Education and facilitation are thus key tools to be able to draw on as professionals, requiring some to learn or brush up on their skills (Clegg, 2012; Williams, 2012).

Cooper (2012) acknowledges the amount of time needed to shift society's worldview toward energy-efficient practices has taken about thirty years. RD&D, in itself, involves a slower and evolving developmental process. Empirical evidence needed to determine the value of the practice, or unintended consequences may take years to come to light (Cooper, 2012). Also,

energy-efficiency is a single issue, whereas RD&D features many complex issues; it would require even more time for evidence of a shift to occur (Cooper, 2012).

Finally, Williams (2012) cautions that it remains to be seen if RD&D principles are too utopian, or if they can be applied to all scales and situations. She mentions our profit-driven economy as a key factor in being unable to adopt RD&D as a widespread concept. As well, places with very little natural or social capital may not lend themselves easily to the process of RD&D (Williams, 2012, p. 363).

2.5 Summary

Current practices in design and development are failing to create a healthy and sustainable world for all of those who inhabit it. The disconnection from nature has clouded the vision of what acceptable development should look like, and has resulted in environmental disaster. Regenerative design and development presents a paradigm to address these issues; to help to restore the relationship between people and nature, and to help build the capacity our living systems (both human and ecological) to self- heal, and self-regulate as they once did.

Lyle (1994) states, "the price of failure would be unthinkably high, probably not outright extinction of the human species but certainly unimaginable levels of human misery, and probably the end of civilization" (p.4).

His words call for an immediate solution, and RD&D is being advocated as the first paradigm with the ability to more effectively address the issues related to unsustainable development. The road toward a complete shift of mind and practice will not be easy; however, the rewards of living in a world which people and nature consciously create together will be many, and one that planners should be excited to be a part of, and take an active role in its unfolding.

Chapter 3: Regenerative Design & Development Precedents

This chapter considers three selected precedent built projects for the purpose of helping to identify how the principles of RD&D are applied in practice, as well as to illuminate possible intervention points for planners. The Willow School is one of the first projects to use regenerative principles. The description of the Willow School features a full and documented history from pre to post-construction, with comprehensive information on lessons learned. The Bullitt Center is one of the most recently completed projects to feature RD&D principles within an urban context, and has extensive resources available to inform the research. A master plan for the Simon Fraser University (SFU) has been selected as a precedent because it considers RD&D principles at a community scale, and may provide insights into both RD&D and planning processes of this scope.

The six regenerative concepts (regeneration as a level of work, design and development, place, pattern literacy, story, and potential) have been applied in the analysis and presentation of each precedent. Since many of the concepts are interrelated and often occur throughout the conception of the project, the development process, the construction process, and post-occupancy stages, their description follows an order most logical for each project. In the section Lessons Learned, situations identified with specific

reference to the development process and planning of each precedent are presented.

3.1 The Willow School

Figure 6: Willow School classroom building surrounded by native plants. Reproduced with permission. Photograph by Back to Nature, n.d. Retrieved from http://backtonature.net/gallery/meadow/

Location: Gladstone, New Jersey
Client: The Willow School
Type: Private Institution
Area of site: 34 acres
Completed: Phase 1 (2003)
Phase 2 (2007)
Phase 3 (2015)
Size of facility: Phase 1 (13,500sqf)
Phase 2 (13,000 sqf)
Phase 3 (20,000 sqf)
Cost: Phase 1 ($5 million)
Phase 2 ($3.8 million)
Phase 3 ($7.5 million)

Responsible Agents (throughout phases)

Architect: Farewell Architects (Phases 1, 3), Hone & Associates (Phase 2)
Landscape Architect: Back To Nature
Civil Engineer: Agpar Engineers
Environmental Engineer: Biohabitats Inc.
Water Systems: Natural Systems International (Phases 1 & 2), Biohabitats (Phase 3)
Structural Engineer: Harrison-Hamnett, P.C. (Phases 1 & 2), Christie Engineering (Phase 3)
MEP Engineer: Joseph R. Loring and Associates, Inc.
Environmentalist: Natural Logic
Site Analysis Consultant: Regenesis Group, Inc.
Regenerative Design Consultant: Integrated Design Collaborative
Commissioning: Engineered Energy Systems (Phases 1 & 2), Sevengroup (Phase 3)
Awards: 2003 LEED Gold Certification, 2007 LEED Platinum Certification, 2009 US EPA Stewardship Initiative, 2010 US EPA Environmental Quality Award

Since opening in 2003, the Willow School has provided independent education for approximately 250 children annually from preschool to grade eight (Willow School, n.d.). What sets the school apart from typical educational institutions is its emphasis on the relationships between people and nature, a concept entrenched in the school's physical design and educational curriculum. Since opening, The Willow School has received much attention for its incorporation of regenerative principles and overall success as a pioneer of sustainable institutions (Willow School, n.d.).

Willow School co-founders, Mark and Gretchen Biedron, decided the school was to become a model of environmental sustainability following a chance meeting with landscape architect Anthony Sblendorio (Global Learning Inc., 2005). It was decided the ecological restoration of the site, and LEED certification, would become the new priorities of the school, despite architectural drawings for a conventional design having been seventy-percent completed (Global Learning Inc., 2005).

Place

Figure 7: Willow School Landscape Plan by Back to Nature. Reproduced with permission. Photograph by Back to Nature, n.d. Sustainable landscape features. Retrieved from http://landscapeperformance.org/case-study-briefs/the-willow-school

In order to better understand the history and context of the location, as well as its functioning ecological systems, the Regenesis Group was brought on as a consultant for the project (Alliance for Regeneration, n.d.). Regenesis helped to develop a Story of Place™ for the site, uncovering a formerly functioning forest ecosystem that had fallen into a state of disrepair (Alliance for Regeneration, n.d.). The focus of the project again shifted to restore the health of the ecosystem, with the school as an integral part of it (Alliance for Regeneration, n.d.). The importance of people as a part of nature was also emphasized throughout the land-use plan and educational curriculum (Willow School, n.d.).

Regeneration

The Willow School provides an example of how the implicate order of Charles Krone's Levels of Work (discussed in Chapter 2) cannot be achieved without the proficient management of the explicate order. The Willow School had first envisioned using the eco-restorative features of the LEED rating system for their buildings during the first phase, which would have only engaged the system at the 'operational' level (Alliance for Regeneration, n.d.). The Regenesis Group helped the stakeholders to see a greater potential, and engage in higher Levels of Work, by adopting a regenerative approach (Alliance for Regeneration, n.d.).

As part of the plan to restore the natural ecosystem of the site, native and drought-tolerant plants were re-established via sustainable forest management practices, meeting the criteria for the 'maintain' level of work (Landscape Architecture Foundation, n.d.). This could have been the mere extent of the progression of this site, however, after careful harvesting of overgrown forest to restore depleted topsoil, native species were planted in succession as an act at the level of 'improvement' (Landscape Architecture Foundation, n.d.). The school also actively connects all stakeholders (students, faculty, parents, community) to the ongoing process of partnering with the living systems on the site through ecosystem management, gardens, and education. Through this co-

creation, both people and natural systems are able to reach their higher potentials, meeting the requirements for a 'regenerative' Level of Work (Alliance for Regeneration, n.d.).

Pattern Literacy

Figure 8: Landscape featuring wetland and forest by Back to Nature. Reproduced with permission. Photograph by Back to Nature, n.d. Retrieved from http://backtonature.net/gallery/wetlands/

A goal in designing the infrastructure was to disturb the site as little as possible (Farewell Architects, n.d.). This required the design team be knowledgeable about the flows and patterns of the systems on site, as well as how the design, construction, and operation of the buildings would impact them. The site of the school features farmland, forest, and wetland (Farewell Architects, n.d.). The buildings were planned to connect these unique

ecosystems and evoke a sense of natural order when navigating the campus (Farewell Architects, n.d.).

Design and Development

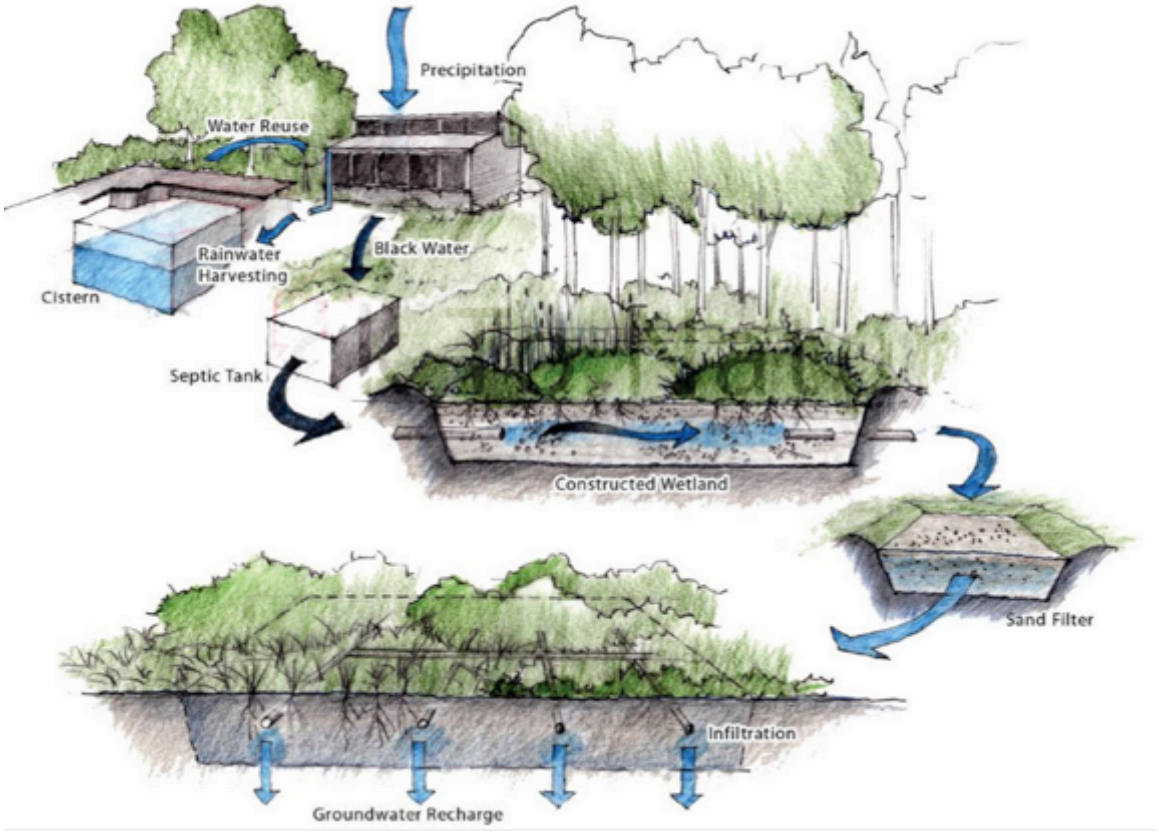

Figure 9: Black water treatment system by Back to Nature. Reproduced with permission. Photograph by Back to Nature, n.d. Retrieved from http://backtonature.net/gallery/wetlands/

Complimenting the forest systems, it was also important to focus on the water cycle (Alliance for Regeneration, n.d.). Therefore, the design approach sought to integrate water in a way to mirror natural processes (Alliance for Regeneration, n.d.). A constructed wetland treats wastewater for irrigation and toilet water re-use, cisterns collect rainwater for irrigation, and bioswales slow

down runoff before it reaches a deep pool wetland for storage (Landscape Architecture Foundation, n.d.).

Two buildings on the campus achieved LEED Gold and LEED Platinum certification, by employing numerous regenerative design principles, such as passive-solar heating, daylighting, renewable energy, and the use of local, reclaimed or restored materials when possible (Global Learning Inc., 2005).

Story

Figure 10: Students learn about natural systems on campus. Reproduced with permission. Photograph by Back to Nature, n.d. Retrieved from http://backtonature.net/gallery/wetlands/

As mentioned under the concept of regeneration, the connection to nature through story is facilitated through the academic structure of the school's curriculum, allowing students and staff to experience a "living classroom", and participate as co-creators of the place (Landscape Architecture Foundation,

n.d.). Students not only learn about how the building systems work, but how the buildings connect to the greater systems, such as the wastewater facility on site, enhancing their ecoliteracy and appreciation for the interconnectedness of life (Willow School, n.d.). Students are also educated and immersed in the land, carrying out various studies and experiments, as well as maintaining an orchard and vegetable garden (Alliance for Regeneration, n.d.).

Potential

Figure 11: Students are educated by a naturalized outdoor landscape. Reproduced with permission. Photograph by Back to Nature, n.d. Retrieved from http://backtonature.net/gallery/wetlands/

Those involved with the Willow School have helped to regenerate the system, and enabled it to reach a higher potential through educational programming during the first two completed phases. This co-evolution has continued during the recent planning and completion of the school's Phase III

Health, Wellness, and Nutrition Center, a 20,000 square foot multi-use building (Willow School, 2015). The center is home to classrooms, performing arts space, a health and wellness area, commercial teaching kitchens and dining hall, and supporting gardens (Willow School, 2015). The school considers it to be not just a building, but also as a living entity, which will teach and participate in the living systems on and around the campus (Willow School, 2015). For example, students will learn firsthand about agricultural processes and the science behind cooking and nutrition through hands-on experience in the garden and kitchen (Willow School, 2015).

The Willow School embodies the dedication and passion that may arise when engaging with the land in a regenerative way. They say, "Our buildings, landscape, and curriculum, through their programmatic advancements, help educate a new generation of ecologically literate citizens who will understand how to live in alignment with our planet's ecological systems, which support us and give us life" (Willow School, n.d.).

Lessons Learned

Although development of the school campus continues with Phases 2 and 3, three key lessons were learned from the first phase. Firstly, the choice to pursue LEED or other intensive integrated design processes can be costly, if not adopted at the very beginning of the project. The decision to attempt LEED

certification and incorporate other progressive features was made after 70% of the architectural drawings had already been completed, significantly increasing the final cost of the project (Landscape Architecture Foundation, n.d.). Engaging in a RD&D framework from the onset of a project allows for greater potential to be found and/or realized during the development process and efficiencies in design to be maximized.

Secondly, the town of Gladstone was initially hesitant to grant variances for the school to implement the sustainability features designed (Rocky Mountain Institute, 2010). Biedron says "…the pushback that we got. 'Oh you can't do this. This can't be done. The town will never, never pass this.' And now fast forward, what we get now is, 'Tell us more', instead of, you know, 'Go away'" (The Rocky Mountain Institute, 2010). Bill Reed, a team member of Regenesis explained how the school has effectively been given carte blanche for any future development by the Somerset County Planning Board (Bill Reed, personal communication, May 21, 2014). This is because the board now knows the agents responsible for the planning and design of Willow School will hold the campus to a higher standard than could ever be imposed by the county's own regulations (Bill Reed, personal communication, May 21, 2014).

Finally, the Willow School serves as an example of what a regenerative form of human development could look like, enabling people to participate with

nature, and for the living systems to co-evolve and create a healthier and more abundant form than could be achieved on their own (Willow School, n.d.). The students and staff of the school, as well as the greater community, have the opportunity to understand the many benefits of changing our worldview and actions toward the natural world and enable them to become interconnected with these processes once more (Willow School, n.d.).

> By participating with our natural systems, rather than trying to control them and have dominion over them, man and nature can co-evolve into richer forms that give greater diversity and resilience to each other and to the whole that supports them. (Willow School, n.d.)

3.2 The Bullitt Center

Figure 12: The Bullitt Center. Reproduced with permission. 570.011 - Across Pike Street. © Nic Lehoux, 2013. Retrieved from https://www.flickr.com/photos/bullitt_center/10425319975/in/photostream/

Location: Seattle, Washington
Client: The Bullitt Foundation
Type: Grade A Commercial
Site area: 10,076 sqf
Building area: 50, 000 sqf
Completed: April 2012
Cost: $30 million

Responsible Agents

Owner: Bullitt Foundation
Developer: Point32**Architect:** The Miller Hull Partnership
General Contractor: Schuchart
Mechanical and Electrical Engineers: PAE Consulting Engineers
Structural Engineers: DCI Engineers
Building Envelope Consultant: RDH Building Envelope Consultants
Water System Engineer: 2020 Engineering
Energy Consultant: Solar Design Associates, Inc.
Civil Engineers: Springline Design
Landscape Architect: Berger Partnership
Building Manager: Urbis Partners

Built in 2012, the Bullitt Center is a 50,000 square foot commercial building in downtown Seattle, Washington (Bullitt Center, n.d.). Owned by the Bullitt Foundation, the building personifies the foundation's values and beliefs, namely to support innovative policies and projects, which push the environmental agenda forward (Bullitt Foundation, n.d.). After deciding to create a new headquarters, it was important to the foundation's CEO, Denis Hayes, that they "walk the talk" (Bullitt Center, n.d.). The state-of-the-art sustainable building systems resulted in a commercially viable office building, which acts as a living laboratory for the world to learn from (Bullitt Center, n.d.).

As of 2015, the Bullitt Center has achieved certification under the Living Building Challenge, one of the world's most ambitious and strenuous certification systems, administered by the International Living Future Institute (Bullitt Center, n.d.). To become fully certified, the building had to meet twenty imperatives, within seven performance categories known as petals (Bullitt Center, n.d.). Some imperatives require the building to generate all of its own renewable electricity, collect all of its own water for use, manage its waste on site, and eliminate the use of "red listed" or hazardous building materials (Living Building Challenge, n.d.).

The building embodies the evolutionary process of RD&D, and embraces its role as a participant and co-creator with the living systems it is a part of. For

instance, the building has been built to last for 250 years, but its technologies, envelope, and supporting structure have been designed in ways that can be updated in the future, as these systems and technology improves (Miller Hull, n.d.). These features enable the Bullitt Center to be as flexible and dynamic as the living systems the building is now integrated into.

Place

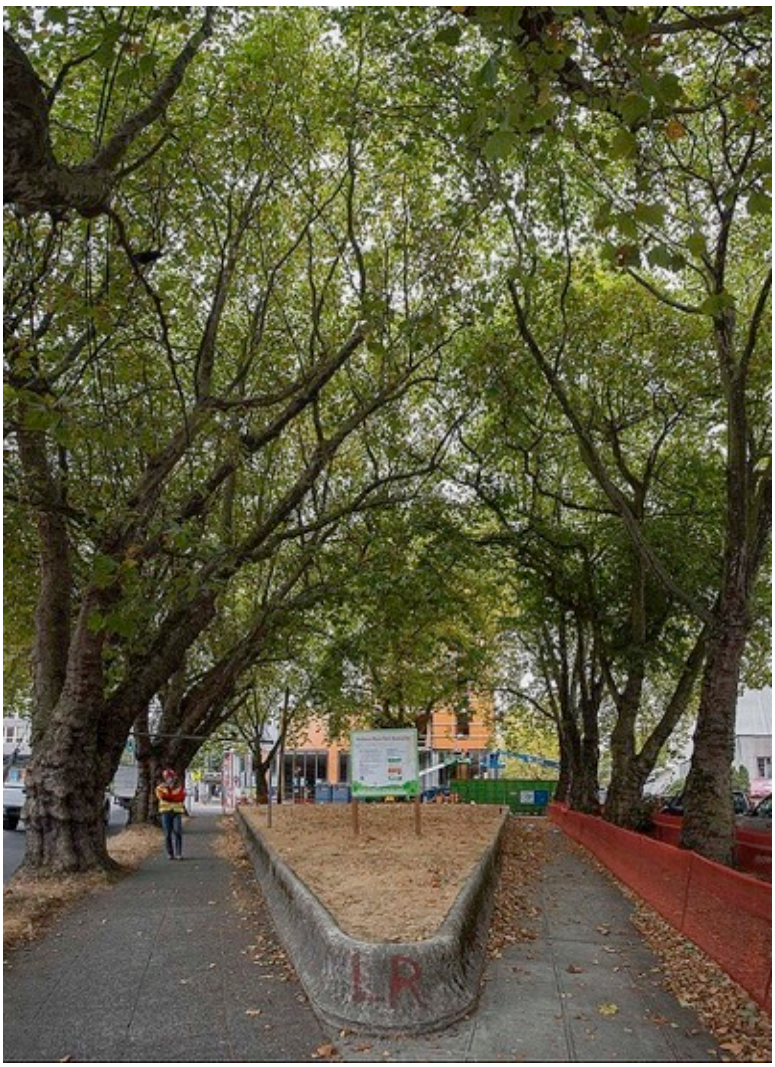

Figure 13: Original site condition of 'triangular traffic island'. Reproduced with permission. McGilvra Place Park - Before. © John Stamets, 2013. Retrieved from https://www.flickr.com/photos/87145936@N05/8100855011/

Many RD&D projects, like the Willow School, are located in sizeable rural settings where the natural ecosystems are more extensive and pronounced, making the natural systems easier to read. However, the Bullitt Center is located in a dense urban setting, which has long established human-based systems to account for, in addition to natural ones.

What natural systems had once existed on site had been severely degraded, and urban development had taken its toll. The Urban Land Institute (2015) described the site prior to construction as "little more than a triangular traffic island comprising an elevated patch of grass surrounded by sidewalks…" (p. 5). The basic design of the Bullitt Center is therefore modeled after the fir forest, which once existed on the site before settlement, with a combination of natural and technological techniques mimicking the original forest systems (Werner, 2013).

Regeneration

The systems of the Bullitt Center have been designed to work synergistically. I have chosen to focus on the water system, as an example of how all of the RD&D Levels of Work are engaged.

To comply with current health regulations, the Seattle Public Utilities must supply all potable water at the Bullitt Center. This regulation forced the building to install conventional water connections and operate at a 'maintain' level of

work. However, the building had to achieve net-zero water use in order to meet the requirements of the Living Building Challenge (LBC), meaning they will eventually have to collect all of the water required for potable and non-potable uses on site (Bullitt Center, n.d.). To meet this requirement, the Center has installed a 500-gallon cistern in the basement to collect filtered rainwater (Bullitt Center, n.d.). This will eventually be used to supply all of the building's water needs, and meet the criteria for an 'operational' level of work (Bullitt Center, n.d.).

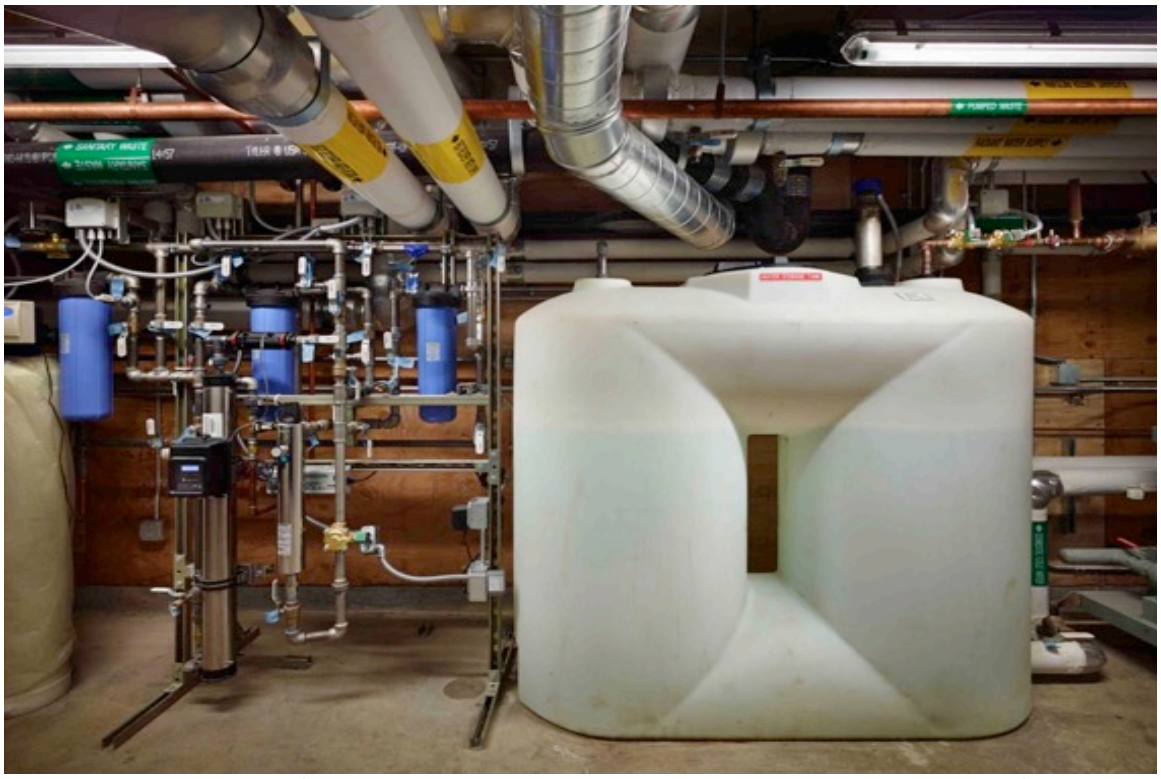

Figure 14: Water cistern for collecting rainwater. Reproduced with permission. Water filtration. © Benjamin Benschneider, 2013. Retrieved from https://www.flickr.com/photos/bullitt_center /11587647655/in/photostream/

To work above the line and realize a level of 'improvement' within the water system, grey water is also collected from the sinks and showers and stored in a cistern (Bullitt Center, n.d.). Once collected, the water then filters through the building's green roof and constructed wetlands, and eventually makes its way down to the street-level bioswales before re-entering the local aquifer (Bullitt Center, n.d.).

Figure 15: Green roof and grey-water filtration system (Penelton, 2015).

The Bullitt Center has also considered the treatment of its black water and solid waste. The building features the world's first six-story compostable toilet system, where each toilet only uses less than half a cup of water and biodegradable foam to move the waste down into aerobic composters (Bullitt Center, n.d.).

Figure 16: Aerobic composters. Reproduced with permission. Composters. © Benjamin Benschneider, 2013. Retrieved from https://www.flickr.com/photos/bullitt_center/11587647565/in/photostream/

The waste system becomes 'regenerative' after the waste products are collected monthly, and re-used as food for a local bird sanctuary (liquid waste), and fertilizer processor (solid waste), then returned to the greater living systems once more (Bullitt Center, n.d.).

Pattern Literacy

A comprehensive knowledge of the local living systems was necessary to inform the design process of the Bullitt Center. Given the coastal climate of Seattle, the techniques employed in the water system "not only provide direct, positive ecosystem service benefits at the scale of the building site, but also reduce ecosystem impacts and the watershed and regional level…" (Cowan, Davies, Diaz, Enelow, Halsey, & Langstaff, 2014, p. 36). For example, rainwater catchment on site reduces the pressure on local watersheds, while wastewater treatment within the building reduces the pressure on local facilities (Cowan et al., 2014). Without the knowledge of current pressures and effects of regional and local systems provided by a pattern literacy, the design would not have been as effective at addressing them.

According to RD&D theory, the application of climate-specific techniques, such as the rainwater system, will not be as relevant or successful in other regions. The Bullitt Center design team asked three main questions when considering the patterns of the site: "What is here? What will nature allow us to do here? And what will nature help us do here?" (Pena, 2014). Each project must be considerate of the patterns applicable to its own site, and find ways to interact with them through development and design.

Figure 17: Constructed wetlands provide grey-water filtration and landscaping (Penelton, 2015)

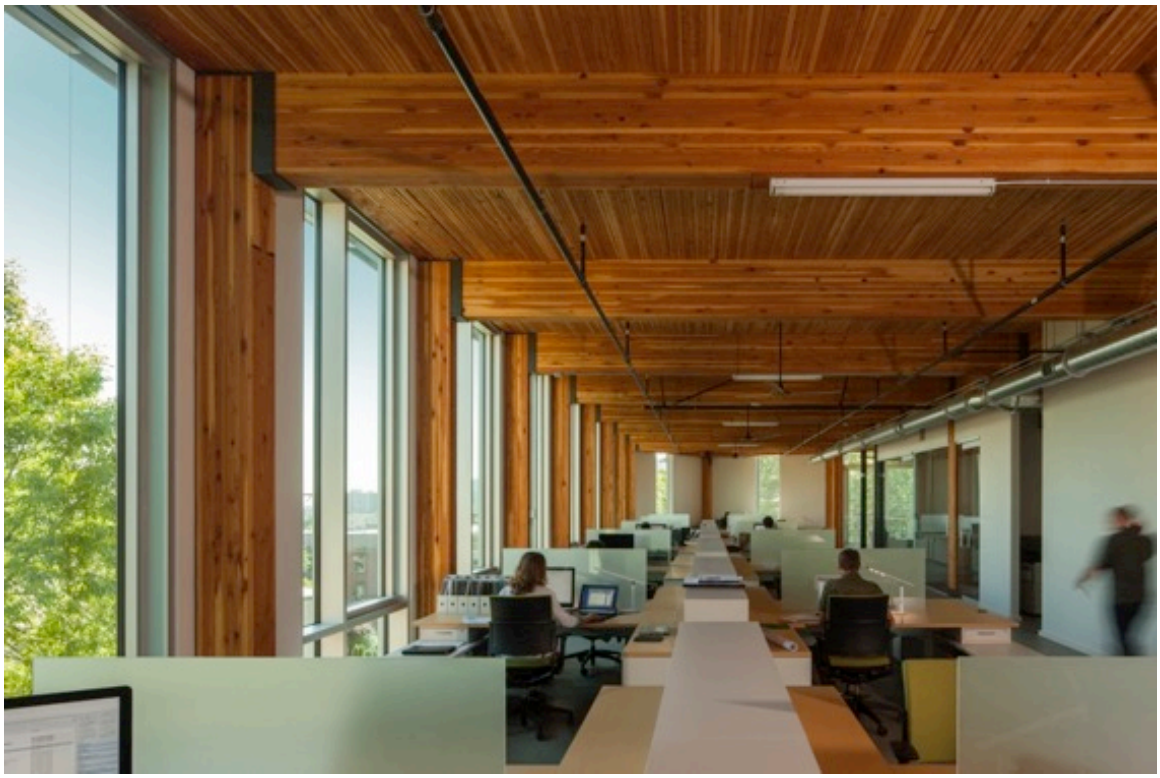

Figure 18: Natural daylight in offices. Reproduced with permission. Suite 400 co-working space. © Nic Lehoux, 2013. Retrieved from https://www.flickr.com/photos/bullitt_center/10425434523/in/photostream/

Another example of applied pattern knowledge is the study of the solar path on site, which was undertaken in order to calculate the most effective placement of the building to take advantage of natural daylighting and passive heating and cooling (ULI, 2015). The study of the solar path was most important when designing the 575-panel solar array, which supplies the building with all of its electricity demand (Bullitt Center, n.d.). The array is connected to the grid, drawing upon grid energy during the winter and supplying energy back when the building has a surplus in the summer (Bullitt Center, n.d.). The system has been so effective that in 2013 it produced fifty percent more energy than was required by tenants (Bullitt Center, n.d.).

Figure 19: Installation of solar array on roof . Reproduced with permission. stamets-BCS-2012-9.6_e5819-850px - Solar array with workers. © John Stamets, 2013. Retrieved from https://www.flickr.com/photos/87145936@N05/7986784539/

Development and Design

The development process for the Bullitt Center was approached differently than conventional process. The team responsible for designing the building was carefully selected by the Foundation, who identifies the early adoption of a very comprehensive integrated design process (IDP) with the success of such a complicated and complex building (Miller Hull, n.d.).

According to Craig Curtis, a design partner with Miller Hull, the IDP process allowed the team to "move beyond the traditionally linear design, engineering and construction process to orchestrate a diverse team targeting the seemingly impossible together, right from the start" (Miller Hull, n.d.). The ambitious goals of the project required the team to be clear and communicative, as well as open to new ideas and creative with overcoming challenges (ULI, 2015).

While some of the distinctive building design features have been mentioned, it should be reiterated, the various systems of the building are constantly working interdependently, as they would in a natural ecosystem (see Chapter 4). For example, geothermal heat pumps move water through a radiant floor system throughout the Bullitt Center to moderate the temperature of the building (Bullitt Center, n.d.). The Bullitt Center's systems mimic those in nature,

such as geothermal vents, which heat water at the surface of the Earth, or flowing rivers, which cool the air surrounding them.

A state-of-the-art monitoring system acts as the "brain" and "nervous system", collecting real-time information; energy and water production and use, temperatures, carbon dioxide levels, sunlight angles, and more are all monitored so the building can respond accordingly (Bullitt Center, n.d.). Automated systems control the windows, thermostat, exterior blinds, and lighting, ensuring the building operates at its optimal efficiency and effectiveness (Bullitt Center, n.d.).

Tenant health is promoted throughout the design. There are no parking stalls on site; instead a bike garage is available, and with a walk score of 100 (out of 100), public transit is a viable alternative (Bullitt Centre, n.d.). Also, a staircase known as the "Irresistible Stair" was built out of local FSC certified wood, and features stunning views to encourage employees to climb instead of using the elevator (Bullitt Centre, n.d.). Natural efficiencies also greatly benefit the health of tenants with features such as operable windows, daylighting, and sightlines and access to natural features (Bullitt Center, n.d.).

Story

Prior to the Center's construction, there was a bar with a parking lot on the site, and a street used as a short cut for vehicles coming to and from downtown (ULI, 2015). Interest in the area was renewed in the early 2000's, and residential and mixed-use buildings now surround the site. As a budding neighbourhood, public consultations were a valuable and influential part of the development process (ULI, 2015), however the story of the Bullitt Center will continue to be formed by those who use the building.

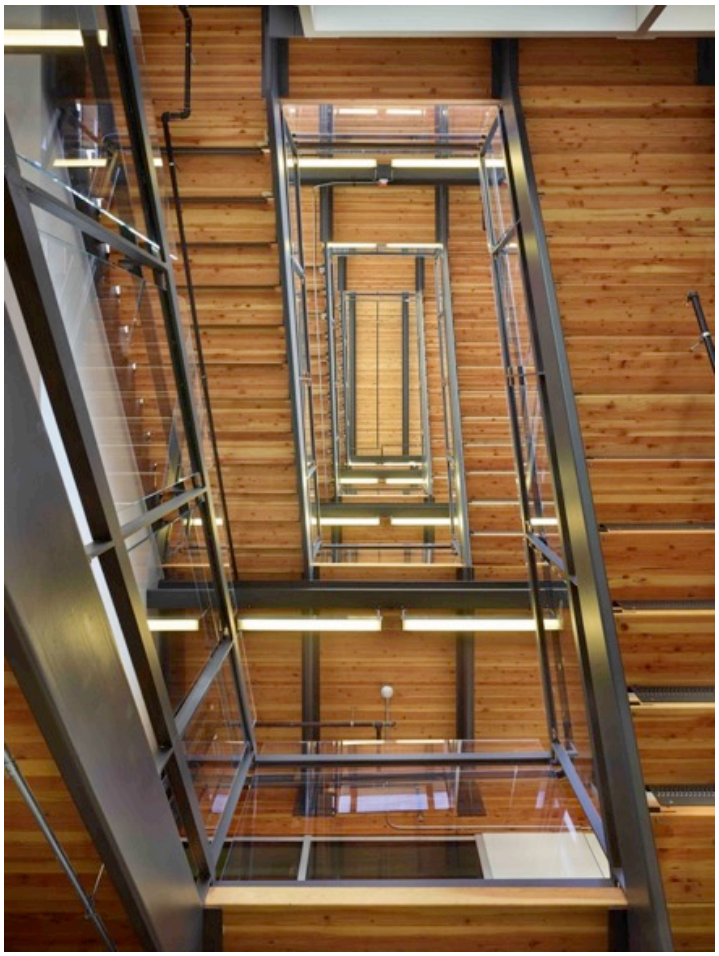

Figure 20: The Irresistible Stair. Reproduced with permission. Irresistible Stairway. © Benjamin Benschneider, 2013. Retrieved from https://www.flickr.com/photos/bullitt_center/11587964054/ In/photostream/

Tenants themselves also play a very active and prominent role in the ongoing success of the building. Unlike most commercial buildings that lease space, tenant behaviors, such as electrical consumption and water use, are also tracked, and some even incentivized. For example, tenants are given an energy budget and required to monitor their energy use; if they can operate within their budget, the foundation will pay for the tenant's utility bill (Campbell and Werner, 2013). Furthermore, an interactive online dashboard provides real-time information on how tenant behavior affects the building systems to those in the building, as well as the general public (Bullitt Center, n.d.).

Figure 21: Bullitt Center Dashboard. Public Domain. Retrieved from http://www.bullittcenter.org/building/dashboard/

Prior to moving into the building, tenant PAE Consulting Engineers conducted an energy audit and found they were well above the allowed energy budget of the Bullitt Center (ULI, 2015). PAE switched to laptop computers and task lighting, and cut down to one printer in an effort to reduce their energy consumption (ULI, 2015). Tenants such as PAE are playing an active role in the story of the Center on a daily basis, and learn how their behaviors directly influence the effectiveness of the individual systems and the health of the building overall. Moreover, tenants are able to see a direct correlation between their resource consumption and utility bill, and the case to build using RD&D techniques can be made economically. As time goes on, their actions will become documented chapters in the ongoing story of the Bullitt Center.

Potential

The Bullitt Foundation and the Bullitt Center encourage a strong educational and advocacy component of sustainable building practices to share their knowledge and experience of the project, drive change in the marketplace by showing what's possible, and reduce local political and regulatory barriers (Bullitt Center, n.d.). These actions not only allow the project to be more than just another office building; they enable it to reach a higher potential.

As part of the foundation's tactics to promote sustainable communities, the Bullitt Center also makes all of its monitored building information available

to the public (Bullitt Center, n.d.). Their website features a dashboard with all of the real-time energy and water use information, as well as a comprehensive overview of the building's systems. The University of Washington's Center for Integrated Design (CID), whose team occupies tenant space and tests and monitors the building as ongoing research, also makes tours of the building available (Bullitt Center, n.d.; Campbell and Werner, 2013).

Figure 22: Visitors explore the Bullitt Center (Photo by Penelton, 2015).

Lessons Learned

Although the architectural and sustainability communities have celebrated the success of the project, the road to get there was not always easy, and is far from over. Local and state regulatory hurdles constrained the project, and still

have their hold on a few of the building's main features. Federal health codes require the use of chlorine, a red list item, to treat all tap water; a regulation the LBC is permitting for now, as long as it is filtered out with charcoal before reaching the user (Bullitt Center, n.d.). Likewise, although the building's fully functioning grey water system can safely clean the water, federal regulations still deem the re-use of water illegal for potable purposes (Bullitt Center, n.d.). The Foundation has been working with local, state, and federal authorities to identify similar obstacles, and the Bullitt Center is being used to test appropriate sustainable alternatives (Bullitt Center, n.d.).

Fortunately, the City of Seattle has been receptive to the concept of sustainable buildings and communities, and has created a pilot program to enable and encourage more projects such as the Bullitt Center to be developed. Seattle's Living Building Pilot Program recognizes projects that are attempting Living Building Certification and allows for approved departures from the land-use code and an expedited design review process (City of Seattle, n.d.). Through this pilot program, the Bullitt Center was granted a variance to install a larger roof overhang, which was necessary to fit the solar array needed to power the building (City of Seattle, n.d.).

Figure 23: Over-sized roof overhang granted through the Living Building Pilot Program. Reproduced with permission. stamets-BCS-2013-1.1_e6216_sm. © John Stamets, 2013. Retrieved from https://www.flickr.com/photos/bullitt_center/8414290283/in/photostream/

To encourage projects like the Bullitt Center to become the new conventional form of development, Hayes recognizes the importance for governments to provide incentives (Hower, 2014). Such incentives could include variances for roof overhang size, building footprint and height, which are already included in Seattle's pilot program, or to allow tax breaks and license fee discounts (Hower, 2014).

Other obstacles to achieving traction in the market include higher perceived costs and extended implementation time. Although the Foundation made it very clear the intention of the Bullitt Center was not to make money, the

building construction cost was an average of $55 more per square foot than a conventional office building of the same size (Campbell & Werner, 2014). Finally, the Center's certification as a living building was stalled until full occupancy could be achieved, and the yearlong post-occupancy monitoring had been completed (Bullitt Center, n.d.). It took nearly two years after the building was completed for a full occupancy rate and post-occupancy monitoring to be achieved (Bullitt Center, n.d.). Restrictive tenant requirements, and neighbourhood location were reasons for the delayed full occupancy (ULI, 2015)

Figure 24: Vacant commercial office space as of May, 2014 (Photo by Penelton, 2015).

It is encouraging the Foundation was not aiming to turn a quick profit. Instead, they examined the long-term costs and benefits, and upheld their

objective of delivering a building that would sustain healthy social and natural environments. The Bullitt Foundation is able to communicate widely through its website and media publications about the impact of design decisions, demonstrate better choices, and prove this level of development can be achieved. In doing so, they hope to accelerate change in the marketplace and to challenge policymakers to update codes and regulations to enable more buildings like this to become commonplace (Bullitt Center, n.d.).

3.3 UniverCity Phase 5 Master Plan, Simon Fraser University

Figure 25: SFU and UniverCity on Burnaby Mountain. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://livingfuture.org/univercitydevelopment

Location: Burnaby, British Columbia
Owner: Simon Fraser University
Type: Public Institution
Size: 34 acres as part of a greater campus of 430 acres
SFU Student Population: 30,000
SFU Faculty & Staff Population: 6,500
UniverCity Current Population: 3, 850
UniverCity Projected Population: 10,000
Completed: At planning stage only
Cost: Unknown

Responsible Agents

Regenerative Design Consultant: International Living Future Institute
SFU Community Trust Director of Development: Dale Mikkelsen
SFU Trust Staff
SFU Community Trust Board of Directors

The Simon Fraser University in Burnaby, B.C. was founded in 1965 (Simon Fraser University (SFU) (n.d.). SFU is now one of the country's top comprehensive universities, and operates with the vision of being Canada's most community-engaged research institution (SFU, n.d.). The essence of this vision was incorporated into the design of the original campus by Canadian architects Arthur Erickson and Geoffrey Massey, whose plan encourages interdisciplinary connections between students and researchers, while also paying homage to the natural surroundings of the mountain forests and bay views (SFU, n.d.).

In 1995, President John Stubbs announced a "model sustainable community" would be built adjacent to the SFU Campus to help support the institution, and to serve as an example of improved urban planning practices respectful of their natural environments (SFU Community Trust, 2014). As a self-governing entity, UniverCity essentially operates as a small city, with the fortunate opportunity to have close control over the standards process for development. This has allowed UniverCity to set high standards for development that align with their vision for a model sustainable community, and to push the boundaries of conventional development practices.

After transferring over 320 hectares of land owned by the university to the City's Burnaby Mountain Conservation Area, the City of Burnaby granted SFU development approval, and by 1996 the Official Community Plan (OCP) and

Zoning Bylaw Amendments for the community were approved and UniverCity was born! (SFU, n.d.). In 1997 the SFU Community Corporation (formerly the Burnaby Mountain Community Corporation) was established as the Trustee of the land to oversee the development of UniverCity (SFU, n.d.). A Board of Directors, composed of key SFU stakeholders, faculty and student representatives, as well as local real estate and development experts, governs the Trust (SFU, n.d.). A separate Community Advisory Committee (CAC) involves students, neighboring residents, and representatives from key organizations such as BC Housing, Canada Mortgage and Housing Corporation and SmartGrowth BC in a collaborative development process (SFU, n.d.).

SFU recognized two main goals for UniverCity: to establish a profitable endowment fund to support teaching and research at SFU, and to create a sustainable mixed-use community complete with a diversity of housing options, services, and amenities (D. Mikkelsen, personal communication, May 14, 2014). UniverCity will eventually be home to approximately 10,000 people upon its completion, with unique neighbourhoods, schools and childcare, a retail/commercial district, and an extensive park and trail system (SFU, n.d.).

As a self-governing entity, SFU provides an informative case in which a clear process and progressive development plan are in place to implement regenerative concepts. Although collaboration with local governments and

entities is still important, SFU has the will and authority to implement progressive ideas, as well as having the flexibility to adapt to new ideas more quickly.

Development and Design

The SFU Trust carefully created clear development objectives, which aligned with their commitment to sustainability. The first objective was to designate only 65 of the 320 hectares of already-disturbed land as the future site of the community (SFU Community Trust, 2014). SFU understood that to have a vibrant and active campus, the adjoining community had to be affordable and provide amenities both students and residents could enjoy (SFU Community Trust, 2014). Being careful to stay in step with demand from the greater metro-Vancouver region, development has been completed in the residential/institutional Phase 1, and has begun in the mixed-use Phases 2 and 3 (SFU, n.d.). Development requirements and conceptual by ILFI has been completed.

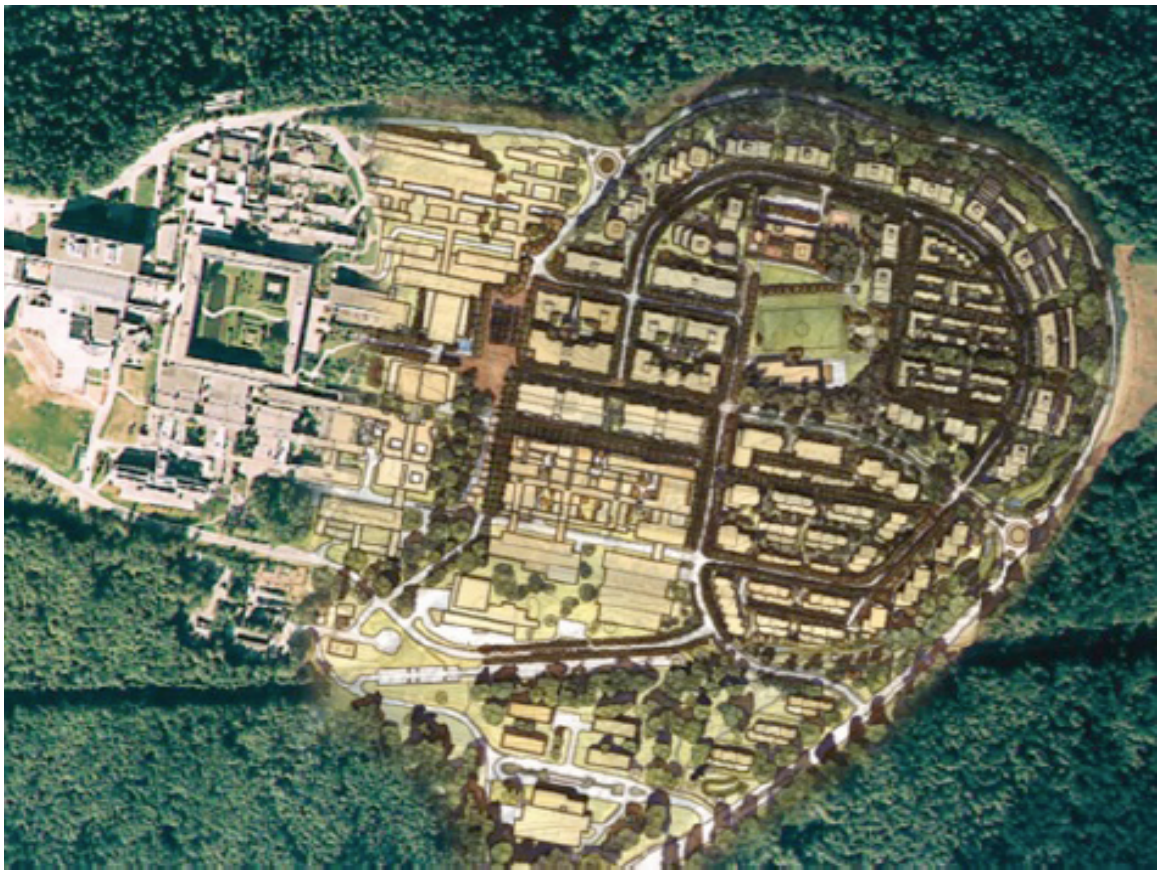

Figure 26: UniverCity Master Plan. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

The engagement of the community has been critical throughout the entire life of SFU and UniverCity. As mentioned above, stakeholders have been involved in every step of the process, from the governing of SFU Community Corporation to the creation of community plans and by-laws (SFU Community Trust, 2014). Each of the development phases have gone through an extensive community review and approval process, and the Trust conducts and publishes annual survey in an effort to continually create a community stakeholders desire (SFU, n.d.).

To further commit to their ambitious sustainability goals, UniverCity's by-laws for new buildings were updated in 2010 to include strict performance-based green building requirements, similar to those required for LEED Gold certification (D. Mikkelsen, personal communication, May 14, 2014). Although LEED certification is not required, many of the buildings completed have been certified (personal communication, May 14, 2014). Dale Mikkelsen, Director of Development for the Trust, explained how with such clear and focused goals for UniverCity in place, the Trust's board is flexible with how goals are achieved, allowing the planning team to be creative and push the boundaries more than with a typical development (personal communication, May 14, 2014).

When it came time to build UniverCity's childcare centre, the Trust chose to employ ILFI's Living Building Challenge as a new standard of sustainability. This was done to show the Trust's commitment to sustainability, and to push developers who had become accustomed to the LEED process further out of their comfort zone (D. Mikkelsen, personal communication, May 14, 2014). The Trust worked closely with ILFI to complete the UniverCity Childcare Centre, now known as the "greenest childcare centre in the world" SFU, n.d.). The centre has been publicized as Canada's first "Living Building", yet as of October 2015, was still waiting to achieve its certification under the challenge.

Figure 27: UniverCity Childcare Center (Photo by Penelton, 2015).

Because of the success of the childcare centre, the Trust asked ILFI to complete a study of the SFU campus and UniverCity based on the principles of RD&D and the Living Building Challenge in 2013 (International Living Future Institute, 2013). ILFI (2013) proposed how a newly identified phase of the campus could bring the development together and become a "living community" by employing regenerative principles at a community scale. The area designated for Phase 5 development, currently utilized as parking, was chosen for its connectivity to existing infrastructure, and proximity to services and amenities (ILFI, 2013).

Figure 28: UniverCity planning phases (Phase 5 concept area identified in red). Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://livingfuture.org/univercitydevelopment

Figure 29: UniverCity reimagined as a Living Community by ILFI. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

The design identified three main opportunities to compliment the current master plan and development, as well as the potential for a newly identified phase (ILFI, 2013). The opportunities included: reconfiguring some parcels and streets to create more concentrated corridors and clear edges, the creation of two "Great Streets" to better connect the campus and UniverCity with each other and a potential commuter gondola, and uninterrupted public space throughout the entire mountain with clear multi-modal transportation connections (ILFI, 2013).

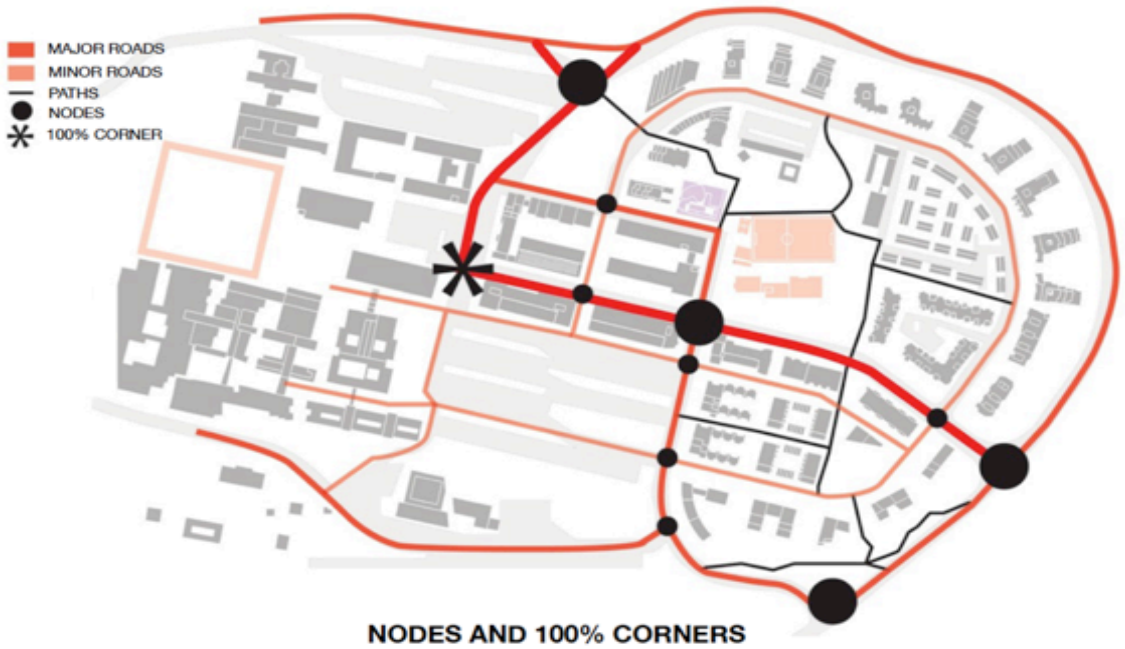

Figure 30: Roadways, nodes, and corners identify opportunities for connection. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

Additional utilitarian regenerative principles are demonstrated in the "living water system" which uses the natural topography of the site to capture, filter, and store storm water in a series of ponds throughout the site (ILFI, 2013). Rainwater would be collected by the buildings for potable use, and a water stream would be constructed as a living machine to treat black water on-site, enabling the development to achieve net zero water (ILFI, 2013). These ponds would also be incorporated as part of a natural landscape and space plan, and would simultaneously introduce more natural elements, connect public spaces and increase a sense of place (ILFI, 2013). Other features include opportunities for urban agriculture, enhanced connectivity, and a new pattern language for pedestrians (ILFI, 2013).

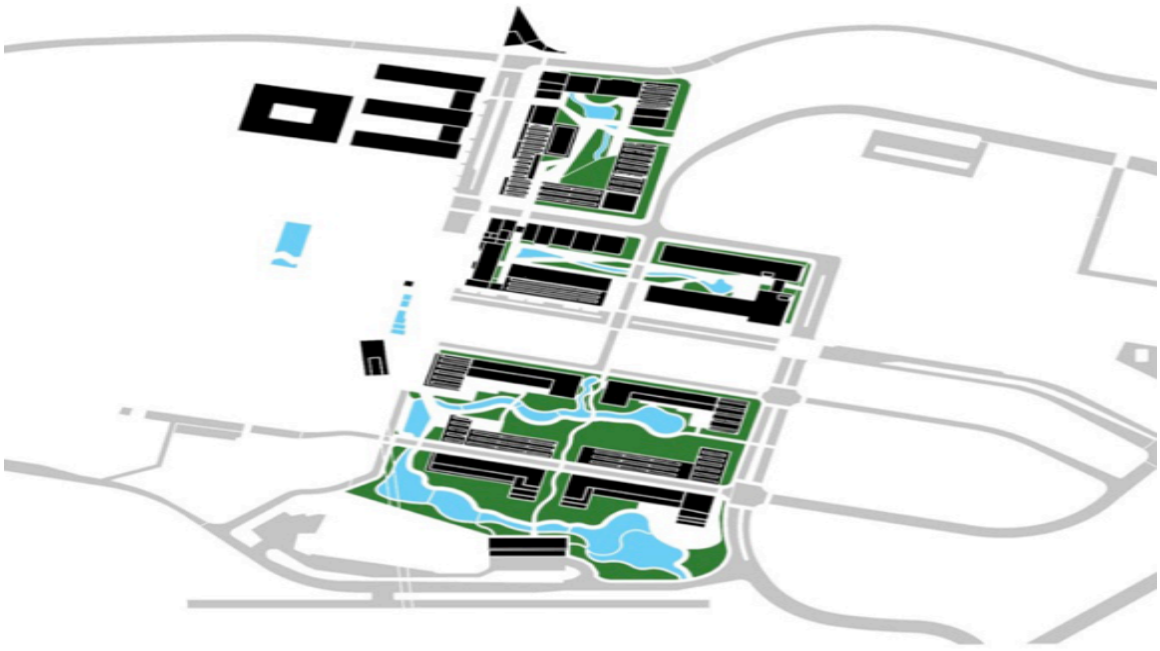

Figure 31: A living water system to treat water and create an engaging landscape. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

Place

ILFI researched the history of Burnaby Mountain, as well as the physical, natural, and developmental perspectives of the place. They identified the site as a veritable "island of knowledge", with the forest providing relief from the imposing urban environment (ILFI, 2013). ILFI considered the site's existing structures and infrastructure, the UniverCity masterplan, and the site's natural topography, nodes and pathways, vistas, public space, and landmarks (ILFI, 2013). By studying the patterns and stories of the mountain, ILFI determined a previously identified site for potential development located outside of the current plan area would not be appropriate due to the extreme slope of the land, as well as the lack of connectivity to existing infrastructure and campus life (ILFI, 2013).

To generate more of a sense of "Place" and identity for the campus, a clock tower was suggested as a gathering point and landmark (ILFI, 2013). A viewing platform was also proposed in order to appreciate the natural beauty of the site, and would create a destination when combined with the recommended clock tower, a performing art space, and a gondola station (ILFI, 2013).

Figure 32: A clock tower may generate a sense of place for the campus. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

Pattern Literacy

The natural flow of water through the site prior to development was analyzed, and proposed to be re-incorporated into ILFI's design of a living water system to slow storm water run-off and allow it to infiltrate back into the water table (ILFI, 2013). In studying the patterns of existing infrastructure such as buildings, roadways, and public space, ILFI ensured Phase 5 would fit in with the current development while emphasizing connections of social and recreational opportunities (ILFI, 2013). Nodes, edges, and vistas were also considered, not only help to generate a sense of place and improve wayfinding, but also to enhance natural surroundings.

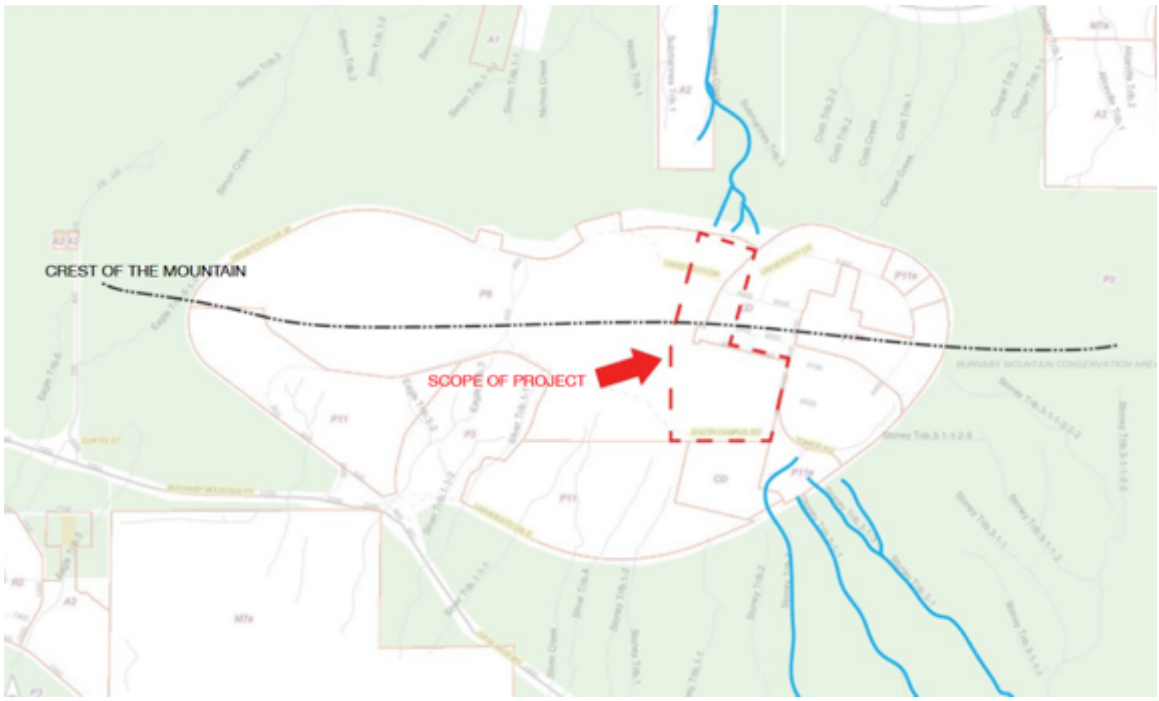

Figure 33: Pattern of natural water flow on Burnaby Mountain. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

Regeneration

UniverCity has shown how the Levels of Work can be engaged over the course of the natural development of the site. The adopted bylaws of UniverCity already set a high bar, requiring buildings to be 40% more water efficient and 30% more energy efficient than the Model National Energy Code for Buildings (SFU, 2014). The updated bylaws engage the 'improve' level of work since these conditions would not have been adopted conventionally. However, below the line conditions are still being addressed. Buildings in Phase 1 possess common green building tactics of the 'operational' level, such as energy and water

efficient appliances, while geothermal heating systems and water treatment improve the resiliency and meet conditions of the 'maintain' level of work.

Proceeding to the 'regenerative' level is the generation of surplus renewable energy at the childcare center. A solar array provides enough energy for the heat and hot water used in the center, and surplus energy is sold back to the UniverCity District Energy System (SFU, 2014). Furthermore, a proposed upgrade to the district system will replace the old boilers currently providing heat and hot water to select campus buildings, and will service all new infrastructure built in UniverCity (SFU Community Trust, 2014). For the time being, the district system in UniverCity is operating with a high-efficiency natural gas boiler, however a biomass boiler will eventually be brought online, using otherwise discarded construction wood waste for fuel (SFU Community Trust, 2014).

Figure 34: Allocation of district energy produced from the biomass plant. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

Story

The SFU Community Trust has conducted resident surveys every four years since 2007, providing feedback about resident "attitudes, opinions, expectations, and needs of their community" (SFU, n.d.). These surveys, in a sense, represent the stories of the residents, providing insight into how people live on Burnaby Mountain, how they feel about it, and what they may like to see changed (SFU, n.d.). The Trust makes this information available to the public and takes the feedback into account, when planning for all future development (SFU,

n.d.). Helping to bring together individual stories are groups such as the Burnaby Mountain Residents Association, which promotes community life by hosting events such as annual dinners, cleanups, festivals, and flea markets (SFU, n.d.). Furthermore, the SFU Community Association responds to issues concerning the UniverCity community, and attempts to present a unified vision from the residents to other stakeholders (SFU, n.d.).

Figure 35: Amenities and gathering places on High Street (Photo by Penelton, 2015).

Potential

Although Phase 5 is still at a conceptual stage, the legacy of UniverCity is already emerging. Strong actions toward creating a sustainable community have been made; by-laws demand more from developers, there are new standards for infrastructure, and a diverse community is forming.

Figure 36: Imagining how people may interact with natural systems. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercitydevelopment

Higher potential will be achieved with the future installation of the biomass district heating system, and inclusion of an outdoor curriculum in the Elementary School. In the future, if elements of Phase 5 are developed as

planned, people will have the chance to closely participate with natural water systems, food systems, and energy systems.

Lessons Learned

The Phase 5 plan's incorporation of a regenerative perspective helps to identify systems that may become more economically feasible when employed at the district or community scale. Mikkelsen points out developers are hesitant to assume all of the risk of certifying a complicated and costly living building, however may be willing to take on the challenge if some of the services were already taken care of at the district scale and they need only tap into it (personal communication, May 14, 2014). Although not many of these district systems exist yet, Mikkelsen also speculates they will be far more cost-effective and may operate more optimally than systems currently installed in individual buildings.

SFU has also already proved that achieving a higher standard of development does not necessarily mean a higher cost. Gordon Harris, President and CEO of the Trust, iterates emphasizes the goal of UniverCity is not to showcase an overly expensive, un-replicable experiment, but to "demonstrate how everyone could achieve a higher environmental and social standard of community building" (SFU Community Trust, 2014, p. 23). For example, despite having to meet the rigorous standards of the LBC, UniverCity Childcare Center was built at 18% lower cost than similar conventional buildings in the area (SFU

Community Trust, 2014). SFU hopes to continue to strive to remove the stigma of high costs around sustainable efforts.

Working with the local systems, and having the forethought and ability to plan at a district-level scale has allowed the UniverCity site to reach higher potentials than if conventional development practices had taken place. The recognition, and use, of both natural and human systems shows how regenerative principles may be incorporated at a community or municipal scale.

Figure 37: Co-creation resulting in natural and human systems blending together. Reproduced with permission. © International Living Future Institute, 2013. Retrieved from http://living-future.org/univercity development

3.4 Conclusions

Applying the RD&D concepts of regeneration as a level of work, design and development, place, pattern literacy, story, and potential to the precedent cases provided a more thorough understanding of the practical application of theory to the practice of RD&D. By applying the concepts it was found that the three precedent studies of the Willow School, the Bullitt Center, and SFU's UniverCity master plan each exhibited characteristics in alignment with RD&D theory. Though identifying these concepts is not meant to limit the characteristics of RD&D projects, their identification may help RD&D to establish itself as a distinct paradigm within the field of sustainable development.

The precedent studies also revealed several characteristics common to RD&D projects. Firstly, when the RD&D process was adopted in the pre-planning stage, greater project potential was achieved through the facilitation of close team member collaboration, design synergies, and stakeholder engagement. Secondly, the RD&D process identified natural systems on project sites, allowing the projects to incorporate the systems into their designs. This partnership will allow tenants or residents to co-create with nature in the ongoing future. Thirdly, all of the precedents required, or implemented changes to conventional regulation and policy in order to push the boundaries of worldviews and designs. Finally, each precedent had champions who advocated

for an alternative developmental process, and upheld the vision of the project throughout implementation.

It should be noted that many projects around the world have also applied the concepts of RD&D, and frameworks such as sustainable planning and design, LEED, One Planet Living, the Living Building Challenge, etc., offer strategies to incorporate them. Many of these projects do not self-identify as having integrated the RD&D process or design features, and with no unifying authority on RD&D, these projects are not formally recognized as having done so.

While the precedent studies were beneficial in understanding more about the application of RD&D theory in practice, further investigation using key informant interviews was considered necessary to answer the second research question regarding the position of planners within RD&D practice. The next chapter discusses results from the key informant interviews, which provided information regarding where the RD&D paradigm is situated within current development practice, and to what degree the planning profession is involved in.

Chapter 4: Interview Results

Key informant interviews were conducted with planners, architects, as well as RD&D and sustainability-related professionals, in an effort to better understand the influence of RD&D principles on current development practices, as well as to investigate the role of planners in the RD&D process. A main series of questions were developed to evaluate the general perception of RD&D and its position within sustainable development, the application of RD&D principles in development, the challenges and opportunities of RD&D implementation, and the role of planners within the RD&D paradigm.

The interviews were conducted in a semi-structured way in order to allow for flexibility if new or unidentified themes emerged. Initially, the interview guide was designed to answer the research questions, but also to gather new information not found in the literature review (see Appendix C for the complete interview guide). As interviews progressed and I attended lectures at the Living Future unConference 2014, questions were adjusted to include topics I felt warranted further inquiry.

Following the completion of the interviews, the results were coded into five main themes: current sustainable paradigm, future sustainable paradigm, worldview, policy, and planners. Although some themes from the initial literature review were repeated, new themes also emerged during the interviews, most

notably the function of policy. The development of self, and the role of the planner were also emphasized.

Five interviews were conducted with an employee of the Simon Fraser University's UniverCity, two employees of ILFI, an independent architecture consultant, and an employee with the City of Seattle's Department of Planning and Development during the period May to August of 2014. Because of the small community of those knowledgeable about RD&D, many attempts were made to make contact with all known experts, practitioners, academics, and advocates. Of those contacted, only five were available to speak by phone or in person, with others having availability issues or not responding. I am confident those who were interviewed were able to provide substantial and comprehensive data, and well represented the field of those involved as RD&D professionals, despite the small number of participants.

Three of these interviews took place in person in the month of May during which time I travelled to Vancouver, BC, and Portland, OR to conduct interviews, visit precedent sites, and attend the ILFI Living Future unConference 2014. Although some interviews were accommodated during busy conference schedules, valuable data was collected. It would have been advantageous to have more representation in interviews from critics of RD&D, as well as from the planning community; however, I believe the literature review was able to inform

a critical opinion. Furthermore, the limited number of participants, and limited representation from planners, affirms how few people are familiar and have experience with the topic of RD&D, emphasizing the need for further research within the planning profession.

The interviews allowed me to discover a better sense of how practitioners consider RD&D, and what major barriers exist to implementing RD&D projects. Interviews also enabled me to become much more confident in the knowledge of RD&D principles and how they fit together during the development process. Finally, through the method of interviews, I was able to draw out the importance of innate qualities of RD&D, such as a development of self, in a way that was not evident in the literature review.

An overview of the analysis reveals more can be done to change conventional practices in preparation to implement RD&D, including overcoming many legislative hurdles. People must also begin to shift their worldview to embrace this new form of development, and find ways to encourage and incorporate progressive and inspiring ideas into RD&D projects. It was also found that planners currently play somewhat traditional roles in the process of RD&D, and there is considerable potential for the profession to contribute more of its skills and expertise to this work.

4.1 Key Informant Interviews

Key Informant	Profession/Position	Acronym
Richard Graves	Architect, Former Executive Director of ILFI	RG
Jason McLennan	Architect, Former CEO of ILFI	JM
Dale Mikkelsen	Landscape Architect, Director of Development, SFU Community Trust	DM
Bill Reed, Architect	Principal at Regenesis Group, Inc.	BR
City of Seattle Department of Planning and Development	N/A	CSDPD

Table 2: Key informant interview respondents, their professions and positions, and associated acronyms

The results from the interviews were transcribed, analyzed and coded into five main themes surrounding: the state of the current sustainable paradigm, the possibilities of a future sustainable paradigm, the influence of worldview on development practices, the function of policy as a barrier or opportunity, and the role of planners in RD&D. Each theme will be discussed by individual section, beginning with an application to a more broad audience, and then with a focus on the planning profession, specifically.

4.1.1 Current Sustainable Paradigm

One of the greatest challenges of RD&D is conveying the gravity of the world's current situation, and therefore the necessity of the paradigm. When people do not realize there is an urgent problem, they may continue to perpetuate the detrimental worldview and practices. For example, the use of

DDT was restricted worldwide after discovering its dangerous effects on the ecosystem. Many participants recognized there is a lack of consciousness surrounding the seriousness of our current reality, which is an underlying reason for the delay in getting this work off the ground. In this regard some participants remarked:

> "There's a big segment of the population that just don't really care about his kind of thing. And don't see the urge, or the importance of changing things." - RG

> "Yeah, most people are kind of oblivious. You know, people are going about their daily life and not conscious of the, and consciousness is really at the heart of this right? It's being awakened to the reality of the paradigm that we're in. And people are not awakened to that. They're in their own, you know, they're in the fabricated reality that we have around us." - JM

A significant obstacle to overcome in order for RD&D to be more widely accepted as a new paradigm is a greater sense of urgency and necessity. When asked what one of the greatest challenges of RD&D was, Bill Reed replied, "You know, getting people to actually slow down enough to even feel the need for it." Overcoming an egocentric worldview to become more aware and empathetic toward the impact of people on a global scale are also significant factors, notes Jason McLennan who said,

> "Well if you're breathing and alive you should care. You can care for purely selfish reasons, or for love of your family, or love of your species, or love of any species…this is the most

> important issue that we have, this is. Making sure that we're, that we aren't the last of our kind, that we are creating a healthy future, a living future for all species through time."

Another important piece of regenerative work is being able to position it within the greater field of sustainable development. Participants often suggested RD&D is perhaps the first development paradigm that could be considered truly sustainable. As stated in the literature review, participants confirmed efforts in sustainable development to date have been an important step in the right direction, but have essentially only slowed the impacts of degradation. Confusion may stem from a society where addressing the issue of sustainability with 'green' and 'eco-friendly' products has become trendy and profitable, yet only perpetuates the degradation of natural systems. Meanwhile, the root of the problems with consumption and uncontrolled development remain unaddressed.

> "You know most designs are still caught, at worst, in a kind of traditional development, barely legal, still polluting, still putting most of the burden and most of the impacts of development, on the ecosystem, on society. And even green design is just reducing those impacts by incremental amounts that's still pretty far away from truly creating higher states of health for ecosystems or people." - RG

In order to ensure RD&D is established as a transformative paradigm of development, those involved will have to be deliberate and clear about what regenerative principles and practices are, and how they differ from other

degenerative or less harmful ones. Furthermore, education and demonstration of the practice of RD&D will also be important in influencing wider acceptance of the paradigm.

Opinions regarding the influence of sustainability on developmental practices differed amongst interviewees. The popularity of sustainability as a brand in the built environment was recognized, with sustainable development rating systems, such as LEED and Green Globes, permeating the industry. Dale Mikkelson noted, "…I think that has almost, well, it's probably too much to say this, but I was going to say, it's almost become a mainstream." Although these rating systems still only account for a fraction of all built development projects, they have become common among investors who are hoping to gain legitimacy as being sustainably responsible.

Although sustainable development has garnered more attention over the past few decades, such practices are still far from becoming a new standard of development, and RD&D even more so. Few municipalities have implemented policy requiring a minimum standard of sustainable development be followed.

Since they have the option, most developers still elect to use conventional practices, even though they could profit from employing more conscious practices.

> "I think developers and builders…can easily achieve less bad buildings, and less bad neighbourhoods, but somehow seem to, mostly only, do it if they're asked to. Even though they know they can do it, and they can do it cost equivalent, and they can do it just as easily, and it sells just as well. They still need to, for some reason, and so why municipalities aren't asking everyone to do this, it blows my mind." – DM

Many participants noted the municipalities who have gone as far as setting a minimum standard for new buildings, have been met with resistance from the industry, and the attempt has failed to gain real momentum in pushing the industry to set a new standard for development. In Manitoba, Canada, for example, the provincial government mandated in 2007 that all new buildings receiving funding from provincial organizations must meet criteria set out in the *Manitoba Green Building Program*. The program sets out sustainable development standards that buildings are mandated or recommended to meet. Unfortunately, some development practitioners were not familiar with such requirements and integrated processes, and contested the policy was enacted without sufficient consultation and education.

When considered from the perspective of leverage points (see section 2.4.1), these standards still only address the system through the use of parameters, which were the weakest points of influence on a system. The impacts of "sustainable" approaches are not as harmful as conventional practices; yet still operate within the conventional North American worldview

and economic systems. One participant noted development practices in North America have not begun to fully embrace RD&D in part because there has been no need to. Scandinavia is often heralded as the leader of progressive sustainable efforts, creating built environments that push the boundaries of energy efficiency, living systems, transportation, and overall health of lifestyle. The participant argued this is not because Scandinavians have more progressive, socialist ideals, but because they literally cannot afford to do things the same way.

> "And if you go to Malmo in Sweden, and you talk to them, they will show you these wonderful developments they're doing, but they'll also say that it's not because people in Sweden are generally more thoughtful about global warming. They are, but they've become that way because of the cost of energy." – DM

Since many of the full costs of energy and goods are externalized, North American consumers don't experience such pressures, and are able to maintain their lifestyles seemingly without consequence. Even when faced with environmental disasters North American's are quick to rally and re-build, but rarely consider the situation as an opportunity to implement innovative practices, or consider if significant changes should be made to better prepare for long-term future scenarios.

Alternatively, there is a portion of the population who has awakened to the situation, and is taking on leadership roles to show others how regenerative

work can be done. Adopting the paradigm of RD&D as a new form of development is a daunting task, not only because its process will require people to think and act differently than they have in the past, but because the paradigm calls for us to make a change when things seem to be fine as they are.

> "…I think we're in the middle of a paradigm shift, where there's still a lot of work on rating systems, greening kinds of things, but not enough work on making a transformative leap forward. To just, you know, throw everything on the table and say, you know, let's re-imagine everything that we do in development. We need to imagine all of these things that we take for granted in a community, and create a, you know a bolder vision of the future." – RG

4.1.2 A Future Sustainable Paradigm

As stated above, it is important to clearly define what RD&D principles and practices are, in order to determine a direction for the work of RD&D to evolve from. One difficulty, however, is RD&D remains a very new concept still in the process of being characterized. When asked to define RD&D in the simplest terms, participants had different ways of describing a similar view: it was a process enabling people to co-evolve with our environments in a way to create positive, healthy systems, which are able to support life. Variations included:

> "…I think I can define it in a way that it is one of understanding essence to essence relationship that allows us to actually reconcile so much complexity – it's basically how do we participate in evolution. Evolving ourselves, our cohorts and the world that we're part of – participating in co-evolving."

> "…how is that design creating the conditions for ecological systems, social systems, to evolve or regenerate to a state of increased health at the process evolves"
>
> "…to create a built environment that doesn't degrade the quality of life for the natural environment, but in fact is restorative and regenerative. So how do we create more conditions conducive for life through the act of design and construction."
>
> "…I find the next, the next evolution of buildings are those that will give back, or produce more than they need. And to me that would start being a regenerative style building. And I think that sort of definition can be propagated into the neighbourhood scale as well."
>
> "…moving beyond thinking about reducing impacts and really thinking about how a project can give back."

The question posed a challenge to some participants, because RD&D is a relatively abstract and complex notion, and there are very few real-life examples of RD&D to draw on. Some working in the field of RD&D admit they are still trying to decide what defines RD&D, and what these projects actually look like.

> "…you know there's really no regenerative design going on right now in terms of truly regenerative development. I think we're trying to figure out what that means, and how we can show the emergence of regenerative design in some way."
>
> - RG

There is also still much debate as to how a RD&D project should be valued and if its projects can even be evaluated. The success of a project is measured over a long period of time and often involves qualitative indicators, neither of which are currently valued appropriately by our economic system. Arguably, if RD&D is to

be a progressive new paradigm, attempting to place a value on it based on the current paradigm is unnecessary, and only prevents RD&D from evolving. As one interviewees stated:

> "I've seen groups try and create metrics to sort of measure regenerative design, and I think that there's some things that you can measure, but there are other things that we can't really measure physically – they're really qualitative aspects of, of healthy systems. And that's the best that we can do at this point." – RG

The quantitative measurements valued and upheld by the reductionist worldview of our current paradigm, are inadequate at describing characteristics of RD&D, such as the strength of feeling or connection to place. Since qualitative valuation *is* able to justify the importance of such a connection, it could be used as a strong leverage point with which to challenge the conventional paradigm.

Those practicing RD&D are turning theory into action using new dynamic processes. These processes differ from practitioner to practitioner, however, similarities exist amongst them with regards to worldview. A clear, yet flexible attitude has been taken to ensure the fundamental regenerative principles can still be applied, although there are variations in how each project is approached.

> "Well there's intention and there's sort of a deliberateness …I think when we focus too much on process that can become a trap unto itself, and so we actually have to be much more fluid on the how… But I think that we have to be much more nimble to be really effective." – JM

Additionally, stronger projects emerge from a process deliberately assembling an integrated team from an early stage, which is able to work together to consider how the systems of a project are going to interact holistically. Although IDP has become a more popular process since being integrated into green building certification programs, RD&D teams may consult a wider range of stakeholders and experts, such as biologists, ecologists, and spiritual guides. Interviewees noted how the use and functionality of a project were highlighted and improved through the RD&D process:

> "…well because of the way they approached the whole project as sort of a whole system… I think in the end it sort of highlighted, or added something to the design of the building that wouldn't necessarily have emerged from a typical process." - CSDPD

> "We had the traditional format, like what are the owner's needs, and what are we trying to get out of this building, and then they had a two-day charette with three to five year olds and childcare providers to say you know, how is this building used, what are we missing, what don't we understand as fifty-year old designers?" - DM

When considering the design of a project, green building practices in particular often incorporate highly sophisticated and expensive technologies. These systems or components are often costly and require trained personnel to monitor and maintain them. Even after installation, there's no guarantee the high-tech systems will function as expected, or perform to standards achieved in design simulations. These technologies also require fine-tuning once a project is

occupied to ensure they're stable and performing optimally. In some cases it has been found the systems actually fail or under-perform despite their predicted success, adding to the operational costs and harming the reputation of green technologies in the process.

> "…black water systems, as we've learned from the challenges at Dockside Green, if you follow that project, and neighbourhood, they've got the same issues at the neighbourhood scale …if you build all that stuff at the start and the density doesn't come, those systems fail." – DM

The success and failure of early RD&D projects, such as Dockside Green in Victoria, BC, provide important lessons for development practitioners. As described in the precedent studies, some participants mentioned how regenerative projects are now starting to incorporate designs that mimic natural systems, and work in partnership with technological systems to create an optimal environment. The more information shared about these projects will help generate a better understanding of how these partnerships can be improved through the RD&D process.

When thinking about systems from a natural perspective, a design immediately becomes more complex, and must be approached holistically; the heat, water, and energy systems cannot be thought of as separate, but must be integrated and thought of and work together as one being. This holistic

approach also challenges conventional practices, which often consider such systems as separate entities.

> "…I think we're dealing with very complex systems, the function of ecosystems and how they change over time, and I think that our biggest challenge is that much of our thinking is based upon an old technological paradigm of thinking about design systems. And so we want to think about just energy, or just water, or just certain aspects of a system, and we've got to adjust our worldview to really kind of think holistically, which is complex, and also requires some creativity…" - RG

A few participants proposed that some RD&D concepts may be more successful, both operationally and economically, when implemented at the community scale. This notion is mostly based on speculation since so few projects have been completed at this scale, however as previously mentioned, the UniverCity Childcare Center was able to achieve net positive energy (von Hausen, 2013) as a direct result of its connection to a district energy system. The majority of participants alluded to a particular density, which would be required for the success of RD&D at a community scale, though none could provide an exact population:

> "…we've found that the scale of neighbourhoods sometimes, you know, sometimes better more sustainable systems could actually cost less, even in traditional economics." – RG

> "…we said we were delivering this building for 18% below budget…and we did really push the fact that it's because of the neighbourhood connectivity." – DM

> "Well community works better at a community scale. It's not very good to have a party of one, you know? Um, so there's certainly cultural and social interaction that requires scale and art, and art and sort of bringing out the most poetic aspects of humanity happen at a certain point of density and population, that's for sure." – JM

However, not all participants felt these concepts could be directly imposed at a particular scale since RD&D involves the use of qualitative assets such as consciousness and intuition; qualities cannot be prescribed within categories of scale. In this case, scale is insignificant because the design of the project should be determined in its relativity to the place it will be a part of, and interact at that level regardless. Bill Reed states, "…you have to understand Place. So we'll just say Place is the smallest thing you have to design to."

> "It's not scalable, it doesn't matter, it's a field. And it's a hard thing for people to understand who are taught in quantitative world. That it isn't just scale, it's infinite. The minute you start getting into consciousness it's infinite. It doesn't matter. It can be as small as your heart, or as large the planet, you know the universe. So in terms of practicality though the community, whatever that means, and the only way you can define that is how big is here." – BR

Scale remains subjective to each RD&D project; the emphasis on the essence of a place, the unique conditions that vary from site to site, and the purpose of a project, are all conditions that do not allow for concrete or replicated numbers.

Working at the community scale requires more collaboration amongst design teams and cooperation from municipalities. A number of initiatives, such as *EcoDistrict* or *2030 Districts*, are attempting to help facilitate the process (McLennan, Hydes, Bennett, Desai, & Owens, 2014). Although they may not advocate for all of the tenets of RD&D, these initiatives are generating discussion, pilot projects, and policy reform. They are also laying the groundwork for future regeneration to occur at the community scale.

As previously explained, the RD&D paradigm is far from capturing a significant hold as a viable option in the marketplace. According to one participant, RD&D seems to appeal to those who have already shifted their worldview and agree with the tenets of RD&D, and those who are not forced to implement such principles have not. One participant suggested a reason for the lack of enthusiasm might be the considerable difficulty in financing these projects. Most lending institutions believe RD&D projects are a higher risk due to their complex and relatively untested systems. As is the case with the Willow School and Bullitt Center (see Chapter 3), many RD&D projects have had to procure alternative funding.

To encourage more RD&D built projects, one participant suggested investors and developers would be more inclined to attempt RD&D if some of the major infrastructure components were already in place. They suggested if a

district heating or sewer system were already in place, and maintained and operated by another entity, it would be more enticing to developers, adding "the more you make the development site look normal they're not concerned about the offsite" (DM).

Another solution proposed to promote RD&D projects has been for governments to create policy-based incentive programs to allow for particular variances or an expedited approval process. Though this approach in Seattle, WA has not seemed to attract new interest in a deeper level of sustainable development, it was implied by one participant that financial incentives might be more successful at generating some momentum if governments would be willing to provide them. However, governments would have to be convinced there were a need, or enough interest and demand from the public before such funding was provided.

Obviously, the challenges associated with the practice of RD&D require innovative solutions and significant changes to be made to current economical systems and developmental practices. Without first shifting the worldview which upholds such complex and deeply rooted systems, it is not likely that these changes will be made in a timely manner.

4.1.3 Worldview

As the interviews progressed, it became obvious the current worldview was a very important component of the challenges associated with the RD&D paradigm. RD&D is a new paradigm, and as such, requires people to shift from how they currently think and act; to change deeply rooted ideas and practices. Planners are very aware of the human instinct to resist change, but to reiterate, we may soon not have a choice. One participant argues the journey to make this shift must first take place at the intimate psychological level of the self, saying, "…sustainability is a search, right? Ultimately, you prompt the idea that it's an inside job; sustainability is an inside job … because the will comes from within, it isn't externalized" (BR).

Other participants commented how this difficult, yet necessary step, forces one to look deep within themselves, and question qualities and behaviors much easier left unquestioned.

> "Well it's a tough subject, a touchy subject for a lot of people. I think we really ask people to get in touch with what's ultimately important, and people have different words, and mythologies, and beliefs to describe what that is. But getting to that essence for folks is really…that's the mechanism through which you turn the lights on and get people to awaken to our real place in the world and what we have to do differently." – JM

Doing things the way they have been done for the past hundred years is less painful, less expensive, and less arduous. Pointing out the failures of the current

system may also make a person unpopular, however as Donella Meadows (2008) states, it is also the most effective way to enact change in a system.

Again, the work of RD&D draws on qualitative aspects that are crucial to creating successful communities. Through the process of RD&D, people will have to shift their worldviews to acknowledge the spiritual connection to people and place, and use it to create communities that are socially and environmentally sustainable. Bill Reed confirms the importance of cultivating a spiritual element into development processes:

> "The point is to be intentional and conscious of the dimensions of existence. And just as we started this conversation, people talk about energy, or love, but they don't want to acknowledge the spirit. They acknowledge that it's really important, and yet its what makes people happy and sad, so it's remarkable that we, we're finally giving ourselves permission to, in our culture, to actually engage and open to this dimension." - BR

Many participants noted, in instances where a shift in worldview has taken place, the results show a transformative change not only in the physical design of a project, but in all of the people involved. The work becomes about more than a particular building, it becomes about how one can participate to create a future that is beneficial to all forms of life.

> "…it's always a bit different, every project, but I think it's really what the impact was on the people that were involved on the projects. The commonality is that people are transformed through the act of trying to do regenerative design, and it shifts their thinking, and then if affects everything else that they do going forward." - JM

There is no one-way to engage people at this level. When asked how this shift can be enabled through the process of RD&D, Bill Reed responded it was about "engaging people around questions that have full dimensions". In doing so the person is able to make a fundamental, essence-to-essence connection, to help a project, and its stakeholders, meet their full potential.

> "The being dimension, the functional dimension, the will dimension...those are three domains that are vital to our continued existence. Without will we wouldn't create, and without function we wouldn't live, without being we wouldn't love." - BR

RD&D recognizes that people have a greater potential to meet as conscious inhabitants of this planet, which can be unlocked through the development and design processes. A certain degree of vulnerability, humility, compassion, and discipline will have to be embraced as part of a new worldview if this potential is to be met.

4.1.4 Policy

The interviewees unanimously agreed restrictive policy surrounding building codes and regulations was one of the greatest barriers to RD&D projects. One participant noted current governing policies were implemented for the purpose of public safety; water sanitation, fire codes, electrical codes, etc., but have been become complicated and onerous over time (RG). Design professionals are now forced to design within policies that don't leave much

room to experiment in ways that may create healthier environments. Attempting to change such policies will also require considerable time and resources, both of which developers have little to spare.

A considerable policy hurdle is the multiple levels of government that preside over various, yet similar codes. Participants observed that governing authorities could become confused about who has authority over a particular regulation, and spend a significant amount of time passing along the responsibility. Given the unpredictability of the performance of innovative RD&D designs, authorities may also deny approval of a design to absolve themselves of responsibility should something go wrong. One participant said, "…it continues to be difficult to convince the public health agencies to even allow a project to try new ways of treating water on site and re-using water…" (CSDPD). These circumstances have resulted in developers and planners becoming discouraged with challenging the conventional process, and hesitant to implement alternative design solutions.

Policy and code challenges are also difficult to overcome because they are often tied to the political system, which changes with an election every four years: "…you don't have a continuum of, of commitment to certain policy, so you'll always get the needs of the day," says one participant, "…so you're missing that long-term vision" (DM). Given that the current political climate in

North America has been focused on strengthening the economic system, sustainability is also a difficult topic to encourage politicians to get behind.

Instead of relying on the slow-moving political system, proponents of sustainable development have instead attempted to directly influence change in the economic system. Green building certification systems are one method that seeks to influence consumers and developers by promoting change in the market.

However, as previously mentioned in Chapter Two, these programs have not been influential in shifting development standards away from conventional practices. Given that minimal sustainable development practices still aren't recognized as a new industry standard, it will make implementing the more intensive paradigm of RD&D, a difficult task. One participant explained, "…I think the challenge going to regenerative is, is one that we haven't gone to the zero impact very aggressively, so it's hard to take the next step," they say, adding we should currently be requiring a minimum of LEED or zero impact level at present (DM).

As much as policy is to blame for the obstacles in the way of RD&D, participants also believed it held the most promise for supporting the paradigm in the long run. "…I've learned you can't do good urban design without supporting policy," said one participant, who went on to attribute the success of

their project work to a tangible understanding of policy (DM). It was found policy could be considered as 'the carrot or the stick', encouraging those who are willing and able to align with the policy's vision, or punish those who do not (DM).

Although the carrot approach taken by Seattle's Deep Green Pilot Program may not be the most effective way to encourage a paradigm shift, one participant remarked, "it's a sort of promotion in making sure that we continue to raise the minimum standards" (CSDPD). From this perspective, policy can be used to raise minimum standards incrementally, which would achieve the objective a more sustainable minimum requirement without the backlash associated costs or bias towards a particular brand of 'green building'. One participant suggested the onus be placed on national governments to step up and set a higher bar for more progressive and accommodating policies. This approach would ensure minimum standards were raised at a national level, giving a foothold for regions and municipalities struggling to implement policy change, and lighting a fire under regions that are not yet on board.

Another central issue coinciding with a lack of minimum standards is that many green building certification programs predominantly focus on the design phase of a project. A building may be certified as a model of sustainability in the post-occupancy phase, without having to perform to the standards of stipulated

in the design phase. Following in the footsteps of ILFI (which only certifies its projects after a year of occupancy), it was suggested policy should require minimum standards based on actual performance in the post-occupancy phase, eliminating the possibility of a sustainable project impostor.

> "…instead of just looking at how a project is designed, also monitoring it, having requirements tied to performance so it's not just an approval that you get with your plans, you have to demonstrate that once it's built and occupied that it's actually performing as you promised" (CSDPD).

Opportunity exists for RD&D to be used as a benchmark for creating policy that encourages an alternative value system, inclusive of qualitative attributes. Qualitative policy would validate the importance of a person's emotional connection with place, and remove the stigma surrounding the involvement of spirituality in development. This alternate system would also redistribute the costs and burdens of development appropriately by giving fair value to natural systems and the services they provide.

4.1.5 Planners

Planning education provides the opportunity for its professionals to acquire a wide-range of skills, which may be applied in diverse contexts. Because of the nature of their occupation, planners have the potential to participate in the work of RD&D in a variety of capacities. Insight provided by interview participants illuminated the current role of planners, as well as some

roles they could potentially play in RD&D projects. Interview participants also commented on the knowledge and skills of planners possess, or would benefit from, and provided other valuable insight as to how planners may enable the endeavors of RD&D.

When questioned about the current role of planners in the practice of RD&D, participants offered underwhelming responses, stating that planners remained functional and traditional in their responsibilities. Processing development applications, holding public meetings, and briefing city departments were considered to be common tasks performed by the planning department. However, with some prompting it became clear that planners have the opportunities to engage in a more important roles in the process of RD&D as champions and collaborators of projects, as policymakers facilitating reform, and as co-participants in equitable community-planning processes.

An open mind and flexibility are important qualities in planners, notes one interviewee, who went to a planning department saying, “you know what guys, I’m going to be bringing something crazy in. You know, so you might want to be ready for it” (DM). Planners can assume the role of champion for a project early on by preparing a planning department or city council for new ideas, and pushing for the approval of unconventional practices.

A few participants suggested planners are sometimes less flexible, and are limited in their visions of the future because of the limited roles they had assumed over the past fifty years or so:

> "…I think a challenge with planning is, the planning profession has been, like many professions, kind of segmented and"silo-ed" over time, and so a lot of planners now just focus solely on land-use and zoning..." – RG

In this case, the importance of constant self-development and continuing education on alternative methods becomes evident in order for planners to remain relevant and progressive.

Another criticism of the silo-ed professions is they prevent project teams from thinking holistically and working to co-create; two essential components of an RD&D project. Collaboration with other disciplines is also critical when considering planners may have to incorporate specific requirements such as electrical and sewage systems into policy, and will need to draw on the knowledge of fellow colleagues. It was suggested planning schools could work harder at incorporating inter-disciplinary interactions during young planners' educations. By doing so, planners may better understand the roles and skills of other disciplines, and vice versa, translating to a more effective platform from which to collaborate and coordinate in the professional world.

In stepping into the shoes of the project manager, planners are also well positioned to bring together other members of the design team together. One

participant said planners in this capacity are "…helping facilitate the process and connecting people to each other so it's a more integrated approach both in the design and in the review of the project" (CSDPD). As mentioned in Chapter Three, the designs of the RD&D precedent projects were much stronger and successful because of the interdisciplinary collaboration of an integrated design team.

As previously mentioned, policy plays a large role in RD&D projects, and provides an opportunity for planners to become involved even before a development process begins. Being open to the principles of RD&D is a critical step in getting policy to become more facilitative of such projects.

> "…I think the policy planner is absolutely, probably the most critical piece of the whole thing right at the start, because if they're not open and receptive to embracing the concepts of say a Living Neighbourhood, and embedding those in the initial policy statements, and ultimately the zoning of the site, it can't be achieved" (DM).

Other participants noted there is an advantage of being well informed about RD&D principles, as well as new techniques and technologies. Knowledgeable policy planners are able to incorporate a certain degree of flexibility and preparation into minimum policy requirements and master plan land-use codes. These policies then encourage RD&D projects by allowing systems such as district energy to be easily implemented. Furthermore, it enables policy writers

to avoid reinventing the wheel by tweaking or adapting existing policies or pilot projects into a relevant context.

Community members are also integral to the RD&D process, which requires planners consider them not only as people who live there, but also as resources rich in stories that may be mined to inform a beautiful and sustainable project. Participants commented on the poor state of community involvement, such as open houses, used in our current development procedures, saying:

> "It's a terrible one-way conversation. You have three minutes to tell us why you like or don't like this and then, okay we've noted it. Well how do we have a dialogue, how do we develop our understanding? You know, my opinion may or may not be right, but how do we find all those core issues that allow us to raise the potential. That's never given at public meeting." – BR

Conventional planning processes, such as the one described above, result in an apathetic and uneducated public. The projects resulting from conventional processes do little to engage both the community of people and the natural systems present, leaving the greater potential for both unmet.

Despite various planning theories that promote an equitable public process, it remains a goal yet to be achieved. One municipal participant noted this discrepancy by saying, "we talk a lot in graduate school about you know, planners, public participation and different strategies, but I don't really think it's a very accurate depiction of how things actually play out in the real world" (CSDPD). Becoming familiar with local planning issues and attending public

meetings was suggested as a way for planning students to be better prepared for the public distrust and resistance they may come across when in the workforce.

Another participant recognized planners and design professionals often came off as superior experts in community meetings, perhaps listening and nodding to comments from the public, but more so using the event as a platform to tell them what will actually happen. RD&D creates the opportunity for the planners to take on a role as a guide, starting with a blank slate and helping the community to find the story of their Place, and purpose of the project themselves. Without this new process of public participation an RD&D project will not be sustainable in the long-term. A planner's role is to facilitate a process whereby the people are engaged around questions about who they are, determining not only their own essence, but also the essence of the Place.

> "We never ask people what they want, we ask them how they live – and those are the patterns actually express more. Nobody really knows what they want, but the patterns ultimately express their essence, and what we're looking for…" - BR

In this process, the community becomes the resource, instead of the bystander, so the community is actively participating in the outcome of the project. The facilitation requires planners to slow the process down in order to hear what is, and is not being said. Then, the facilitators can report to the community what they have heard, and work with them to come to a definitive understanding of

what is needed from the design. So far this process has only been utilized at a small scale such as design charrettes, or organizations where the "public" did not include an entire neighbourhood or city. Therefore, it remains to be seen how, or if, this concept could be successful for all scales of projects.

4.2 Summary

Through the interviews it was acknowledged by participants that people must face the implications of our present paradigm and begin to seek a new one. Although North Americans are just beginning to sense how the consequences of our current paradigm will affect our daily lives, we should proactively explore alternative methods of development that regenerate natural systems, instead of continuing to use methods that degenerate them.

More examples of the RD&D process and built projects will provide evidence as to the merits and demands of the paradigm. Built projects will identify the potential value in RD&D as a legitimate alternative to conventional development processes. This experience will also inform the question of how human systems and natural systems can be combined to reach unfulfilled potential and harmony through development and design. It remains to be seen if RD&D is more advantageous at a building or community scale, or if scale is a negligible factor in such work.

Lending institutions, public health and safety regulations, and municipal infrastructure capabilities currently impede the progression of RD&D. In order for RD&D to become a more appealing option of development, serious reform will have to be made to current economic systems, policies and regulations, and infrastructure networks. The completion of demonstrated projects will help prove whether the paradigm of RD&D is a sound investment, can provide a safe built environment, and is worth re-examining infrastructure networks.

Through self-development and adoption of a new worldview, RD&D as a paradigm may start to take hold as a mainstream practice. Incorporating qualitative aspects such as spirit of Place, and connection to nature, will provide a new basis of value in developmental practices. These practices will also need to remain mindful of how they may promote conditions that will sustain all forms of life.

This new view will help planners, in particular, to imagine new policies and practices that push boundaries, and generate momentum behind the RD&D movement. Planners may also be integral to bringing disciplines together, and empowering communities to become partners and co-creators with living systems. With the adoption of these new roles, planners may help make more RD&D projects a reality, and provide merits and validation of RD&D as a viable step in the evolution of a new worldview.

Chapter 5: Synthesis & Recommendations

This thesis has attempted to provide more knowledge about the paradigm of RD&D with specific application to the profession of planning. The review of literature and conducting of interviews with development professionals has clarified the theory and process of RD&D, as well of the current and potential role of the planner within this process. The three precedent studies provided examples of how regenerative concepts have been applied in built projects of various scales and contexts.

This research has focused primarily on the qualitative aspects of RD&D, and what I believe are the key steps that need to be taken before regenerative principles can be successfully carried out in development practices. Nonetheless, there are very real structural conditions of our current paradigm, such as economics and politics, which play a significant role in the future of RD&D and were not addressed within the scope of this project.

The objective of this research document was to help bring attention to RD&D within the field of urban planning and to create an interest amongst planners in integrating RD&D worldview and principles within planning practice. Therefore, this research may be seen as one spark, which hopefully lights a fire to illuminate a new way of seeing the world, and how planners may participate in it. This concluding chapter reviews key findings, provides directions for future

research, answers to research questions, and presents final conclusions of this research.

5.1 Summary of Key Findings

Throughout the literature reviewed and the interviews it was constantly restated that RD&D would not be successful if people do not adopt a new worldview. The problems facing humanity will stay the same, or get worse, if people cannot find a new way of thinking about their role on the planet. We will continue to degrade the living systems we rely on until they cannot be regenerated and disappear entirely.

The new worldview will see people as part of nature, enabling them to both respect it and learn from nature. The success of RD&D depends on this understanding, and there is significant opportunity to form a new partnership, combining the technical prowess of our species with the wondrous complexity and efficiency of nature. This new worldview also allows people to delve deep within themselves in search of a greater potential and a more meaningful purpose. Such a worldview will open new doors for planners, as professionals responsible for shaping our built environments, providing them the opportunity to incorporate new abilities and responsibilities.

Given the early stage of RD&D, it is imperative that more demonstrative projects are completed so theory may be directly connected to tangible

projects. Further discussion on the direct links between regenerative concepts and their application in practice should also be a priority, given there are so few built projects available to readily reference. The processes and technologies employed in the precedent cases were did not always require the latest technology or cost a significant portion of the budget . The projects were compelling because the process undertaken required that design teams perform outside of their comfort zones, to incorporate new practices with well proven practices, unrealized ideas with realized ideas, and natural technologies with mechanical ones.

The combination of development and design techniques were unique to each precedent study, yet each project still encouraged that conventional boundaries were constantly pushed. The adoption of new policy standards required by the innovative designs described in the precedent cases helps not only to legitimize RD&D as a practice, but provides inspiration to others interested in adopting RD&D as a new paradigm. There are opportunities for governments to encourage RD&D by adopting pilot programs, such as the Seattle Deep Green and Living Building Program. This program not only creates room for learning and error on a smaller scale, but also facilitates those who are willing to assume the risk and take the first step =.

Propelling a new worldview, and the future of RD&D, is a shift away from the current paradigm. The challenges of policy and financing are deeply rooted in a worldview that is dominated by economics. More RD&D projects will help identify where policy restricts innovation and needs to be amended. Successful projects will also prove to politicians and fanciers there are alternative ways to be profitable. However, in order to encourage more projects to adopt RD&D principles, significant work has to be done to remove these barriers.

Research on the health effects of alternative systems, such as living machines to treat black water, should be carried out to provide evidence on the benefits of such systems, or to prove if they are a safe alternative to current systems. Examination of policy that prohibits the implementation of progressive ideas, such as capturing rainwater for potable use, can be identified and amended. Future policy should also be written to be more flexible so the incorporation of future innovations is not hindered.

Gathering and publicizing performance statistics, as the Bullitt Centre does (see Section 3.2) is one way to prove to potential financiers the viability of RD&D projects. Since little is known about the performance of such intricate operating systems, it will be beneficial for projects to make data analysis and education an important component of their post-occupancy program.

5.2 Recommendations for Planners

The following recommendations for planners have been made as a means to further develop a role for planners within the practice of RD&D. These recommendations are intended to help develop the mindset required to understand and practice RD&D. They are also made to guide further inquiry as to the involvement of planners in the paradigm.

1) Planners should maintain a degree of open-mindedness, and continually educate themselves on innovative theories and practices in the field.

The precedent cases emphasized the importance of being open to new ideas and approaches to the planning process as a means of achieving greater holistic designs. The need to further educate planners on alternative methods, and stay in touch with innovative technologies also became evident in the research. Study tours of RD&D projects would provide the opportunity for planners to learn first hand about the application of RD&D, and to understand what a project feels like and how it functions. It would also allow planners to ask questions about the application of RD&D that are specific to the profession. The following questions would provide further insight into how planners may become more relevant and involved members of the RD&D team.

a) What were the differences from using the RD&D process, as opposed to a traditional process?

b) What were the advantages or disadvantages to using the RD&D process?

c) Were there any non-traditional team members involved in the project? How did/could they contribute to the project?

d) What skills do you think are important as a member of an RD&D team? How might you develop such skills?

e) In what ways were the stakeholders involved? Does this differ from their traditional involvement?

f) In what ways were the RD&D concepts of place, pattern literacy, development and design, regeneration, story, and potential, applied to the project?

g) Were there any unexpected outcomes of the project?

2) Planning education should introduce interdisciplinary collaboration early in the education process.

School is a great environment to begin to foster meaningful collaborative practices between design professions. In the past, design professions and other useful fields have been separated during the education process. Sharing perspectives and creating a general understanding of the roles and responsibilities of each expertise will foster respectful professional relationships. Also, learning the skills to collaborate early in the education process will significantly contribute to a more holistic process in the professional world.

3) Professional planners should develop their capacity as champions for projects, and as guides to stakeholders.

Planners are in an advantageous position to become champions for RD&D projects; to inform their employers about RD&D, to advocate for the approval innovative technologies, and to assist RD&D projects through the planning and approval process. Planners are also positioned to help guide stakeholders through a meaningful RD&D process, drawing out their stories and generating a greater purpose for the project. Interviewees reiterated that a regenerative approach generated a greater role for stakeholders and a deeper connection to the project, resulting in a higher degree of long-term success.

4) Planners should remain conscious of implications, and build in flexibility when creating policy.

Planners as policymakers have to remain conscious of the possible effects policy will have on RD&D projects. Policymakers should remain conscious that the policy being made today will impact the form of the built environment for years to come. While regulations should ensure the safety of the public, they should be flexible enough to allow for new and alternative ideas to be easily tested or incorporated into projects. By allowing for flexibility, RD&D projects may be encouraged and supported through the development process.

5.3 Recommendations for Future Research

The following four recommendations for future research have been made based on responses from the key informant interviews, as well as gaps found in

the literature. The recommendations are made to direct further study towards incorporating self-development and a new worldview in development professions as a process for embracing the greater work of RD&D. The recommendations also focus on closing the information gap that exists between RD&D theory and practice, and how barriers to RD&D could be overcome.

1) What is the current focus of professional development in planning? How could professional development promote an ethos that develops the capacity, capability, and empathy required for planners to facilitate the RD&D process?

One participant in particular noted the importance of developing the self as the first step in participating in RD&D. Self development in the professional context may include exploring the personal ego, identifying mental processes and patterns, and observing how they relate to others and your professional work. This degree of introspection also implies one must first recognize a problem with their current worldview and then be willing to set their ego aside enough to create a new view.

Integral theory, developed by Ken Wilbur, offers insight into how spiritual development may be included as a part of professional development. Wilbur discusses how spirituality could be incorporated in the workplace to improve management practices, research, and education (as cited in Pauchant et. Al, 2010). He asserts that spirituality, defined as an attitude of openness or care that

can be held, must be first addressed on an individual basis before it can be attempted by a collection of individuals (as cited in Pauchant et al., 2010, pp. 115-116). He also implies that spirituality in the workplace is a practice of being present in the moment, and sensitive and perceptive to your environment (Pauchant et al., 2010).

Although his work was not included in the scope of this research, Mark DeKay's (2011) *The Principles of Integral Sustainable Design*, provides further suggestion as how to incorporate integral theory into the practice of architecture and planning, with a particular focus on sustainable development.

Further questions regarding spirituality in the planning professions, which may be asked using integral theory and other resources include: How could self-exploration be applied to planning education and further professional development? How could this impact the role of the planner as a project champion, community connection, or project manager of RD&D projects? How can an emotional and spiritual connection be seen as necessary, instead of superfluous?

2) **What techniques or tools are available to assist planners in shifting society's current worldview towards one that supports the work of RD&D?**

   Shifting the worldview of society may seem like an impossible endeavor, however it has been done before.

> "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has."
>
> - Margaret Mead

JoAnna Macy advises how people may empower themselves to take action in the real world from a spiritual and ecological point of view (Macy & Johnstone, 2012). To shift to a new worldview, she proposes the following four stages be explored: opening to gratitude, owning our pain for the worlds, seeing with new eyes, and going forth, be explored as a way for individuals to ground themselves, and connect with their empathy and personal power (Macy & Johnstone, 2012).

Donella Meadow's concept of leverage points also offers considerable insight on how a worldview may be shifted. By identifying leverage points to address the issues of sustainable development, underlying problems with the current worldview and dominating systems are exposed (Meadows, 2008). Alternative views and systems that improve upon its predecessor are then adopted (Meadows, 2008).

Planners have been identified as important facilitators and champions for RD&D, and may enable those who wish to achieve success using the paradigm to do so. Therefore, another challenge will be to see how planners could continue to support such action. Questions remain in my mind as to how

paradigm shifts have been prompted in the past? What are the appropriate leverage points related to RD&D, and how may they be pursued? How may modern technology or alternative economic systems be explored to assist these efforts?

3) **In what ways can planners help make the process of RD&D more accessible to other design professions, stakeholders, and the general public?**

> "If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking." - Buckminster Fuller

The literature review revealed the theory of RD&D to be dense and intricate; there is a dictionary of terms to learn, complex methodologies to sort through, and few practical applications to show how theory is applied. My research journey required over a year of intense study, and speaking with experts who had been practicing RD&D for years, for me to confidently grasp the concept. Even still, it is difficult to concisely convey the subject to someone unfamiliar with RD&D. Bill Reed said it can take up to 18 months for brain synapses to re-wire for people to fully embrace a new way of thinking, making it difficult for champions of RD&D to convince potential clients to quickly jump on board a RD&D project (Reed, personal communication, May 21, 2014).

An essential question then would be, in what ways can RD&D be made more easily understood? Is there a way to simplify a methodology without losing

the importance of the RD&D process? Should it be simplified? What would help people realize the greater value and potential of RD&D as a paradigm?

This leads to the larger topic of demonstration. It will become easier to identify RD&D and to appreciate a more involved development process, harmonizing design solutions, and post-occupancy study, as more projects are realized. van Vliet (2000) identifies that demonstration projects can be successful development instruments, and have the ability to drive system change. Such projects provide the opportunity for practitioners to:

- re-educate stakeholders and engage them in the change process;
- promote experimental planning and design;
- encourage large-scale change;
- share information on design processes and technologies; and
- overcome barriers to policy development (van Vliet, 2000,p. 332).

Despite the advantages of demonstration projects, the current research found that projects incorporating RD&D strategies are not always recognized specifically as utilizing RD&D, nor is the information about their process very detailed or available. Also, current information on experts and practitioners, projects, and tools and techniques, are scattered throughout various sources. It would be not only useful, but influential, if a centralized database or organized network were established to collect contacts, literature, case studies, etc.

associated with the practice of RD&D This would make RD&D more accessible to the greater public, and also provide a platform from which RD&D practitioners could learn where they could apply more leverage, and help the paradigm gain a better foothold in the mainstream.

4) **What policy barriers exist to implementing RD&D projects locally? Provincially? Nationally? In what ways could impeding policy be improved to enable the work of RD&D?**

One of the greatest barriers to RD&D is the existing, restrictive policy at every level of government. Overly cautious and slow political systems are ill suited for addressing policy issues associated with the technological innovation and progressive nature of RD&D. Therefore, research identifying national, regional, and municipal policy currently impeding RD&D is an urgent and imperative recommendation. Moreover, further research on new policies and programs, such as Seattle's Living Building Pilot Program, should be conducted to see how the policy was received, what the benefits and challenges of its adoption were, and how similar policies may be adopted by other cities. Finally, it is suggested that new policy be written in an anticipatory and flexible way, to incorporate RD&D techniques such as district energy systems. Research could therefore also focus on such types of planning or policy as applied to RD&D.

5.3 Conclusions

The following section addresses the research questions, and draws final conclusions on the subject of RD&D and its application to the profession of planning.

5.3.1 Answering the Research Questions

1) What are the principles associated with RD&D, and how are they being our applied in practice?

RD&D was identified as a new phase within the spectrum of sustainable development, which attempts to restore the relationship between people and nature in order for them to co-create healthy, dynamic, and interrelated systems that sustain life. Before RD&D can be accomplished, a new worldview will have to be adopted, which will attempt to restore the broken relationship between people and nature. This new worldview will allow people to repair the damage they have caused to the natural living systems, and interact with them in harmonious, collaborative, and mutually beneficial ways.

RD&D theory looks to consciously partner with whole systems, in order to turn developmental processes into cyclical flows. The study of ecological design is an important component throughout the process, helping people to read natural patterns, and understand the flows of energy required to partner with them. The Regenesis methodology applies six concepts of regeneration, design

and development, place, pattern literacy, story, and potential, to a regenerative practice. When applied to RD&D projects, these concepts help to clarify how theory may become functional in practice. The identification of such concepts may also be used as a benchmark to determine if projects incorporate RD&D principles, or if there is opportunity for them to do so. Although RD&D has only begun to form an identity amongst design professionals, its virtues are being extolled for engaging communities around a just, and inclusive process, and creating built environments in harmony with nature, and can support all forms of life. This process cannot be structured like any conventional process in use today. A significant amount of education must first be undertaken on the part of the professional, and the general public. In order to facilitate the intensive process, practitioners must be well versed on RD&D principles, and skillful in engaging stakeholders as key knowledge holders, and proponents of projects. Professionals will have to learn how to read patterns of natural systems, and how to distill important stories to inform the essence of a project. Furthermore, stakeholders will have to re-learn how to think of themselves in relation to place, and discover its greater potential, in order to engage with it as co-participants.

2) What role do planners play in the process of RD&D, and how might they contribute to its future as a successful paradigm?

As an emerging paradigm, the implications of RD&D for the planning profession are significant. Planners typically play traditional roles as early consultants and regulation keepers for completed RD&D projects. Nonetheless, the role of planners has much more potential to become deeply involved.

Shifting the practice of planning may begin at the educational level. Significant opportunity exists to introduce students to a new worldview at the beginning of their training as young planning professionals. Drawing on previously mentioned techniques (see Section 2.4), this new worldview may introduce issues with the current worldview, incorporate mindful practices, and identify opportunities to address the current system using leverage points. A new worldview could also guide students to empower themselves in their future roles as planners, and provide suggestions as to how to engage clients in the RD&D process.

It was also suggested emphasis could be placed on education of the innovative technologies, and creative solutions of RD&D principles. The development of interdisciplinary cooperation has also been mentioned as an important opportunity at the educational level. Finally, student experience with public participation processes was also stressed, to better acquaint professionals-in-training with mediation, presentation, and facilitation skills.

Planners are well suited for RD&D because they are educated to consider design and development for various scales and scenarios, as well as the long-term implications of a project (CIP, n.d.). As RD&D projects continue to evolve well past their initial construction and commissioning, growing with the people and environments of which they are a part of, they will need to be re-examined. Planners are well versed in recognizing not only how people may use space over time, but also how climate, technology, economics, and other factors may influence the design of a project, and how to flexible and adapt to them. Their professional training also emphasizes the importance of both qualitative and quantitative facets of built environments, which are essential to the RD&D process, but may not be as embedded in other professions.

Planners are also well positioned within development processes to become advocates for the practice of RD&D to governments and development professions. They may also embrace more of a role as project managers, who can bring together and facilitate interdisciplinary teams necessary for bringing innovative and complex ideas to projects.

Planner's knowledge and experience with policy-making is also a critical component of making RD&D more accessible and successful as a practice. Identifying repressive policies, and creating new flexible ones will be an important role for planners to take on. Also, planners will have the ability to

lobby for more pilot projects or test zones. These will help push policy boundaries, without having to permanently change policy before long-term impacts are known.

Dramstad (1996) says of planners, "we are poised as key players in society as people with creative vision, can-do attitudes, futurists, and weavers of intricate ecological, cultural, and social tapestries" (p. 9). As planners we will have great influence over the shape of our built environments in the future, and if we are resolved to engage in regenerative practices, we too can be part of the shifts in practice needed to bring about urgent change.

5.3.2 Conclusions

This work has been guided by the knowledge that the way people have lived on this planet has resulted in a profound loss of biological and spiritual integrity, and something must be done to change these ways. Literature from all spectrums of science, planning, psychology, and religion revealed a similar worldview is predicted for the future of our species, which leaves me hopeful that soon RD&D will become a new norm of development practice. Interviews and site visits were extremely helpful in gaining a better understanding of the application of RD&D principles in practice, although I have a sense that being directly involved in the RD&D process is the best way to understand how the theory becomes a reality.

This thesis offers a small contribution to the emergent paradigm of RD&D, but one I hope will make a difference in educating others about alternative methods of design and development of built environments. Planners have the skillset and knowledge to become active proponents for RD&D. The opportunity to create places that incorporate fundamental elements of just, healthy, dynamic environments, and can support all of life on Earth, is at our fingertips.

References

Alexander, C. (2002). *The nature of order: An essay on the art of building and the nature of the universe* (Book One). Berkeley, CA: The Center for Environmental Structure.

Alliance for Regeneration. (n.d.). Retrieved from http://regenerationalliance.com

Berry, T. (1999). *The great work: Our way into the future*. New York, N.Y.: Bell Tower.

Brown, K. (2009). *A better world through regenerative studies? Implications of this hefty obligation on education, research and outreach.* Retrieved from www.csupomona.edu/~crs/documents/Brown_seminar_2009.pdf

Bryman, A. & Teevan, J. (2005). *Social research methods: Canadian edition*. Don Mills, ON: Oxford University Press.

The Bullitt Center. (n.d.). Retrieved from http://bullittcenter.org/

Bui, Y. (2008). *How to write a masters thesis*. Thousand Oaks, CA: Sage Publications Ltd.

Canadian Institute for Planners. (CIP). (n.d.). *CIP Policy on Climate Change*. Retrieved from http://www.cip-icu.ca

Campbell, K., & Werner, M. (2013). *Seattle's Bullitt Center: The world's greenest office building* [Video file]. Retrieved from http://vimeo.com/64281701

Capra, F. (2004). *The hidden connections: A science for sustainable living*. New York, NY: Anchor Books.

Carson, R. (1962). *Silent spring*. Boston, MA: Houghton Mifflin.

Clegg, P. (2012). A practitioner's view of the 'regenerative paradigm'. *Building Research & Design* 40 (3), 365-368. http://dx.doi.org/10.1080/09613218.2012.663557

The City of Seattle (n.d.). Retrieved from http://www.seattle.gov

Cole, R. (2012a). Regenerative design and development: Current theory and practice. *Building Research & Design*, 40 (1), 1-6. http://dx.doi.org/10.1080/09613218.2012.617516

Cole, R. (2012b). Transitioning from green to regenerative design. *Building Research & Design* 40 (1), 39–53. http://dx.doi.org/10.1080/09613218.2011.610608

Cole, R. (2012c). Proceedings from Beyond LEED: Regenerative Design Symposium: Beyond LEED: Embracing Holism, Engaging Complexity, and Accepting Uncertainty. Austin, TX: The University of Texas.

Cooper, I. (2012). Winning heards and minds or evidence-driven: Which trajectory for regenerative design? *Building Research & Design* 40 (3), 357-360. http://dx.doi.org/10.1080/09613218.2012.662388

Cowan, S., Davies, B., Diaz, D., Enelow, N., Halsey, K., & Langstaff, K. (2014). *Optimizing urban ecosystem services: The bullitt center case study.* Retrieved from http://www.ecotrust.org

DeKay, M. (2011). *Integral sustainable design: Transformative perspective.* London: Earthscan.

Denney, A. & Tewksbury, R. (2012). How to write a literature review. *Journal of* Criminal Justice Education, 24 (2) 218-234. doi:10.1080/10511253.2012.730617

Dias, B. (2015). Beyond sustainability: Biophilic and regenerative design in architecture*. European Scientific Journal*. Retrieved from http://eujournal.org/index.php/esj/article/view/5385/5184

Edwards, A. (2010). *Thriving beyond sustainability: Pathways to resilient society*. Gabriola Island, B.C.: New Society Publishers.

Eisenberg, D., & Reed, B. (2003). *Regenerative design: Toward the re-integration of human systems within nature.* Retrieved from http://www.integrativedesign.net

Farewell Architects. (n.d.) Retrieved from http://www.farewell-architects.com/

Fuller, B. (1968). Operating manual for spaceship earth. Carbondale: IL: Southern Illinois University Press.

Global Learning, Inc. (2005). Retrieved from http://www.globallearningnj.org

Gray, D. (2009). *Doing research in the real world* (2nd ed.). London, England: Sage Publications Ltd.

Harris, D. (2013). *Pedal power: Designing effective cycling infrastructure in Winnipeg with lessons from Minneapolis* (MDP Practicum). Retrieved from http://mspace.lib.umanitoba.ca/

Hes, D. & du Plessis, C. (2015). *Designing for hope: Pathways to regenerative sustainability*. Retrieved from https://play.google.com/books

Hawken, P., Lovins, A., & Lovins, L. (2010). The Next Industrial Revolution. In *Natural capitalism: The next industrial revolution* (10th ed.) (1). Retrieved from http://www.natcap.org/images/other/NCchapter1.pdf

Hough, M. (2004). *Cities and natural process a basis for sustainability*. London: Routledge.

Hower, M. (2014). *Denis Hayes: From earth day to the Bullitt Center*. Retrieved from http://www.greenbiz.com/

International Living Future Institute. (2013). *UniverCity development: From living building to living community*. Retrieved from http://living-future.org

Korten, D. (2006). *The great turning: From empire to Earth community*. Bloomfield, CT: Kumarian Press, Inc. and San Francisco, CA: Berrett-Koehler Publishers.

Landscape Architecture Foundation. (n.d.). Retrieved from http://landscapeperformance.org

LaDuke, W. (2014). In the time of sacred places. In L. Vaughan-Lee (Ed.), *Spiritual ecology: The cry of the Earth* (pp. 85-102). Point Reyes, CA: The Golden Sufi Center.

Laszlo, E. (2001). *Macroshift: Navigating the transformation to a sustainable world*. San Francisco, CA: Berrett-Koehler Publishers Inc.

Leopold, A. (1949). *A sand county almanac*. New York, NY: Oxford University Press, Inc.

Lyle, J. (1994). *Regenerative design for sustainable development.* New York, NY: John Wiley & Sons, Inc.

Lovelock, J. E. (1991). The Earth as a living organism. In B. Willers (Ed.), *Learning to listen to the land* (11-16). Washington, D.C.: Island Press.

Macy, J. & Johnstone, C. (2012). *Active hope: How to face the mess we're in without going crazy*. Novato, CA: New World Library.

Mang, N. (2009). *Toward a Regenerative Psychology of Urban Planning* (Doctoral dissertation. Retrieved from http://regenerationalliance.com/wpcontent/uploads/Toward_a_Regenerative_Psychology_of_Urban_Planning.pdf

Mang, P. & Reed, B. (2011). *Designing from place: A regenerative framework and methodology.* Retrieved from http://www.regenesisgroup.com

Mang, P. & Reed, B. (2012). Regenerative Development and Design. In *Springer Encyclopedia of Sustainability Science and Technology*. (Volume 1, pp. 8855- 8879).

Mbohwa, C. & Mudiwakure, A. (2013). Sustainable and ecological designs of the built environment. World Academy of Science, Engineering and Technology. 7 (4) 379-386. Retrieved from http://waset.org/publication/Sustainable-and-Ecological-Designs-of-the-Built-Environment/826

Meadows, D. (2008). *Thinking in systems: A primer*. D. Wright (Ed.). London, EN: Earthscan.

Meadows, D., Randers, J., & Meadows, D. (2004). *Limits to growth: The 30-Year update*. White River Junction, VT: Chelsea Green Publishing Company.

McDonough, W., & Braungart, M. (2002*). Cradle to cradle*. New York, NY: North Point Press.

McHarg, I., & Steiner, F. (Eds.). (1998). *To heal the Earth: Selected writings of Ian L. McHarg*. Washington, D.C.: Island Press.

McLennan, J., & Reed, B. (2013). *Regenerating the whole: From living buildings to building life*. Trim Tab, May 2013 (17). Retrieved from http://living-future.org

McLennan, J., Hydes, K., Bennett, R., Desai, P., & Owens, B. (2014, May). Living Building Challenge, Ecodistricts, One Planet Living, LEED: Shared Goals & Leveraging for Great Impact. At the International Living Future Institute's, *Living Future unConference 2014*. Conference held at the Hilton Portland, Portland, OR.

Miller Hull (n.d.). Retrieved from http://www.millerhull.com

Mollison, B. & Holmgren, D. (1978). *Permaculture one: A perennial agricultural system for human settlements*. Melbourne, AU: Transworld.

Montuori, A. (2005). Literature review as a creative inquiry: Reframing scholarship as a creative process. *Journal of Transformative Education*, 3. doi:10.1177/1541344605279381

Naess, A. (2002). *Life's philosophy: Reason and feeling in a deeper world*. Athens, GA: University of Georgia Press.

Newman, P., Beatley, T., & Boyer, H. (2009) *Resilient cities: Responding to peak oil and climate change* (2nd ed.). Washington, D.C.: Island Press

Newman, P. & Jennings, I. (2008) *Cities as Sustainable Ecosystems: Principles and Practices*, Washington, D.C.: Island Press.

Pedersen Zari, M. & Jenkins, S. (2010). *Redefining cutting edge sustainable design: From eco-efficiency to regenerative development*. Retrieved from www.branz.co.nz

Pena, R. (2014). *Living Proof: The Bullitt Center, high performance building case study*. University of Washington Centre for Integrated Design. Retrieved

from http://neea.org/docs/default-source/default-document-library/living-proof---bullitt-center-case-study.pdf?sfvrsn=6

Pauchant, T.C., Bennett, J., Benefiel, M., Delbecq, A., Fitzgibbons, D., Goddard, T., …Young, J. (2010). Integrating spirituality at work: An interview with Ken Wilbur. *Journal of Management, Spirituality, & Religion*, 1(1). Retrieved from http://dx.doi.org/10.1080/14766080409518545

Penelton, K. (2013). *Regenerative design and development: A new planning paradigm.* Urban Ecology / Environmental Planning, City 7460. Winter, 2013.

Randolph, J. (2009). A guide to writing the dissertation literature review. *Practical Assessment, Research & Evaluation*, 14 (13). Retrieved from http://sfxhosted.ex librisgroup.com/umanitoba?issn=1531-7714&issue=13&volume= 14&date=2009

Reed, B. (2007). Shifting from 'sustainability' to regeneration. *Building Research and Information*, 35, 674 - 680. http://dx.doi.org/10.1080/09613210701475753

Robinson, J. (2004). Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics*, (48), 369–384. Retrieved from http://ipidumn.pbworks.com

Roseland, M. (2005). *Toward sustainable communities: Resources for citizens and their environments*. Gabriola Island, BC: New Society Publishers.

Roszak, T. (1995) *Ecopsychology: Restoring the Earth, healing the mind*. New York, NY: Sierra Club Books.

Senge, P., Scharmer, C., Jaworski, J., & Flowers, B.S. (2004). *Presence: Human purpose and the field of the future*. New York, NY: Doubleday.

Simon Fraser University (n.d.). Retrieved from http://univercity.ca

Simon Fraser University Community Trust. (2014). *UniverCity: A complete sustainable community on Burnaby mountain*. Retrieved from http://univercity.ca

Stanely, J. & Loy, D. (2014). At the edge of the roof: The evolutionary crisis of the human spirit. In L. Vaughan-Lee (Ed.), *Spiritual ecology: The cry of the Earth* (pp. 37-48). Point Reyes, CA: The Golden Sufi Center.

Suzuki, D. (1997). *The sacred balance: Rediscovering our place in nature*. Vancouver, BC: Greystone Books.

Thoreau, H. (1854). *Walden; or, life in the woods*. Boston, MA: Ticknor and Fields.

The Willow School. (n.d.). Retrieved from http://www.willowschool.org

The Willow School. (2015). Retrieved from http://www.willowschool.org

The Rocky Mountain Institute. [Rocky Mountain Institute]. (2010, June 10). *Willow School* [Video file]. Retrieved from https://www.youtube.com/watch?v=oAf76Pt-iJQ

The Urban Land Institute (2015). *ULI case studies: Bullitt center – Seattle*. Retrieved from http://uli.org

van Der Ryn, S. & Cohen, S. (1996). *Ecological design*. Washington, DC: Island Press.

van Der Ryn, S. (2013). *Design for an empathic world: Reconnecting people, nature, self*. Washington, D.C.: Island Press.

van Vliet, D. (2000). *Sustainable community planning and design: A demonstration project as pathway* (Doctoral dissertation). Retrieved from http://hdl.handle.net.uml.idm.oclc.org/2429/10997

von Hausen, M. (2013). *Dynamic urban design: A handbook for creating sustainable communities worldwide*. Bloomington, IN: iUniverse.

Williams, K. (2012). Regenerative design as a force for change: Thoughtful optimistic and evolving ideas. *Building Research & Information*, 40 (3), 361-364. http://dx.doi.org/10.1080/09613218.2012.662389

Wilson, E.O. (1993). Biophilia and the conservation ethic. In S.R. Kellert & E.O. Wilson (Eds.), *The biophilia hypothesis (*31-41). Washington DC: Island Press, Shearwater Books

PANEL ON RESEARCH ETHICS
Navigating the ethics of human research

TCPS 2: CORE

Certificate of Completion

This document certifies that

Kayla Penelton

has completed the Tri-Council Policy Statement:
Ethical Conduct for Research Involving Humans
Course on Research Ethics (TCPS 2: CORE)

Date of Issue: **22 February, 2013**

Appendix B: Ethics Consent Form

UNIVERSITY OF MANITOBA | Faculty of Architecture

Department of City Planning
201 Russell Building
Winnipeg, Manitoba
Canada R3T 2N2
Telephone (204) 474-9458
Fax (204) 474-7532

Faculty of Architecture
Statement of Informed Consent

Research Project Title:

Planning for Regenerative Design and Development: Taking the Pulse of Practice

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. Purpose of Research

The purpose of this research is to satisfy the major degree project requirement for the Master of City Planning Degree at the University of Manitoba. The purpose of this project is to explore the current theory and application of Regenerative Design and Development (RD&D) principles within the planning profession and related disciplines. It is predicted that this research will reveal the strengths and challenges of RD&D as a planning paradigm, and how future planning can incorporate principles that are truly mindful of ecological health, human wellbeing, and economic prosperity. Furthermore this research will position planners within the RD&D movement and determine how they may contribute to its future as a practice.

2. Procedures and Data Recording

To complete this research, you are invited to participate in a one-time focused interview that is anticipated to last approximately one hour. Interview topics will involve questions about evolution of RD&D as a sustainable paradigm, any opportunities or challenges of RD&D at present, as well as any predictions or suggestions as to how the future of RD&D may unfold. You may end the interview at any time if you do not feel comfortable proceeding.

With your permission, interviews will be recorded digitally to ensure an accurate record of responses in conjunction with hand-written notes. These recordings will be transcribed to allow for greater accuracy and efficiency of analysis at a later date. Such audio-recordings will be kept in a secure place, and destroyed by myself after they have been transcribed. If you do not wish to be recorded, only hand-written notes will be taken.

3. Risks and Benefits

The research should pose minimal risk, if any, beyond everyday life. This study does not address personal or confidential issues and only asks for your professional knowledge and opinion about RD&D.

Anticipated benefits may include the opportunity to contribute your knowledge and experience to research within their professional field and the prospect of being introduced to new perspectives and opportunities regarding your area of expertise.

4. Confidentiality

Your name or any other personal information will not be included in any publicly disseminated materials arising from the study. Only the primary researcher will have access to any information collected over the course of the study. Recordings and notes taken during the interview will be secured during the project and destroyed upon the project's completion. Where information occurs within a session transcript that will be included in the final project documentation, names and other personal information will be omitted, unless such permission has been explicitly granted. If you wish to withdraw from the project, you may do so by September 1, 2014, and your responses will not be used in the final document.

5. Credit or Remuneration

There is no credit or remuneration as part of your involvement in the research.

6. Feedback and Debriefing

At the conclusion of the interview, an overall interview summary will be provided to you in accordance with this informed consent protocol. Individual feedback will be provided within one month of the interview. A summary of results will be provided by myself, the principal researcher, by phone, email, in person, or in writing to ensure the information that you have provided is accurate. You will have three weeks to confirm that the information provided is correct. If no response is provided by the end of the three weeks, it will be assumed that there were no corrections to be made.

In addition, at the conclusion of the overall study you will be offered a copy of the practicum, in a digital format.

7. Dissemination of Results:

Study results will be disseminated by the primary researcher through a Masters of City Planning thesis – by hard copy at the University of Manitoba Architecture/Fine Arts Library, a digital copy online, and through the oral defense. It is also possible, that the study results will be disseminated in a journal article or conference presentation. Dissemination of results will not compromise confidentiality of the participants.

Contact Information:
Principal Investigator:
Kayla Penelton, Graduate Student, Department of City Planning, University of Manitoba
Phone: [redacted]
Email: umpenelk@myumanitoba.ca

Research Supervisor:
Dr. Rae Bridgman, Professor, Department of City Planning, Faculty of Architecture,
University of Manitoba
Phone: 204-474-7179
Email: Rae.Bridgman@ad.umanitoba.ca

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the Joint Faculty Research Ethics Board (JFREB). If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC), Margaret Bowman at (204) 474-7122, or Margaret_Bowman@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

Thank you for taking the time to contribute to this project. Your participation and insights are very valuable and are greatly appreciated.

☐ I consent to the inclusion of my name in publications resulting from the study.

☐ I **DO NOT** consent to the inclusion of my name in publications resulting from the study.

☐ I consent to being audio-taped during the interview as part of the study.

☐ I **DO NOT** consent to being audio-taped during the interview as part of this study.

I understand that the information I provide will be incorporated in a presentation and report by the student researcher. I also understand that all information will be treated as confidential, stored in a private and secure place, and subsequently destroyed two years after the end of the project by the Principal Investigator.

Signature of Participant Date

Signature of Principal Researcher Date

Appendix C: Interview Schedule

Introduction Questions

1. How do you define RD&D (Regenerative Design and Development) as a paradigm? What does it mean to you?
2. What are the major differences between current development practices and the practice of RD&D?
3. What do you consider to be the most significant challenges of RD&D as a paradigm?
4. What do you consider to be the most significant opportunities of RD&D as a paradigm?

RD&D Principles

5. What techniques may be most useful in educating others on the principles and process of RD&D?
6. What is required to shift people's worldviews to be more considerate of RD&D principles, and how may planners enable such a shift to take place?

RD&D in Practice

7. In what ways were RD&D principles applied to [project name], and why were they important to consider?
8. What role did/do planners play in the implementation of this project (or any RD&D project)?
9. What are some of the key components, or lessons learned, regarding what elements are necessary to create successful RD&D projects? How have/may they be incorporated into the planning process?

Suggestions or Predictions on the Future of RD&D

10. Where do you see the role of planners in the future development and implementation of RD&D as a practice?

11. What current barriers exist to implementing RD&D as a practice, and what steps could to be taken to remove these barriers?

Conclusion

12. Is there anything else you would like to add before concluding the interview?